

UPTAKE OF ADAPTIVE LEARNING

FINAL TECHNICAL REPORT



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Table of Contents

ACKNOWLEDGEMENTS	4
STRUCTURE OF REPORT.....	4
1 EXECUTIVE SUMMARY.....	5
2 BACKGROUND	6
3 PROJECT PURPOSE	9
4 RESEARCH ACTIVITIES.....	11
4.1 DEVELOPMENT AND PROMOTION OF THE ADAPTIVE LEARNING GUIDELINES AND THE KEY RESEARCH MESSAGES.	11
4.1.1 <i>Developing and implementing a communications strategy</i>	<i>11</i>
4.1.2 <i>Increasing the comprehensiveness and applicability of the adaptive learning guidelines.....</i>	<i>12</i>
4.2 IMPLEMENTING AND EVALUATING THE ADAPTIVE LEARNING APPROACH.....	12
5 OUTPUTS.....	13
5.1 DEVELOPMENT AND PROMOTION OF THE ADAPTIVE LEARNING GUIDELINES AND THE KEY RESEARCH MESSAGES.	13
5.1.1 <i>Developing and implementing a communications strategy</i>	<i>13</i>
5.1.2 <i>Increasing the comprehensiveness and applicability of the adaptive learning guidelines.....</i>	<i>17</i>
5.2 IMPLEMENTING AND EVALUATING THE ADAPTIVE LEARNING APPROACH.....	17
5.3 RESULTS OF EXPERIMENTAL APPROACHES	20
5.3.1 <i>Collection and analysis of baseline information.....</i>	<i>20</i>
5.3.2 <i>Design and implementation of the management experiments.</i>	<i>21</i>
5.3.3 <i>Analysis of data relating to the technical aspects of management.....</i>	<i>22</i>
5.3.4 <i>Analysis of data relating to the costs and benefits of different management systems.</i>	<i>23</i>
5.4 EVALUATION OF THE ADAPTIVE LEARNING APPROACH	26
5.4.1 <i>Evaluation of the project process.....</i>	<i>26</i>
5.4.2 <i>Evaluation of the project outcomes.....</i>	<i>27</i>
5.4.3 <i>Conclusions.....</i>	<i>30</i>
6 CONTRIBUTION OF OUTPUTS.....	31
6.1 CONTRIBUTION OF OUTPUTS TOWARDS DFID’S DEVELOPMENT GOALS.....	31
6.2 PROMOTION OF OUTPUTS	32
7 REFERENCES	33
Annex 1 – Uptake of adaptive learning (R8292) communication strategy	
Annex 2 – Implementing the adaptive learning approach and sharing information and experiences: outputs from the case studies	
Annex 3 – Adaptive learning (R8292): results of the pre-testing of the adaptive learning guidelines.	
Annex 4 – Examples of the final guidelines	

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Structure of report

The structure of the final technical report is determined by the format that has been set out by DFID format. The report has been produced in order to provide a statement of the purpose, activities and results of the project. Supporting documentation giving more details of the activities and results is provided in the annexes to the main report and in other reports that have been produced as a part of the adaptive learning process. These reports detail the activities that have been undertaken and their outcomes. It is intended that the supporting documents in the annexes should be read in conjunction with this report in order to provide more detail and to support a number of the points made.

1 Executive Summary

This project has arisen from the successful outcomes of the adaptive learning project (R7335). The adaptive learning project had successfully developed and tested the adaptive learning approach for the management of enhanced fisheries. However, the promotion of the outputs of the project were limited and it was recognised that the opportunity for uptake of the approach could be enhanced by further testing of the approach that could widen its applicability (and show this) and the refinement of the outputs – essentially the adaptive learning guidelines.

This entailed a multi-level testing and assessment exercise within which the project sought to learn more about a) the products, b) the adaptive learning approach and c) the fisheries in which the approach was being tested so that improvements could be made to each. This report describes the activities undertaken with regard to each and, describes what was learned and how this was used to make improvements in each case. The project purpose was therefore to develop and promote adaptive learning approaches to fisheries enhancements in order to achieve increased uptake.

Activities undertaken during the project included: the refinement of tools for supporting adaptive learning; implementing an adaptive learning approach to enhancements, using as a case study, rice-fish systems in West Bengal, India; testing of tools associated with adaptive learning in countries of the Mekong Basin; promotion, through a variety of media, of the key research messages and adaptive learning products. Key outcomes included:

- Simple modifications to culture practices that can increase productivity at little or no cost in culture-based fisheries have been successfully tested and promoted and the process shown to have the potential to effectively reduce uncertainties associated with fisheries assessments.
- Uptake of management recommendations by resource users providing the potential for increased fisheries productivity.
- Understanding of the costs and benefits of existing management systems and marketing arrangements increased providing the potential for future adaptation of the systems to increase the benefits from the systems.
- Capacity of key stakeholders in West Bengal was increased as a result of taking an adaptive learning approach, illustrating again that adaptive learning approaches have the potential to increase understanding, improve management practice and build capacity at the same time.
- Implementation and testing provided information that was used to refine a number of the tools associated with the approach and highlighted areas, such as organisational capacity, for which tools needed to be developed and included.
- Changes to the format, content and presentation of the guidelines as a result of a structured testing procedure.
- Increased uptake of the research messages by a wide range of target organisations and agencies and use of the adaptive learning approach and products as a resource to inform natural resources management and development initiatives.

Overall it is expected that the combination of an explicitly pro-poor and inclusive approach to research and management, improved guidelines, case studies and the wide variety of associated outputs produced by the project will contribute significantly to the uptake and further development of tools and strategies to support improved livelihood outcomes of the poor.

2 Background

As has been increasingly recognized in other research (including FMSP projects R5023, R7043, R7335), enhancements initiatives often have to be undertaken in conditions of great technical, social, economic and institutional uncertainty. These uncertainties are a result of the complex and dynamic nature of both the resources being managed and the people and society that are dependent upon them. As a result of these uncertainties, while enhancements have the potential to yield substantial benefits, they all too frequently lead to outcomes (in terms of production, distribution of benefit, institutional sustainability) that are unexpected or even undesirable or are found to be unsustainable (Cowan *et al.*, 1997; Lorenzen & Garaway 1998; Garaway *et al.*, 2001). It is therefore increasingly recognised that enhancement should therefore be seen as a process, not an event, and that large technological and institutional uncertainties and lack of management control preclude a blueprint approach to the development of enhancements (Lorenzen *et al.*, 2001, Arthur 2004).

Adaptive learning approaches

The adaptive learning approach has been developed as a response to the large uncertainties often associated with natural resource management. The approach has arisen from adaptive approaches that have been developed for both (technical) management of renewable resources (e.g. Holling, 1978; Walters, 1986) as well as for economic policy and development administration (e.g. Berman, 1980; Rondinelli, 1993). Whilst emphases in these fields are different, the central concepts are the same: management must occur despite uncertainty and therefore the reduction of this uncertainty becomes a central function of management itself. The adaptive learning approach aim to reduce uncertainties by treating management as an experimental process, aimed at yielding crucial information for the improvement of management regimes as well as more immediate benefits. Experimental models developed to be used in, and to justify, an adaptive learning approach have been developed (Lorenzen, 2001; Garaway *et al.* 2002; Arthur 2004). The crucial point, and the main difference with reflective learning and adaptation that should occur as a part of any management process, is that within adaptive learning the learning topic is identified at the outset, the potential to learn is assessed and management actions are selected in order to generate the information required. This point is often missed.

Whilst the principles of experimentation and learning from management have long been associated with adaptive learning approaches, it is only more recently that the question of **who** should be involved in this process has been actively addressed. Increasingly, and particularly in the context of resource management in developing countries, it is recognised that resource users should play a more active role: To enhance stakeholders and resource users own learning and capabilities, empowering their decision-making, as it is they who will ultimately determine how effective management is (Parson and Clark 1995; Hagmann and Chuma 2002 and Gonzalez, 2002); to involve resource users in collaborative learning as a means to develop natural resource management strategies that are suited to local ecological, socio-economic and institutional conditions, thereby maximizing their benefits (e.g. Petr, 1997; Allen, 1997).

