

Evaluation of the Adaptive Learning Approach as applied in West Bengal, India.

2003 - 2005



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1 Introduction

This report describes how the evaluation tools developed in R7335 (see Garaway *et al.* 2002 and Garaway and Arthur 2004) were applied in the field testing phase of this project in India and used to examine further some of the some of the results from Southeast Asia. The results of doing so are described here. This evaluation forms part of the whole process of adaptive learning, as described in Garaway and Arthur (2004). The process was implemented in West Bengal as part of an effort, funded by the UK Department for International Development (DFID) and managed by the Fisheries Management Science Programme (FMSP), to further test and promote the promising 'adaptive learning' approach.

Within West Bengal, the approach was implemented in order to reduce some of the key uncertainties relating to rice-fish culture system management and enhancement. The management experiments implemented to generate the information that would reduce the uncertainties and the actual experimental results resulting from implementation are described and can be found in MRAG 2004 and Arthur *et al.* (2005) respectively. The experiments are described here only as much as is needed to provide an evaluation of the process and its outcomes.

Two elements are considered when applying the evaluation tools. Firstly the process of implementing the adaptive learning approach and secondly the outcomes of this implementation are dealt with in turn. Both of these aspects are considered to be important when evaluating a learning based approach where the emphasis has been on the effective generation and communication of information that will be of direct benefit and relevance to the management of the resources. While **process** was evaluated to see how effective it had been in completing each stage of the adaptive learning process (see p12 of Garaway and Arthur 2004), **outcomes** were considered in terms of the impact that the process had had on knowledge, skills, attitudes and practices.

The report describes the analytical framework that was used to guide the evaluation of the approach and to highlight potential problems or areas to address where outcomes were not as expected.

2 Framing the evaluation

The adaptive learning approach aims to reduce uncertainties in natural resource management through a structured process that has learning as an objective of resource management and where information is generated through the use of considered management experiments that are both agreed and implemented collaboratively with those managing the resources.

While it is acknowledged that this approach may (or may not) incur short term costs (that may or may not be unequally distributed), the idea is that the longer term benefits of the information gained, in terms of improved management, will be worth these costs. This, the benefits received over the costs, is then the ultimate criteria against which the adaptive learning approach should be evaluated and is the one that should have been considered and used in determining the learning strategy in the first place.

As the approach makes clear (Garaway and Arthur 2004), satisfactory outcomes and developmental impact will only result if the learning process (where learning is taken as a three step process of generating, sharing and utilising information) has, itself, been effective. Thus improved management requires that the process of adaptive learning generates the information desired and this (relevant) information is subsequently disseminated in a timely fashion through appropriate means and subsequently utilised.

In evaluating the outcomes of the process and the benefits of the information gain, it is therefore necessary to evaluate the process itself to see whether, and to what extent, it generated the results it was expected to generate. If it didn't, then different parts of the process must be evaluated to see where problems lie. The framework below (Figure 1) was developed within R7335 and modified within R8292 to guide evaluation both during the experimental cycle and after it.