Issues of co-management have therefore become an intrinsic element of the adaptive learning approach and, in order to be effective, adaptive learning approaches must take in to consideration issues of communication, stakeholders' objectives, facilitation of self-governance, decision-making, and monitoring & enforcement. Effective communication between stakeholders at different levels (resource users, local decision makers, scientists etc.) is crucial to the success of co-management and adaptive learning. External analysts

such as fisheries departments often lack resources for widespread research at a local level. At the same time, the crucial importance of local people's expectations and understanding of resource dynamics in determining outcomes is often overlooked. On the other hand, resource users often have substantial knowledge of local dynamics but being isolated, and with little technical knowledge, their learning is slow. By involving all stakeholders in the adaptive learning process, the potential for more dynamic, relevant and location specific outcomes is greatly increased. Methods to enhance communication with resource users have been developed and used successfully in many contexts, including in FMSP project (R7335) for small-waterbodies in Lao PDR (Garaway *et al.*, 2002).

Experiences with adaptive learning approaches to enhanced fisheries

In Lao PDR, the approach was developed, implemented in stocked communal waterbodies (1 – 40 hectares), and evaluated. The waterbodies were managed by the local communities to provide income for their own community development. In the trial case the approach was able, fairly rapidly and at relatively low cost and risk, to reduce uncertainties surrounding small waterbody enhancements. This led to improved management and more predictable and desirable outcomes (Garaway *et al.*, 2002).

Whilst examples of these approaches being applied are not common, the “Management of River and Reservoir Fisheries in the Mekong Basin” Programme, managed by the Mekong River Commission have also adopted a learning approach with respect to management of large reservoirs (Hartmann 2001, 2002) and advocated co-management as the only solution to the management of such waterbodies (Hartmann *et al.*, 1999; Hartmann, 2000).

In summary, despite having rarely been tried in the field of enhancement, the adaptive learning approach appears to have great potential for the management of enhancement fisheries within South and Southeast Asia and elsewhere. However, while the approach was successful in the trial, a number of factors were identified as having facilitated the implementation of the approach Garaway *et al.*, 2002) and there is a need to test it in different institutional settings with different resource types.

Enhancement fisheries in target areas

The project will be based on case studies of different types of enhancement fisheries: Deep seasonally flooding rice land and small brackishwater rice paddies in India and larger reservoir fisheries in the Mekong Basin. Reservoirs and lakes as well as small seasonal inland floodplains and swamps supporting rice fish culture are recognised as constituting an important inland fishery resource in many developing countries of Asia ensuring the food security and improving the living standards of many rural communities, particularly marginal and subsistence fishers (Sugunan, 1997). In the Asia-Pacific region, both capture and enhanced fisheries have been recognised as playing an important role in securing and enhancing the livelihoods of poor people specifically (STREAM 2001). Here, the management and use of aquatic resources by poor people play a vital role in livelihoods management, food security, health and nutrition. Substantial benefits to the rural poor can be derived from individual fishing, culturing fish, fish catching and processing, supplying commodities to fishers and distributing and selling products. Poorer groups are often more highly dependant on resources with common property rights or no property rights associated with them (Somnasung *et al.*, 1991, Garaway, 1999), characteristics that are associated with many of the enhanced fisheries that are the object of this research.

Particular groups of people that this research hopes to help are the the rural poor (those whose livelihoods commonly depend upon aquatic resources, forest resources and a small amount of rice land) and the landless (for example those who trade fish for rice and other

commodities) and. Included are professional and subsistence fishers who may belong to either of the categories above.

There are few studies that have quantified or explicitly identified the role of these resources in poor peoples livelihoods, but where it has been done they have been shown to be extremely important. These include rice-field fisheries in Cambodia (Gregory *et al.*, 1996), small waterbodies in Lao PDR (Garaway, 1999) and small and large reservoirs in Thailand and Vietnam (MRC 1992, Garaway 1995). In India, nearly 70% of the 0.71 million full time fishermen fish in inland waters, the most important of these being reservoirs, and most of these fishers are reported to be living in abject poverty (Sugunan, 1995). Rice-fish systems in India enhance food yield and income addressing the needs of the rural poor and landless fishers and labourers (IFAD, 2002)

The resource systems that are the focus of the project are different from the resource systems studied in R7335 technically, bio-physically and institutionally with the rice-fish systems being small, seasonal sub-community level management systems, and reservoirs in the Mekong Basin large, permanent multi-village management systems. Implementing pilot projects in these systems will allow comprehensive testing and development of Project R7335 outputs.

Whilst developing the adaptive learning approach (R7335), it became apparent that organizational learning and process monitoring were key issues and further investigation of these, and the pooling of other practitioners experience, will also be important in improving the effectiveness, transferability and applicability of the approach.

Uptake of research outputs

Recent research has shown that the development impact of outputs from natural resource management research is often low (Norrish, 2001; Gundel *et al.*, 2001). Reasons for this include poor involvement of intended users; a lack of understanding of the communication context (e.g. what information do stakeholders have access to, what are preferred means of communication, what are appropriate media types), and insufficient appreciation of the real costs involved in producing and distributing appropriate materials. A well-developed communication strategy is therefore now seen as a vital component of any RNRRS research project and will be a major component of this one.

3 Project Purpose

The project purpose was to Increase uptake by identified target institutions and resource users of the adaptive learning approach, management tools and fisheries enhancement strategies most likely to support improved livelihood outcomes of the poor. The purpose and how this was to be achieved during the project lifespan can be seen in the project logframe (see below).

<i>Hierarchy of Objectives</i>	<i>Objectively verifiable indicators</i>	<i>Means of verification</i>	<i>Important assumptions</i>
<p>Goal</p> <p>Benefits for poor people generated by application of new knowledge to fisheries management systems.</p>	<p>In target countries, increased livelihood benefits to communities by increased and less variable capture and enhancement fisheries production, improved fisheries employment and access to knowledge by 2005.</p>	<p>National and local level surveys, reports and statistics.</p> <p>Evaluation of fisheries management programme.</p>	<p>Poor people invest benefits to improve livelihoods.</p>
<p>Purpose</p> <p>Increased uptake by identified target institutions and resource users of the adaptive learning approach, management tools and fisheries enhancement strategies most likely to support improved livelihood outcomes of the poor.</p>	<p>Adaptive learning approaches promoted and taken up by identified target institutions.</p>	<p>Target institution reports and policy briefs</p> <p>Project Final Technical Report.</p>	<p>Adequate interest can be generated and an enabling environment for the adoption of adaptive approaches exists.</p>
<p>Outputs</p> <p>1. A strategy for identifying stakeholders and communicating and promoting project products developed and implemented.</p> <p>2. The adaptive learning approach (or important elements of it) implemented and evaluated in pilot studies, and locally appropriate enhancement strategies developed.</p> <p>3. Comprehensiveness and applicability of project products increased through analysis of project's' and others' experiences and translation into suitable media forms.</p>	<p>Stakeholders identified and engaged by month 2, all elements of communications strategy in place by month 12 and subject to continuous review.</p> <p>Locally appropriate management strategies identified for pilot studies by month 19. Results disseminated by month 20.</p> <p>Improved products produced by month 23.</p>	<p>Stakeholder analysis report, quarterly and annual reports and project briefs</p> <p>Quarterly and annual reports.</p> <p>Final Technical Report, new media products</p>	<p>Sufficient interest exists in project activities and results. Effective communication and promotional activities can be implemented within budgetary constraints.</p> <p>Suitable locations and/or resource systems can be found.</p> <p>Approach is accepted by target institutions.</p> <p>Enabling environment exists</p> <p>Benefits can be generated within project lifespan.</p> <p>Findings from Output 2 and others' experiences allow identification of wider lessons.</p>