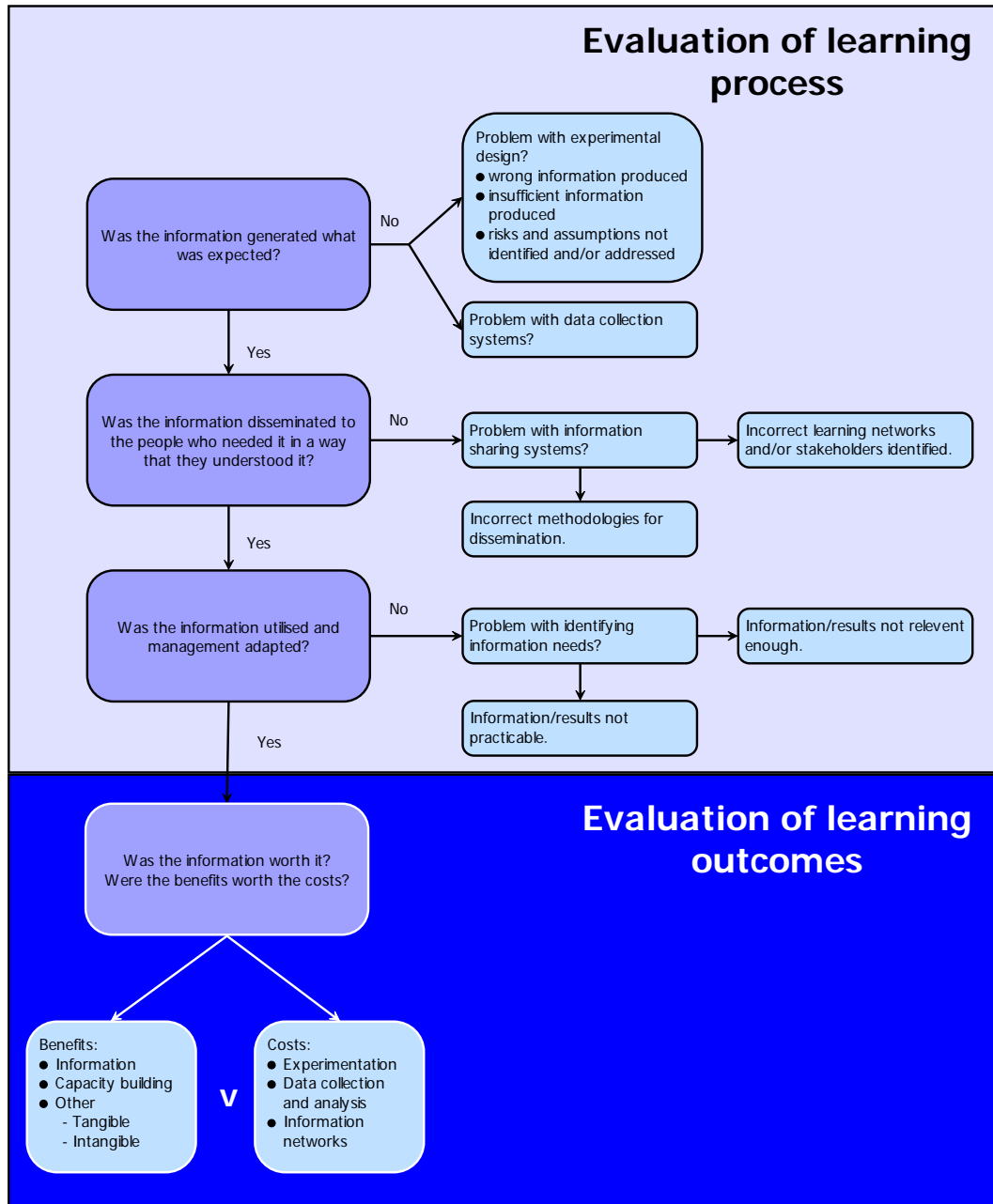


Figure 1. A framework to evaluate process and outcomes in adaptive learning (from Garaway and Arthur, 2004).

The structure of the results sections in the following sections follow the framework in Figure 1, starting from the top and working down.

3 Evaluation Methods

Having analysed the results from the management experiments (see Arthur *et al.* 2005 for more detail) to provide the information that could reduce the key uncertainties, this information was then disseminated (shared) and subsequently discussed and evaluated

by all stakeholder groups in terms of their implications for future management and the extent to which they had succeeded in reducing identified uncertainties. This discussion and evaluation was conducted through analysis and discussion at stakeholder workshops.

As the framework in the section above, if the outcomes of the process (i.e. utilisation of the information that had been generated and shared through adaptations to management practices) were not as anticipated, it was important to be able to pin-point where problems had occurred and, in particular, whether the problem lay with the understanding of the needs of the users, the experimental design, the way information was collected or the way it was shared. Evaluation throughout implementation was therefore critical and opportunities were taken at workshops at each stage of the experimental cycle (Table 1).

Table 1 Methods used to evaluation information generation and sharing activities and methods.

Evaluator	Subject of evaluation	Role	Method of evaluation
CIFRI and district staff	Data collection methods	Data collector	Group discussions analysis workshops
Farmers		Data collector	Group discussions in information sharing workshops
Panchayat officials and CIFRI staff		Data collection co-ordinators	Meetings
District staff	Methods for training and disseminating information	Object of training and dissemination	Individual questionnaires* in district workshops
Farmers		Object of training and dissemination	Individual questionnaires in district workshops
CIFRI staff		Trainers and facilitators at workshops	Self evaluation through questionnaires and round table discussions

* questionnaires are presented in Appendix 1.

In order to assess the changes in skills, knowledge and attitudes each of the three main stakeholder groups (CIFRI staff, district fisheries and agriculture staff and farmers) were asked to evaluate the adaptive learning process in terms of the extent to which it had benefited them and the extent to which methods had been appropriate and their participation in it satisfactory. This was done through questionnaires and group discussion. The questionnaires included dummy questions for each stakeholder group that covered aspects about which the group was unlikely to have benefited. These were included as a means of indicating how reliable the information gained might be.

4 Evaluation of the process

This section relates to the upper half of Figure 1 (the first three boxes).

4.1 Was the information generated what was expected?

The project carried out an active stocking experiments in both freshwater and brackishwater sites together with active experiments on rice varieties at each. At the same time, information on different management strategies was collected in order to evaluate the benefits, costs and constraints of the different approaches to fisheries management in the rice-fish systems.

Evaluation of data revealed that the information generated from the rice trials was not what was expected and the results were disappointing overall. At the brackishwater site the experiment was implemented well but the variety performed poorly. At this site the process from design through implementing and monitoring went well. However, examining what had happened at the freshwater sites showed that the main problem was with the implementation of the experimental design and that assumptions had been made about rice cultivation and the ease of changing from one variety to another that did not hold true. Uncertainties had not been reduced at the freshwater sites because not enough preparation had been done or training of the farmers in the cultivation of a different rice variety. This led to relatively poor performance of the rice variety being tested. Whilst results were disappointing in terms of the original experimental aims, they did provide valuable information that could improve implementation in the future and indeed formed the basis for considerable discussion between farmers from the different sites with much advice on culture of the Jaya cross variety being imparted by the farmers from the Moyna site.

In contrast to the rice experiments, the stocking experiments with fish and the feed trials were successful in enabling the hypotheses that had been constructed to be tested and confirmed.

Experiences in the first half of the year at the brackishwater site highlighted some issues with the data collection systems at this site. As with the other sites, the 20 (later to be 38) farmers at the site had been issued with record books. However the farmers were not confident in the recording of the information and felt that they needed some support for this task from someone in the village. As a result, for the active stocking and feeding trials in the second half of the year, two assistants were recruited from in the village who helped farmers record the information and liaised with the CIFRI staff if there were any questions about how certain aspects should be interpreted and recorded.

4.2 Was the information from the experiments disseminated to the people who needed it in a way that they understood it?

Evaluating this aspect meant evaluating the methods that were used and how effective they were in disseminating and sharing information with the key stakeholder groups (the resource users and the district level state government staff). The main method used for information transfer was the workshop. These were structured meetings at which

information was presented and discussed. The main method used to evaluate the workshops was participant evaluation through a short questionnaire (see Appendix 1). Within the evaluation the questions could be scored from 0 (poor) to a maximum of 5 (excellent). There were additional reflective sessions amongst the workshop facilitators to identify changes based on the outcomes of the evaluations.