Activities			
<p>1.1 Identification and analysis of communication & scaling up stakeholders (CSUs)</p> <p>1.2 Develop and implement mechanisms to engage CSUs, communicate with them and maintain and strengthen links.</p> <p>1.3 Identify target group communication needs and potential pathways and uptake opportunities</p> <p>1.4 Identify appropriate communication media and activities for promoting new and existing research products to</p> <p>i) target groups</p> <p>ii) CSUs</p> <p>1.5 Implement activities identified under 1.4(ii) and develop an exit strategy for sustained promotion of products</p>	<p>1.1 Stakeholder analysis completed by month 3.</p> <p>1.2. All identified CSUs identified by month 3. Plan implemented by month 9.</p> <p>1.3 Needs and pathways identified by month 6.</p> <p>1.4 Methods for communicating with target groups identified by month 6. Methods for promoting to CSUs by month 12.</p> <p>1.5 Exit strategy developed and under review by month 18, implemented by month 23.</p>	<p>1.1 Stakeholder analysis report</p> <p>1.2 Contacts list, Quarterly and Annual reports, project briefs</p> <p>1.3 Quarterly and Annual reports</p> <p>1.4 Quarterly and Annual reports</p> <p>1.5 Quarterly and Annual reports, Final Technical Report.</p>	<p>1.1 Adequate information exists or is made available.</p> <p>1.2 Cost effective mechanisms exist.</p> <p>1.4 Appropriate and cost effective media and activities can be identified.</p> <p>1.5 CSUs are willing to cooperate and/or wish to be involved.</p>
<p>2.1 Overview of resource systems and clarification of general options at each pilot study site</p> <p>2.2 Select locations where R7335 products are to be implemented</p> <p>2.3 Collect and analyse additional information on system characteristics for each pilot study.</p> <p>2.4 Evaluate experimental management options and select and implement learning strategies in i) Mekong Basin and ii) West Bengal</p> <p>2.5 Design and implement monitoring systems</p> <p>2.6 Workshops held to share and evaluate the information resulting from the learning strategies and evaluate the process of implementing the approach.</p>	<p>2.1 Options clarified by month 2.</p> <p>2.2 Locations selected by month 3.</p> <p>2.3 Additional information collected by month 5 and analysis complete by month 9.</p> <p>2.4 Experimental management options for each pilot study selected by month 12 and implemented by month 16.</p> <p>2.5 Monitoring system implemented by month 15.</p> <p>2.6 Workshops completed and information from the pilot studies shared with beneficiaries and evaluated by month 20.</p>	<p>2.1 Quarterly report</p> <p>2.2 Quarterly report</p> <p>2.3 Appraisal reports & workshop reports</p> <p>2.4 Quarterly and Annual reports</p> <p>2.5 Survey forms and record books</p> <p>2.6 Workshop reports</p>	<p>2.2 Sufficient suitable sites exist.</p> <p>2.3 Baseline information exists or is collectable</p> <p>2.4 Stakeholders are willing & able to participate. Sufficient suitable sites exist. Implementation can be effectively undertaken during project lifetime.</p> <p>2.5 Sufficient resources to monitor effectively.</p> <p>2.6 Adaptive learning strategies implemented & stakeholders are willing & able to participate.</p>
<p>3.1 Review and pretest existing guidelines with CSUs regarding e.g. interest, intelligibility, omissions and readability.</p> <p>3.2 Elicit and document the experiences of other organisations who have implemented similar approaches.</p> <p>3.3 Regional workshop to analyse experiences from 2.7 & 3.1,3.2 and identify current constraints/opportunities with the approach and R7335 products.</p> <p>3.4 As appropriate, refine, develop and add to existing research products R7335, where necessary, incorporating new experiences.</p> <p>3.5 Translate research products into appropriate media as indicated in 1.4</p>	<p>3.1 Guidelines reviewed by month 4.</p> <p>3.2 Experiences of other organisations documented by month 14.</p> <p>3.3 Regional workshop completed by month 20.</p> <p>3.4 Research products further developed where necessary by month 21.</p> <p>3.5 Products promoted by month 23.</p>	<p>3.1 Quarterly and Annual reports</p> <p>3.2 Quarterly and Annual reports</p> <p>3.3 Workshop report</p> <p>3.4 Quarterly and Annual reports</p> <p>3.5 New media products</p>	<p>3.1 CSUs are willing to undertake review and pretesting.</p> <p>3.2 Adequate information exists</p> <p>3.3 Sufficient information is available from 2.1-2.7 and others experiences.</p> <p>3.4 Adequate information from 2.1-2.7 and 3.1-3.2</p>

As can be seen from the logframe above, the purpose was to be achieved by developing the following:

- a) A communications strategy for identifying target communications stakeholders and means for promoting project products.
- b) Locally appropriate enhancement strategies through the application of the adaptive learning approach, or key elements of it in the study sites.
- c) More comprehensive and applicable project products through analysis of project's' and others' experiences and translation into suitable media forms.

4 Research Activities

Research activities can be split into two different, but complimentary components. The first was carried out throughout the project and was concerned with the development and promotion of the adaptive learning guidelines and the key aspects of the approach. The second was the implementation of the approach, or key aspects of the approach, in order to test the approach and tools developed to implement the approach, produce locally appropriate enhancement strategies, and provide lessons that could all be incorporated into the development and promotion of the guidelines and approach. Discussing these in turn, research activities will be described with reference to those set out in the project logical framework, with any changes or additions described.

4.1 Development and promotion of the adaptive learning guidelines and the key research messages.

This section describes activities relating to items a) and c) in Section 3.

4.1.1 Developing and implementing a communications strategy

The communication strategy was the means through which effective scaling up of research products during the project and after the project ends can be achieved. The communications strategy is intended to raise awareness and communicate through an ongoing dialogue the process and outputs of the project. As a starting point the project collaborators and other target stakeholders were involved in identifying who the key communications and scaling up (CSU) stakeholders that the project would be targeting were and what sort of media would be the most appropriate for communicating with these stakeholders (activities 1.1, 1.3 and 1.4). A range of products were developed that spanned face-to-face, electronic and print formats that were then used to communicate the key messages and to raise awareness of the main product (the adaptive learning guidelines). This was conducted within activities 1.5 and 3.5. The products developed included a revised version of the adaptive learning guidelines (see section 4.1.2 and Annex 4 for examples – all guidelines available on the website), a series of peer reviewed papers, newspaper articles, electronic briefs, workshops, web links and a website (see appendices in Annex 1) as well as one-to-one meetings when these could be arranged.

An additional exercise undertaken in the early stages of the project was an assessment of the communications efforts of R7335 to see how effective it had been in promoting the messages and the approach and to ensure that the communications strategy in this project built upon what had been achieved in this earlier project (activities 1.4 and 3.3).

Implementation of the communications strategy was monitored and changes were made and additional products developed or stakeholders targeted to improve effectiveness. The monitoring and evaluation also led to the development of an exit strategy that would ensure that the products and messages remain available and are actively promoted beyond the lifespan of the project (activities 1.2 and 1.5).

4.1.2 Increasing the comprehensiveness and applicability of the adaptive learning guidelines

It was decided early on that the central product that the project would seek to develop would be the existing adaptive learning guidelines (Garaway and Arthur, 2002). The development of these guidelines had two components:

- Increasing the content of the guidelines based on a) the lessons arising from implementing the approach and tools in the study sites and b) experiences of other practitioners (activities 3.2, 3.3 and 3.4);
- Improving the presentation, format and style of the guidelines to ensure that the content is presented in a clear and accessible way (activities 3.1 and 3.5).

For the first of these, implementation in West Bengal followed the approach that was used in southern Lao PDR in R7335 In that the issues surrounding implementation would be considered as well as the actual use of the tools. In addition the communications strategy was used through as a means to establish a dialogue with other practitioners and to learn from the experiences that they had had, particularly with respect to co-management of natural resources. As a part of this effort, a workshop was held in India and two were held in Cambodia to draw out the experiences of various practitioners and use these to shape the development of the guidelines and identify areas that needed to be highlighted further.

For the second of the points, the guidelines were sent to a range of people including communications experts, social scientists, development practitioners, academics and natural resources scientists and managers who could provide feedback on the content, structure, presentation and usefulness of the guidelines. This information could then be used as a basis for revisions to the guidelines that could be further evaluated before the dissemination of the final version.