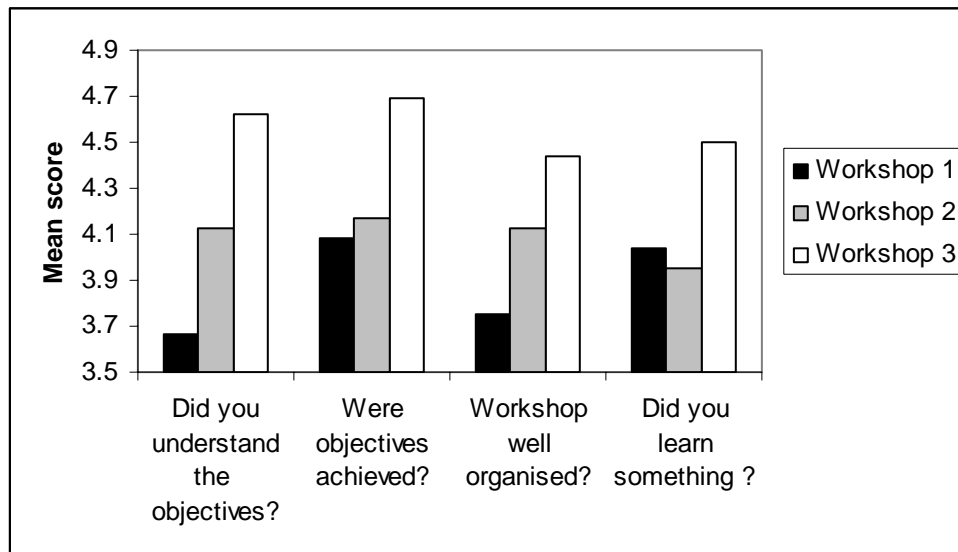


Figure 2. Comparison of the results of participant evaluations over a series of workshops to share results with resource users.

As Figure 2 shows, the scores from an important series of workshops held to share information from the experiments with the resource users (farmers). As the graph shows, the average scores across the series of workshops in these key areas were all above 3.5, representing a good outcome in all cases. However on the basis of the scores and comments on the evaluation forms after each workshop modifications were made to the way information was presented, sometimes reiterating things to make sure that they were clear or using different methods. These modifications can be seen to have had a positive effect on the scores, significantly so in the case of “did you understand the objectives?” and “were the objectives achieved?” ($P < 0.05$). The same thing is seen in the results from another workshop to share information that was held first with farmers from the freshwater and then with farmers from the brackishwater site (Figure 3). Both of these illustrate how the workshop facilitators responded effectively to evaluations to improve the process.

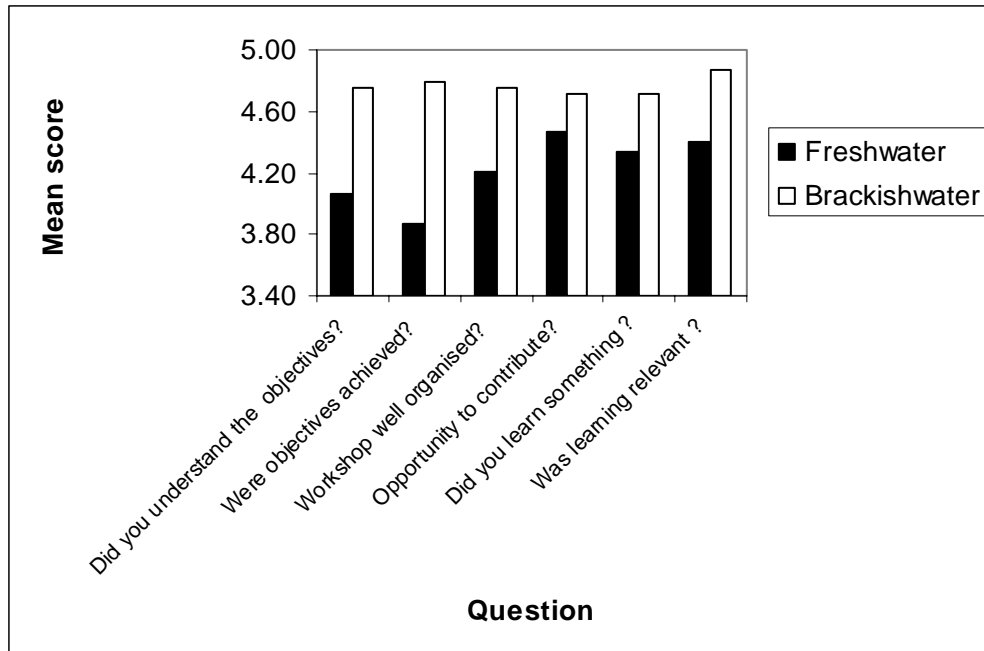


Figure 3. Evaluation scores across key criteria for workshop to share information held first with farmers from the freshwater and secondly brackishwater sites.

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 were asked to evaluate the extent to which their knowledge about resource system management had improved as a result of this process (Figures 4 and 5). This was done using an evaluation questionnaire and an example of the type of questionnaire is provided in Appendix 2.

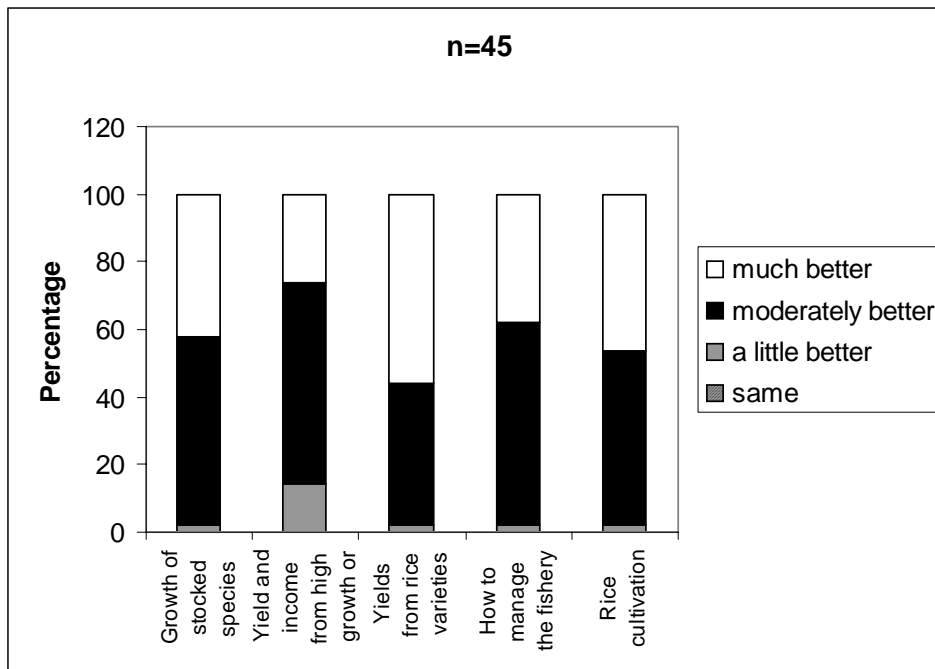


Figure 4. Farmers perception of the change in their own knowledge on a range of topics that they felt was due to involvement in adaptive learning activities.