4.2 Implementing and evaluating the adaptive learning approach.

These research activities corresponded to a number of activities in the project logical framework and relate to item b) in Section 3.

Implementation had two objectives. The first was to develop locally appropriate management strategies and increase knowledge about the resource systems and their dynamics as well as the capacity to manage, a substantial task in its own right. The second was to provide information about the process – the benefits and limitations – that could be used to improve knowledge about the process and how it can be implemented and feed into the development of the guidelines content. Communications, monitoring and evaluation were therefore highly significant parts of learning process as it was implemented. Implementation had three stages:

- Identification and assessment of suitable locations, vital if the project was to be able to generate new information given the duration of the project compared to the duration of production cycles in candidate systems (activities 2.1 – 2.3)
- On the basis of information on the resource systems and the opportunities and constraints faced by those dependent on the resources, implement experimental

management actions designed to reduce uncertainties and produce management recommendations that can benefit the poor (activities 2.4 and 2.5).

- Share recommendations with resource managers and draw from the experiences of implementation wider conclusions on the adaptive learning approach (activity 2.6).

5 Outputs

This section details the results from the activities described above.

5.1 Development and promotion of the adaptive learning guidelines and the key research messages.

5.1.1 Developing and implementing a communications strategy

The activities undertaken as part of the process to develop and implement the communications strategy collaborators and CSU stakeholders assisted in identifying potential CSU stakeholders and the pathways by which the project could best communicate with them (see Table 1 below and, for more detail, Annex 1).

Table 1 Pathways by which the collaborators felt information should be communicated to CSU stakeholders during the project.

Communications pathway	Type of information				
	Detail about the approach and methodologies	Technical findings	Sharing experience across pilot studies	Current activities	About other relevant projects
Face to face					
Lunchtime discussion	1		2	3	
One-to-one meetings	6	3	3	2	1
Group meetings	5	5	8	6	3
Workshops/ conferences	6	7	7	3	3
Study tours/ exchange visits		4	7	1	3
Electronic					
Website	4	5	5	5	5
Database on CD ROM	2	4			
Online database (listserv)	2	5	3	5	4
Video conference/net meeting	1		1		
E-mail	6	6	6	9	6
Telephone			1	1	1
Print					
Project mailshot	4	5	5	3	2
Newspaper article		2		1	2
Journal article	2	6			3
Conference proceedings	1	8	4		2

Using this as a basis, over the lifetime of the project a range of communications products were developed to promote the research messages (see appendices to Annex 1), raise awareness of the approach and project activities and to make the key products from the project more widely available. Workshops with field level officials were used in both the Mekong countries and India to communicate with this group.

The effectiveness in developing products and utilising the pathways identified in Table 1 was monitored and is summarised in Table 2 below.

Table 2 Pathways and types of information communicated during the project.

<i>Communications pathway</i>	<i>Type of information</i>				
	Detail about the approach and methodologies	Technical findings	Sharing experience across pilot studies	Current activities	About other relevant projects
Face to face					
Lunchtime discussion					
One-to-one meetings	Yes			Yes	Yes
Group meetings	Yes	Yes	Yes	Yes	Yes
Workshops/ conferences	Yes	Yes	Yes	Yes	Yes
Study tours/ exchange visits			Yes		
Electronic					
Website	Yes	Yes	Yes	Yes	Yes
Database on CD ROM					
Online discussion group	Yes				
Video/net conference					
E-mail	Yes	Yes	Yes	Yes	Yes
Telephone					
Print					
Project mailshot	Yes		Yes	Yes	
Newspaper article				Yes	
Journal article	Yes	Yes			
Conference proceedings	Yes	Yes			

As can be seen the project was successful overall in developing the required products and in utilising the pathways that had been identified. In order to provide an idea of the scale of the efforts it is worth considering that the adaptive learning website is receiving in excess of 50 hits per day, has over 70 registered members and nearly 400 copies of the English version of the guidelines alone have been downloaded from the site. The number of individuals and agencies receiving regular electronic updates on project activities steadily increased over the lifetime of the project with around 55 recipients of the first project brief rising to over 300 by the end. The numbers of stakeholders receiving the main awareness raising products is shown below in Table 3.

Table 3 Dissemination of awareness raising products to key target communication stakeholders during the project lifespan.

Stakeholder group	Communications product					
	Background	Brief 1	Brief 2	Brief 3	Brief 4	Brief 5
Policy and donor	28	7	17	28	28	55
National implementing	37	10	31	37	37	40
Regional and international implementing	47	12	20	41	47	45
National research	11	3	9	11	11	14
Regional and international research	69	15	54	67	69	98
Promotion organisations	11	2	8	9	11	15
Capacity development	23	2	21	23	23	32
Consultants	16	4	13	13	16	25

The appropriateness of the design of the products and the identification of recipients can be gauged from the fact that there were many positive responses and the uptake that was achieved. Uptake is summarised in Table 4 below. This provides some examples for the various stakeholder types targeted and is meant only to show the types of uptake achieved rather than the full extent, which is greater.

Table 4 Examples of evidence of dialogue and uptake within key CSU stakeholder groups.

Stakeholder group	Examples	Promotion	Evidence of dialogue	Evidence of uptake/promotion
Organisations to promote				
	STREAM	One-to-one, email	meetings	STREAM website, STREAM Media monitor
	VSO	Email	Email	Inclusion of guidelines in resource library
	MekongInfo	Email	Email	Link, hosting guidelines, newsletter
	Inforesources	Email	Email	Newsletter (see Appendix 7)
	CBNRM Asia	Email	Email	Hosting materials on website
	EU DG Fisheries	Email	Email	Circulating materials within DG
Implementing agencies				
	WWF Mekong	Email, one-to-one	Meetings, email	Intention to incorporate into WWF activities
	DANIDA	Email	Email	Informing activities of SUFA in Vietnam
	Worldfish Center	Collaborator	Various	Informing WorldFish Center Challenge Programme activities
	ACIAR	Email, one-to-one, presentations	Various	Informing culture-based fisheries projects in Sri Lanka
	CIAT	Email, one-to-one	Email	Informing CG thinking on innovation systems
	Community Forestry International	Email	Email	Informing activities of the Community Forestry Alliance for Cambodia (CFAC)
	IFPRI	Email	Email	Informing the initiative on "institutional learning and change" in the CGIAR.
	IUCN	Email	Email	Circulated within the IUCN SSC Sustainable Use Specialist Group
Capacity building				
	AIT	Email, one-to-one	Email	Approach informing extension activities
	University of the Philippines	Email	Email	Incorporate materials into teaching
	Stirling University	Email, one-to-one	Email	Website used as a resource in distance learning.
	Plymouth University	Email	Email	Incorporate materials into teaching
	Graduate students	Various	Various	Informing the research of a number of students in Australia, EU, SE Asia, and Canada.
	FAO	Email, one-to-one	Email, discussions	Hosting materials and links

The success, and limitations, of the communications strategy as identified over the lifespan of the project contributed to the development of the exit strategy. There were two key aspects that were considered crucial for the exit strategy. The first was to ensure that the project products remained as widely available as possible and the second, based on limited impact so far amongst researchers, is to develop further products that can target this group beyond the life of the project. The shape that the exit strategy has taken, together with more detail of how the communications strategy was developed, implemented, evaluated and modified, is provided in Annex 1.

5.1.2 *Increasing the comprehensiveness and applicability of the adaptive learning guidelines*

As mentioned, two different activities were undertaken in order to improve the adaptive learning guidelines. The first of these was to improve the content of the guidelines based on the experiences from the case studies (see Annexes 2.1 – 2.6) and also to make use of the experiences of other practitioners. Much of the latter was obtained in face to face meetings, including the workshops held by the project to share experiences (see Annexes 2.5 and 2.6).

The case studies made clear that there was a need to highlight the difference between adaptive management and management adapting. There were many occasions on which respondents would question what was different about the approach on the basis that “all management is adaptive”. This led to the difference between reflective adaptation (good practice) on the one hand and setting out to design management actions so that they will both deliver benefits and produce the information required to reduce key uncertainties constraining management (adaptive management) being stressed (see page 33 of the adaptive learning guidelines in Annex 4). It was also clear that there was a need to expand on the content as the guidelines from R7335 did not have enough detail for those interested in applying the approach and tools to confidently make use of them. In particular more detail was provided on stakeholder analysis and the use of the IAD framework (see Annex 3 and 4 for a comparison of the guidelines and details of their development).

As well as the content of the guidelines, the format and presentation of the material was changed considerably on the basis of comments received. In order to widen access to the guidelines, it was arranged through STREAM to have the guidelines translated into a number of important regional languages, including Khmer, Bangla/Bengali, Vietnamese and Lao (see Annex 4).

Conclusions

- Multiple products and pathways have been effective in increasing the uptake and potential future uptake of the adaptive learning approach and research messages.
- The communications strategy that was developed was effective in promoting products and messages to a wide range of target CSU stakeholders and there are several instances of an influence on initiatives and the use of project materials as a learning resource.
- The efforts that have been made to ensure that the messages and products from the project remain accessible long after the end of the project mean that it is expected that uptake will continue beyond the lifespan of the project.
- Where the project was less successful was in influencing researchers and it is envisaged that this will be addressed through peer reviewed papers that are being produced as part of the exit strategy.

5.2 Implementing and evaluating the adaptive learning approach.

The adaptive learning cycle is consists of three parts: preparing for learning; learning; and evaluating learning. Within each are several sub activities, some fairly common to research in a development context and some more particular to the adaptive learning approach. Tools were developed in project R7335 to facilitate the implementation of the approach and these were tested in the study locations. Because of the differences in the resource systems between the two study sites, it was not possible to implement the whole of the adaptive learning cycle in the reservoir fisheries in the Mekong Basin and yield any results. For this reason, activities at that site concentrated on testing elements of the approach and on

drawing out the lessons from building co-management institutions with a learning remit. This involved activities designed to share information from management activities between stakeholder groups and identifying marketing arrangements in Lao PDR that would provide improved benefits to all involved stakeholders as well as providing much needed funds for the Reservoir management committees. It is likely that this could lead to improved long-term sustainability of the management arrangements and institutions (more details of the activities undertaken can be seen in the reports section of the adaptive learning website – www.adaptivelearning.info – and in Annex 2.6). In West Bengal, the shorter production cycles in the rice-fish systems (roughly six months) meant that all stages of this cycle were could be completed in these cases.

The methodologies and tools that were applied in support of this cycle are synthesised in the Adaptive Learning Guidelines (Annex 4) and more detail of how these were implemented can be found in Annex 2 and the reports detailing implementation of the different parts of the cycle (see www.adaptivelearning.info). As mentioned, workshops were a key method used to communicate with target stakeholders during implementation of the approach and Table 5 below summarises the key workshops held in West Bengal during each stage of the process in order to agree the management plan to generated new information and then to share both the new information generated as well as existing information, e.g. on integrated pest management, that had been identified as a need by the resource users.

Table 5 Core workshops addressing the major stages of the adaptive learning cycle

Title & number of workshops	Stage in cycle workshop addressed	Participants (& Facilitators)	Workshop objectives	Key Activities/methods used	Further information
1. District Analysis Workshops (2 x 1 day workshops)	<ul style="list-style-type: none"> • Selecting learning options • Sharing information • Evaluating learning 	District staff CIFRI staff & MRAG staff	<ul style="list-style-type: none"> • Analyse information from rapid appraisal & experiments • Evaluate workshops and learning process • Preliminary plan management experiments 	<ul style="list-style-type: none"> • Preparation of summary data sheets for participants to analyse during workshop • Participants analyse, discuss and present results to each other Other activities through: <ul style="list-style-type: none"> • Small group discussions & participant presentations; • Whole group discussions; • Evaluation questionnaires. 	Section 5 Reports on adaptive learning website
2. Village Discussion meetings (5 x 1 day workshops)	<ul style="list-style-type: none"> • Sharing Knowledge • Evaluating learning 	Farmers, district staff, CIFRI staff & MRAG staff	<ul style="list-style-type: none"> • Present results from rapid appraisals and experiments and share experiences between villagers • Presentations of potential experimental options for next cycle or recommendations arising from the experiments • negotiations with farmers on precise strategies to be implemented at their site • Evaluation of workshop and learning process • Identify training requirements 	<ul style="list-style-type: none"> • Preparation of key results generated in 'District Analysis' workshop by district staff • Presentations by CIFRI staff and question and answer sessions • Small group discussions and presentations • Evaluation questionnaires 	Reports on adaptive learning website Results in Annex 2
Village Training (3 x 1 day workshops)	<ul style="list-style-type: none"> • Sharing knowledge • Identifying management constraints and opportunities • Generating Knowledge 	Farmers, district staff, trainer, CIFRI & MRAG staff	<ul style="list-style-type: none"> • Provision of training on integrated pest management and fish culture based on the requirements identified in (2). • Evaluation of training and learning process • Further training on data collection where required 	<ul style="list-style-type: none"> • Presentations and demonstrations • Small group discussions & presentations • Evaluation questionnaires and group discussions 	Reports on adaptive learning website Results in Annex 2

5.3 Results of experimental approaches

As with project R7335, but perhaps even more so, the results of the scientific investigation into enhancements, and the recommendations arising from this, were of secondary importance in terms of the objectives of this project. However, they represented the principle means by which impact of the adaptive learning could be evaluated and provided evidence of the effectiveness of the approach that could be disseminated to the target CSU stakeholders. For these reasons details of the implementation of the approach are included in this report. As an initial stage, a stakeholder analysis and an assessment of information sharing networks was undertaken (see Annex 2.1). Following this, the experimental process had four main stages:

- Collection and analysis of baseline information;
- Design and implementation of a management experiment;
- Analysis of data relating to the technical aspects of management and dissemination through the information sharing network;
- Evaluation of the learning process and the costs and benefits of the process.

5.3.1 *Collection and analysis of baseline information*

The rapid appraisal to collect baseline information involved the use of participatory data collection methods at seven locations within West Bengal and a literature review to collate relevant information. Key characteristics of the resource systems, their management and the needs and priorities of resource users were identified through this process.

- The main objective of management in all the systems was to generate income and the waterbodies were stocked as polycultures in order to maximise income and ensure that risk was spread in case of disease outbreaks. Stocking of these waterbodies had some scientific basis but was based more on the experience of the managers together with the availability of both shrimp and fish seed and financial resources.
- Three main categories of management were identified, namely management by individual (or group of individuals), collective management and rental. On the basis of the information gathered it appeared that renting was the most common form of management
- For brackishwater systems, as seed size did not vary much, it appeared that yields had a strong positive correlation with stocking density. For freshwater systems yields were similarly correlated with stocking density but also, and to a greater extent, to the size of seed stocked.
- Initial results from a bio-economic model that was developed seem to indicate that increasing the size of fingerling stocked will provide better returns than increasing stocking density, perhaps due to the higher mortalities experienced by smaller fish.
- It was possible to identify three key factors, namely salinity, water controllability and access to resources that could determine the options for land management and for the management of any rice-fish systems fishery. It is felt that this could benefit from additional studies to determine more fully the relevant importance of such factors and their implications for land use and fisheries management.
- Information about the constraints that farmers felt they faced indicated that one of the most common was a lack of knowledge about technical aspects of fish culture such as stocking and feeding.

Full details of the baseline survey are provided in Annex 2.2. The information from the survey was subsequently used to identify and categorise uncertainties and select the learning options for the freshwater and brackishwater sites. Details of this procedure are

presented in Annex 2.2 and in reports on the adaptive learning website. A summary is given below.