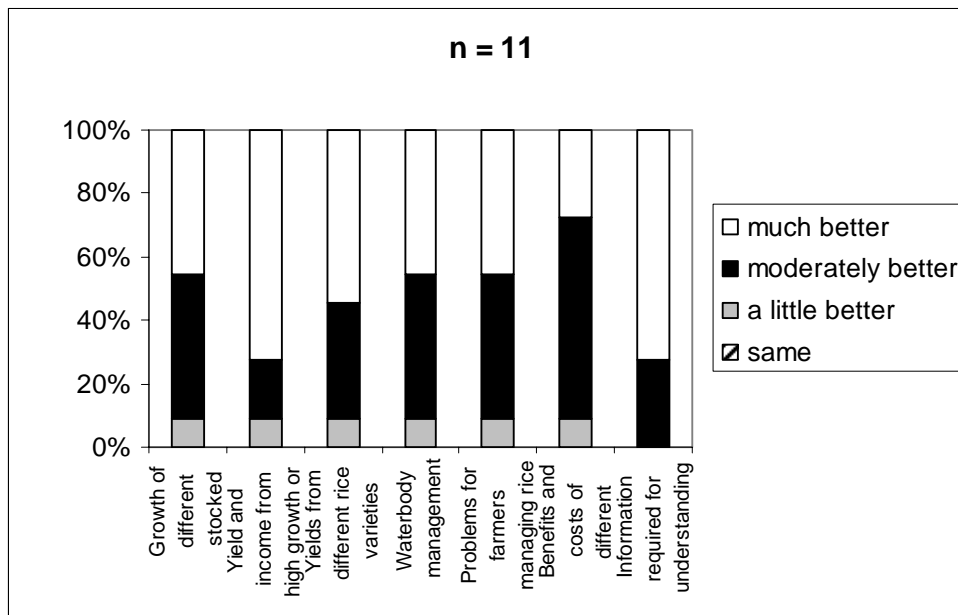


Figure 5. District staff perception of the change in their own knowledge on a range of topics that they felt was due to involvement in adaptive learning activities.

The changes in knowledge results presented here cover the areas most directly relevant to the management experiments though 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. Both groups of stakeholders had indicated that they had either none or some knowledge initially in some of the important areas. For example, district staff knowledge about the costs and benefits of different management arrangements was initially as was their understanding of the information required for understanding user objectives and constraints. These were both areas where improvements were made. Overall, the results suggest that the stakeholders had increased knowledge in the areas that were the focus of the information generation and sharing activities. This is considered to be a very successful result for the adaptive learning process.

4.3 Was the information utilised and management adapted?

The results from the rice trials had been inconclusive in the case of Jaya cross at the freshwater sites but the CSR1010 variety trialled at the brackishwater site performed poorly and was rejected. The fish stocking experiment at the freshwater sites suggested that by stocking faster growing, high yielding species as opposed to the more commonly stocked higher value but lower yielding species, the yields could be increased with no loss of revenue and the production would represent an increase in the availability of relatively cheap fish that might benefit the poor. At the brackishwater site the results of the stocking and feeding experiment indicated that by producing a dried pelleted form of the feed that is traditionally used (a low cost change) and by not stocking bhetki (*Lates calcarifer*), yields and incomes could both be significantly increased over current practices.

These results were shared with stakeholders at workshops and the implications were discussed. At this time it is not possible to report on the extent to which management practices have been adapted in the light of this new information. Early indications though are that at the freshwater site the recommendations will not be adopted and at the brackishwater site they will. At the brackishwater site the farmers were asked if they were prepared to return to the project staff the hand grinder that had been provided to them for making the pelleted feed and they were adamant that they needed the grinder for the next year. This suggests that the application of feed in pelleted form is likely to continue. Whether the farmers will continue to stock bhetki or not is less clear.

The result from the freshwater site was most interesting as the experiment had been designed to produce information that could allow the farmers to meet their objective (generate income) at the same time as meeting wider objectives of the State and Indian central government objectives (increased yields and increased food supply) and of the donor (increased availability of cheap fish for the rural poor). The results showed that the stocking strategy tested had been successful in achieving these multiple objectives as all had been increased. However, from the responses of the farmers it would seem that the information was considered to be not relevant enough in that the increased incomes were insufficient to make the additional effort required to harvest a greater amount of fish worthwhile (it should be noted that there was no significant differences in the financial costs of harvesting). This suggests that the implications of costs (money, time, travel etc.) associated with changes in management practice should also be considered during the design of learning strategies and discussed as well as the benefits.

Moving on from this the subsistence plus fisher may be looking to use the fishery to generate income as well as provide food so will look to increase production (usually yields). In these cases we see yields increase. The small-scale commercial will be looking to maximise income and will look to manipulate the stocking mix in favour of high value species. As mentioned, the work to test species mixes that could provide increased yields of affordable fish and also ensure similar incomes for the small scale commercial fisher indicated that while this objective was achievable, the fisher was not interested in the yield and actually preferred a smaller yield of similar value as there was less difficulty in arranging harvesting and transport.