5.3.2 Design and implementation of the management experiments.

The uncertainties identified from the baseline survey are summarised in Table 6. These uncertainties were identified by the farmers themselves as being the ones that they felt created the greatest constraints to improved management. From these the learning strategy to be implemented at the study sites was determined by rejecting those uncertainties classified as being least relevant to all involved. The remaining uncertainties were discussed and those considered unviable were also rejected. The remaining options for experiments were considered to see if there were sufficient sites, and whether the information could be considered as an active strategy (see Annex 2.3 for detail on this process).

Table 6 Uncertainties identified during the rapid appraisal

Uncertainties identified
Optimal harvesting strategies
Prevention of illegal fishing
Seed quality
Seed sources
Fish marketing
Employment opportunities for the landless poor
Benefits to the landless poor
Distribution of benefits from rice-fish systems
Costs and benefits of management systems
Seed size
Optimising inputs (feed/fertiliser/pesticides)
Stocking densities
Species mixes
Suitable rice varieties

Having rejected options that were clearly unviable, the remainder were carefully evaluated in terms of what the costs would be and how useful the information gained would be. The results of the procedure were learning strategies for both fresh and brackishwater sites. On the basis of the strategies, experiments were designed that combined:

- active experimentation at the freshwater sites to investigate the potential of a promising variety of rice (*Jaya cross*) in comparison to the existing varieties grown;
- active experimentation to investigate the potential of the saline-tolerant CS1010 variety, one which had not been tried by the farmers, compared with the traditionally grown varieties;
- active experimentation at the freshwater site to examine the benefits from stocking fast growing species such as silver carp (*Hypophthalmichthys molitrix*) and common carp (*Cyprinus carpio*) along with the Indian major carps catla (*Catla catla*), mrigal (*Cirrhinus mrigala*) and rohu (*Labeo rohita*) compared with relatively high value species bata (*Labeo bata*) and punti (*Puntius javanicus*);
- active experimentation at the brackishwater site in the form of a two factor experiment where trials could be done with the feed type (wet or dried pellet) and with the stocking mix (with the predator fish *Lates calcarifer* and without).

- passive experimentation to generate information concerning the costs and benefits of different management arrangements.

Full details of the selection and implementation of these experiments, together with details of the information generated is provided in Annex 2.3.

5.3.3 Analysis of data relating to the technical aspects of management.

The rice varieties cultivated at the freshwater sites were *Jaya cross*, *Kalisankar*, *Bullet*, *Udaygiri* and *Swarna masuri*. These varieties are the ones that are traditionally grown at the sites. In terms of production, *Jaya cross* at the Moyna site (Dakshin changra chak, Gopal chak, Janaki chak, Mathuri chak, Baital chak and Charandas chak) performed well but this variety did not do well at the other sites where it was planted in experimental plots. At Kamardanga (Dhamar beel and Kamaner beel) performance of *Udaigiri* and *Bullet* were highly satisfactory giving production of 4000-4500 kg ha^{-1} and 3375-3750 kg ha^{-1} respectively. At Malandighi where *Swarna masuri* was the preferred variety, production ranged between 3375-3550 kg ha^{-1} .

The result was disappointing in that the *Jaya cross* variety had seemed to have a great deal of promise and the degree to which the production differed at Kamardanga and Malandighi was a bit surprising. However much of the poor performance appeared to be due to unfamiliarity with the variety. This was rectified through training with the farmers from Moyna, who were also able to discuss the benefits of planting *Jaya cross* with farmers from the other sites. The result of this was that the farmers from Kamardanga and Malandighi were keen to be involved in future trials of the *Jaya cross* variety that are to be facilitated by the State agriculture department.

The active stocking experiment was able to confirm the hypothesis that stocking with high yielding species could provide increased yields and no loss of income for the farmers. Total yield was found to be significantly greater for the high yield treatment ($p < 0.1$) and was negatively correlated with waterbody area. The results indicated that stocking with high yielding species can provide an increase in the region of 80 kg ha^{-1} over yields from stocking high value species at the densities used. One of the purposes of the experiment was to see if production of low cost fish, of benefit to the poor, could be increased at no cost to the fish producer. Comparing the income generated from the sale of the fish produced, income was not significantly different between the two treatments. However both the waterbody area and 'yield' treatment did appear to provide a small positive effect. This suggests that the managers would not be disadvantaged, and could potentially benefit financially, if waterbodies were stocked with high yielding species. There was also no significant ($p > 0.1$) increase in the transport and harvesting costs due to the increased yields from stocking with high yielding species, a potential disadvantage.

The active stocking experiment at the brackishwater site indicated that fish and shrimp production varied with the level of inputs of fish seed and was also affected by incidence of disease. In addition there were significant effects on yield from the stocking of *L. calcarifer*, type of feed applied and the incidence of disease. This suggested that yields can be increased through altering management practices so that *L. calcarifer* is not stocked, increasing yield by some 62.5 kg ha^{-1} ($P < 0.05$), and so that feed is provided in pelleted form rather than the traditional moist form, potentially also increasing yields by an average of 23.4 kg ha^{-1} ($P = 0.2$). The combined effect of the changes represents a potential increase in yields to farmers of around 15% over current yields.

Because the objective of the farmers is not only to provide fish for household consumption but also to generate income, it is important to also consider the effect of the experimental treatments on income (Figure 1).

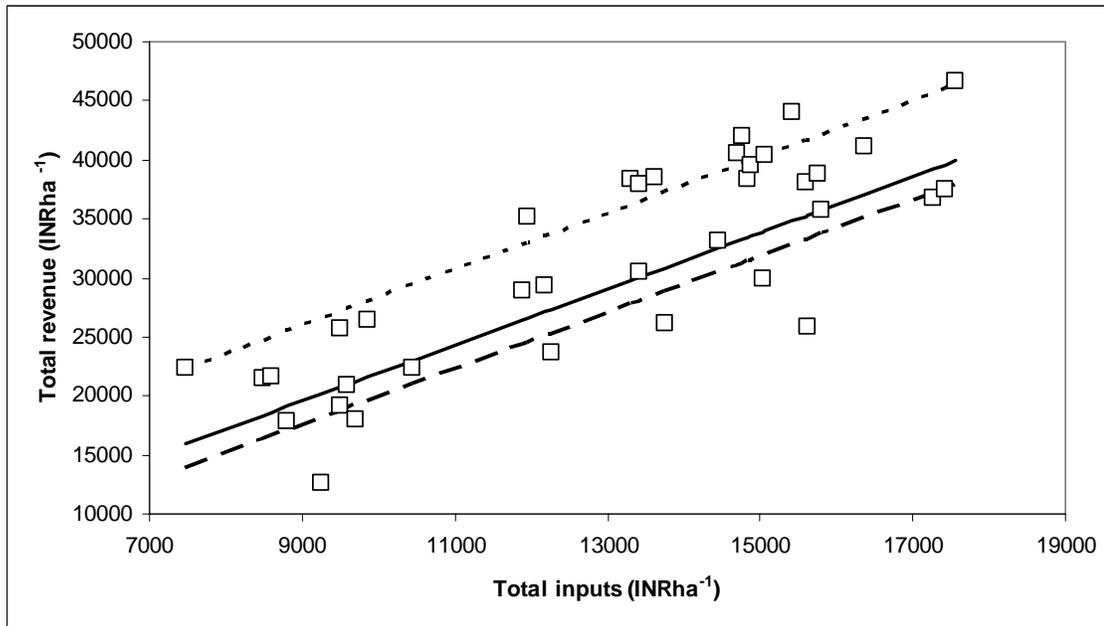


Figure 1 Relationship between income and inputs from the active experiment. Solid line indicates the effect of stocking bhetki (*Lates calcarifer*) and traditional feed formulation and dotted line indicates effect of not stocking bhetki and feeding pelleted feed on yields. The dashed line indicates the effect that disease had on the total income from the system.

As can be seen, stocking *L. calcarifer* again had a negative effect ($P < 0.05$), reducing income on average by 3,026 INRha⁻¹ and disease also reduced incomes ($P < 0.05$) by some 4,987 INRha⁻¹ on average. In addition to the negative effects, providing feed in pelleted form had a positive effect on income ($P < 0.05$), increasing income by 3,417 INRha⁻¹ on average. Again, the results suggest strongly that by discontinuing the stocking of *L. calcarifer* and providing feed in pelleted form, farmer incomes could be increased by some 11%.

5.3.4 Analysis of data relating to the costs and benefits of different management systems.

The results of the passive experimentation at the freshwater sites are presented in Figure 2. As can be seen from this, in the first place, fish from the waterbodies provided a nutritional benefit not only to those who purchased the fish from the market retailers and consumed it. Fish was also provided to those involved in harvesting it and, in the case of Dharmar and Kamner beels at the Kamardanga site, to those guarding the waterbody. After fish has been harvested, a number of poor households (up to about 20-30) are allowed to harvest the smaller wild fish and prawn. They are able to take up to two or three kilograms which they utilise primarily for household consumption, although some may also be sold.

As can be seen from Figure 2, the main financial beneficiaries from the management are the renter and the wholesaler from whom the renter received the loan. The landowners and the wider village community also benefit from the system both directly and indirectly. A direct benefit to the wider community is that following harvesting, poorer households are allowed to collect wild fish and other aquatic organisms for household consumption and sale. Indirect benefits are received through the use of the lease payment by the village development committee. This money, held in a village development fund, is used to provide a range of benefits including investment for the benefit of the site landowners such as the

tilling of the soil, dyke maintenance and irrigation systems. The wider community benefit from the use of funds by the committee through spending on development activities such as the school, temple or road improvements, contributions towards the village festival and direct payments to households in need.

Figure 2 was used as the basis for discussion with CIFRI and Fisheries department staff about the benefits and costs associated with management types. As with the results of the active experiment, the information is extremely relevant to the government staff. The rental systems had been perceived to provide few benefits to any other than the renter. However, the results indicated that this was not necessarily the case and that some benefits were accruing not just to the landowners but also to the wider communities at the study sites. This information can be used to develop systems that are able to provide even greater benefits to the landowners and wider community while still rewarding the renter for the risk that they are taking.

Conclusions.

- Overall the approach has been successful in generating new knowledge about the resource systems and their dynamics that have contributed to reducing some of the key uncertainties that had been identified by farmers, district staff and researchers.
- At the brackish water sites the results indicated that changes in management practices could increase yields by an average of 15% and incomes by some 11%. Not only are these fairly significant figures but it should also be borne in mind that these increases can be realized at little or no additional cost to the farmers.
- The passive study has shown that there can be significant benefits to farmers and the wider community from rental arrangements and that in situations where conflict is likely, or where the opportunity cost of collective management may be high, then rental systems may represent a low cost option for management that avoids the enclosure of the resource and the resulting capture of the benefits by smaller groups.

5.4 Evaluation of the adaptive learning approach

Evaluation was a key aspect of the adaptive learning approach. Not only was each step of the process evaluated but also the entire process (for full details of the evaluation see Annex 2.4). The evaluation was concerned with both process and outcomes but also included a consideration of the costs and benefits associated with implementing the approach.

5.4.1 *Evaluation of the project process*

The management experiments that had been designed and implemented to investigate aspects of fish stocking had proved successful in generating the required information. The rice experiments were less successful but further trials are planned once the farmers have been familiarised with the process for cultivating the *Jaya cross* variety. Effectively sharing the information from the experiments is a crucial step if it is to be used and was therefore something was a focus of monitoring in order to continuously improve this aspect. Participant evaluations indicated that methods for sharing information had been successful and also showed that the methods were increasingly effective as they were improved following evaluations after each (Figure 3). In this graph, each of the questions on the evaluation questionnaire could be ranked between 0-5, 0 being 'poor' and 5 being 'excellent'.

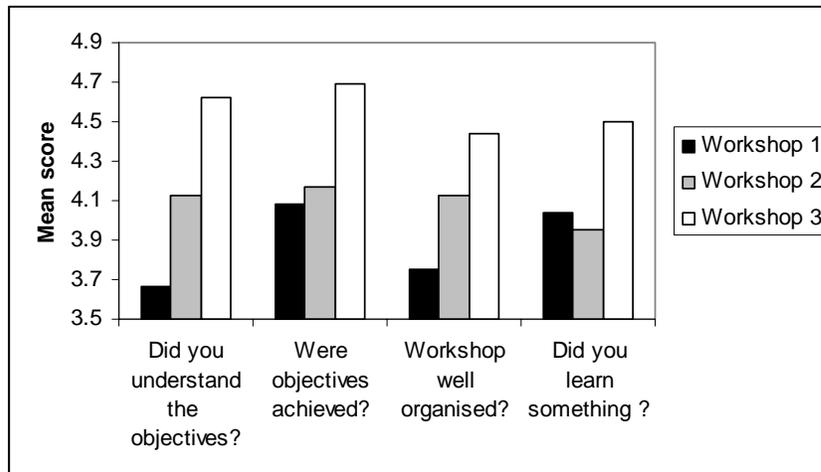


Figure 3 Comparison of the results of participant evaluations over a series of workshops to share results with resource users.

However the fact that the facilitators were becoming more effective is only part of the picture as we also need to look at who was learning, what they were learning and how much they learnt. To address these points, key stakeholders (including both government staff and farmers) were asked to evaluate the extent to which their knowledge about resource system management had improved as a result of this process (Figure 4).

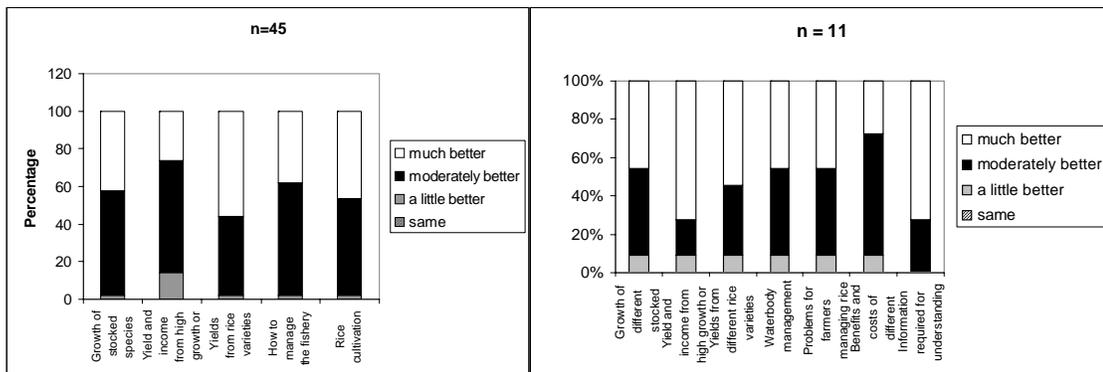


Figure 4 Participant self evaluations of the extent to which their knowledge on a range of relevant topics had been increased a direct result of participation in the project (farmers on left, government staff on the right).

Overall, the results suggest that the stakeholders had increased knowledge in the areas that were the focus of the information generation and sharing activities. In addition to these, the stakeholders also indicated positive changes in a number of other areas more peripheral to the process that it was considered would represent additional benefits. This is considered to be a very successful result for the adaptive learning process.

5.4.2 Evaluation of the project outcomes

The main outcome of the implementation so far is that there is increased knowledge in the key stakeholder groups and that there is potential that this knowledge could be used to provide additional benefits from the resource systems to a wide range of people dependent

Results from the experimental fish stocking trials at the freshwater Moyna site indicated that adjusting the stocking mix so that there was 30% of the total seed that comprised the faster growing and higher yielding species rather than the higher value species then the indication was that the yields from the waterbodies could be increased by an average of about 80 kg ha⁻¹. This increased yield appeared to provide a small amount of extra income to the farmers. Across the total 273 hectares at the site, this represents a potential increase in yield of some 48 tonnes with a value in the region of USD 35,000 (based on the lowest market price of INR 30 per kg described at the site). This is in itself greater than the total costs of stocking across all the waterbodies and more than the in-country costs. Given that the high yielding species made up only 30% of the stocked fish there would, if farmers were prepared to adopt, also be the potential for further increases in yields through manipulation of the stocking mix. The passive studies on the distribution of benefits suggest that it is not only the leaseholder who would benefit from this additional production as the lease fee benefits the wider community and the value of the lease is related to the production potential (larger waterbodies have higher lease prices). Early indications from the project suggested that if leaseholders chose to increase the production by changing the species composition then the lease price would be expected to be increased by around 12%.

For the brackishwater sites, the waterbodies were much smaller so there was much less scope to make a large impact in terms of the total yields and value of the income. However, based on predictions of the yields and incomes that would have resulted from the use of traditional practices and from adopting the recommendations from the experiments (see Figure 1), it can be seen that participating in the experiments was (overall) beneficial and adoption of the recommendations could provide significant increases in both yields and income. Compared to the results during the experiment, adoption of the recommended practices could provide increases in yields of about 15% on average and increases in incomes of around 11%. Over the 38 household plots that were involved (providing a total of 12.36 hectares) this increase in yield represents a total increase in production from all the plots of around 480 kg representing an additional 1,030 USD in income for the adopting farmers. As mentioned, this is the increase over the results during the experimental period and, as the predictions suggest, the experimental results themselves could well be have provided increased benefits overall when compared with uniformly applied traditional practices.

In addition to the knowledge gained and the value of this knowledge, results indicated that skills capacity had also been built as a result of the approach (see Figure 6).

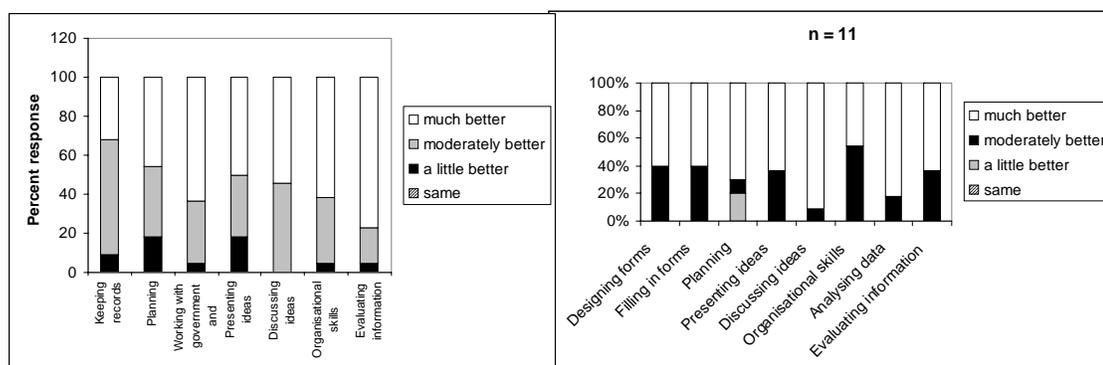


Figure 6 Participant self evaluations of the extent to which their skills had been increased a direct result of participation in the project (farmers on left, government staff on the right).

The increased skills, outlined in Figure 6 above, were not gained as a direct result of the information generated. Skills were developed as a direct result of the way the project (and adaptive learning approach) worked and **how** the activities had been carried out, i.e. with a focus on active participation, capacity building and communication. It is felt that these results provide further evidence for the wider benefits that can be achieved through a **participatory adaptive learning** approach, rather than by simply focusing on the experimentation and/or information gain alone.

5.4.3 Conclusions

Results show that the adaptive learning approach was able to successfully be transferred to situations with differing institutional and organisational arrangements and different bio-physical attributes. The approach can be a very successful way of reducing management uncertainties, meeting multiple learning objectives, potentially increase benefits from a resource system and build capacity. However it is important at the outset to ensure that the common understanding of the resource system is established between resource users and researchers so that the learning strategy is able to reflect their needs and objectives. Constraints at the early stages of implementing the process in West Bengal meant that this was not done to the extent desired.

Process:

- The process was satisfactorily transferred from small waterbody fisheries.
- Evaluations indicated comprehension was high and potential for adoption and adaptation of management practices in the brackishwater site was high.
- Stakeholder evaluations of the whole process showed that they thought levels of participation satisfactory and methods appropriate.
- There is a need to take time at the outset to ensure that the objectives and constraints of the resource users are fully understood and that they have an active role in selecting the learning strategy.
- The evaluations of the process and the further analysis of the data from Lao PDR indicated that the process could be cost-effective in terms of the value of the benefits compared with project costs and in terms of trying to generate the same information in a less participatory manner. There were also clear spin-off benefits from participation that would be less if participation were reduced.

The outcomes:

- Quantitative analysis of the benefits and costs of the information gained indicated that there was the potential to increase both yields and incomes if the information generated were utilised.
- The relevance of the information is not sufficient to ensure adoption and the need to ensure that the learning includes both generation and sharing of information is vital. This means increased attention to the way people receive information and what ways are most effective in ensuring the transition from received information to increased knowledge.

Further information on the evaluation of the approach can be found in Annex 2.4.

6 Contribution of Outputs

6.1 Contribution of outputs towards DfID's development goals

The project relates to DfID goals defined in the FMSP log frames of improving livelihoods through sustainably enhanced production and productivity of land/water interface systems. The project contributes to the purpose level with improved access by poor people to fisheries knowledge generated by the programme. The more specific project goal being; "benefits for poor people generated by application of new knowledge to fisheries management systems." The project is directly relevant to Output 1 of the FMSP log frame for the FMSP for 2004-2006 "existing FMSP research outputs relating to the contribution of capture and enhancement fisheries to the livelihoods of the poor; fisheries management tools and strategies that could benefit the poor; and, the means to realise improved management, further developed, disseminated and promoted to relevant stakeholders at all levels."

This project has contributed in many ways, both directly and indirectly, to achieving this. Firstly, the project has shown that it has had a direct and positive impact on the knowledge of fishers and farmers in both West Bengal and the countries of the Mekong Basin. Furthermore there has been the potential, through increased information about enhancement fisheries management, to increase both yields and incomes from the systems studied as well as the production of cheap wild fish that would be of particular benefit to the rural poor. Additional technical, socio-economic and institutional information generated during the project is expected to improve further performance and the service delivery of the government agencies as well as contributing to the activities of development initiatives such as the Challenge Programme Basin initiatives.

In addition to the benefits that may be seen at the study sites there is considerable potential for adoption elsewhere. For example, the areas in West Bengal that are currently under cultivation as rice-fish systems are extensive and there is additional potential if the results can be effectively shared with farmers in Bangladesh and other similar areas. All the experiments were based on deriving management recommendations that would increase the benefits to farmers and that could be implemented at little or no cost to the farmer and so the barriers to uptake are mainly whether the predicted outcomes are in line with farmer objectives and whether the farmer can be provided with the information in an appropriate way.

As well as the direct results from implementation, the approach, as implemented in this project, has been shown to have the potential to produce benefits to the poor via improved enhancement management, but its application is expected to be much wider. The methodologies that were developed are thought to be widely applicable so have the potential to improve performance in any renewable resource management system where management occurs in conditions of uncertainty. Already the adaptive learning approach has formed the basis for a framework to support the participatory fish stock assessment software developed in project R7947 and this is being promoted as the ParFish toolkit.

Co-management of natural resources is now seen as a crucial factor in improving the livelihoods of those who depend on them, and has been the subject, or principle output, of several FMSP projects to date (e.g. R6436, R7043). As suggested above, its' importance was also recognised in this project and adaptive learning methodologies were specifically developed to facilitate the full involvement of local communities and other stakeholders in management research, ensuring that their needs and priorities were being met, and their

skills and capacity to manage increased. Again, results from implementation of this approach in the Lao setting already suggest that this can be achieved - with another direct benefit of this project being the increased capacity of government staff and local communities alike, as measured by themselves.

With its pro-poor and inclusive approach to research in management, guidelines and associated outputs produced as a result of this project's experience are expected to contribute significantly to the development of tools and strategies to support improved livelihood outcomes of the poor.

6.2 Promotion of outputs

Project outputs have been promoted in a number of ways and these have been discussed in Section 5.1 and is covered in more detail in Annex 1.

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