Where we find that there is the potential to increase productivity of a waterbody (yield or income) then the experience has been that who benefits and how they benefit is far from straightforward (see for example Garaway *et al.* 2001 and papers that are in preparation). Particularly with enhanced fisheries and aquaculture development there is a danger that increasing productivity will lead to changes in the distribution of benefits. For example, irrigation channels in one of the project sites in India are used by the poor as a source of (wild) fish for household consumption. Seeing an opportunity to increase productivity it was suggested that local farmers (who had rights over the channels) should use the channels for cage culture. While this could well have increased the productivity overall, the poor who relied upon the resource would have been excluded and the benefits would have been captured by a group who were less dependent on the resource.

Another observation has been that management of an enhanced fishery (particularly by groups) can have additional benefits that are not directly related to either yields or income. For instance, we find that the group may develop managerial capacity that is used elsewhere and that there is increased trust and solidarity within the group that leads to other benefits – individuals may start to share information about other important aspects such as experiences in combating rice disease etc. Finding ways to assess these benefits and to value them is important but represents a challenge.

Given that the information generated had reduced the uncertainties expected, had been shared effectively with stakeholders and may be expected to be utilised we can now turn our attention to examining the outcomes from the adaptive learning process.

5 Evaluation of learning outcomes

This section looks specifically at the evaluation of costs and benefits from the process. The section will consider the results from the trials in West Bengal but will also include some further evidence from the studies undertaken earlier in Lao PDR as part of R7335.

5.1 Costs of information gain

As shown in Figure , costs of implementation refer to those for:

1. Costs of creating variation (through experimentation);
2. Data collection; and
3. Developing information sharing networks.

The costs of creating variation can be further sub-divided into:

1. Costs for materials, equipment;
2. Opportunity costs of forgoing greater short-term benefits or incurring short term costs (e.g. reduced harvests) for longer term information gains.

In West Bengal, the costs of creating variation only included the former (cost of rice and fish seed, both provided at 40% of total seeding/stocking costs, transport and hand held mincer for producing the pelleted feed). These were therefore relatively straightforward to calculate. Across all of the sites in West Bengal the farmers were found to be taking a risk-averse strategy to stocking and were not interested in substantially increasing inputs or in involving themselves in active experiments that would, while potentially providing increased future benefits, require them to forgo some of the benefits currently enjoyed. This fact was seen with the decision by farmers at the site in Pearypur not to participate. This site was characterised by relatively intensive production and the experimental stocking densities would have been lower than the current densities with probable reductions in yield and income as a result.

Experiments were therefore designed so that the farmers were very unlikely to be worse off as a result, although some farmers might receive larger benefits than others depending upon the treatment. As can be seen from the results (see Arthur *et al.* 2005), in all cases the farmers were no worse off as a result of participating and the management recommendations provide the potential for increases over current benefits. The risk-averse experiments proved to be an important factor in the experimental design that enabled us to get agreement on the implementation of the experiments. The need to design experiments that will provide positive outcomes is a constraint that has been faced in each of the case studies in the adaptive learning projects and we believe that this will be a constraint in any system where dependency means that those reliant on the resource are unwilling to forego current levels of benefits.

An important additional factor to consider is that the costs also relate to who is incurring them and whether they can afford it or are willing to. In this case the farmers were responsible for providing 60% of the fish and rice seed costs (as well as all other inputs such as labour, feed and fertiliser used in the culture and cultivation process) and provide inputs in terms of time for collecting data and attending workshops and training. All other costs of experimentation such as the costs of collecting additional data, sampling, collating and processing data and analysis were paid by external bodies (with funding from DFID). The costs for implementation in West Bengal are provided in Table 2.

Table 2 Costs of implementation of the adaptive learning approach in West Bengal

Activity	Cost (USD)
Local collaborator costs	30,500
Field costs (stocking, data collection, transport, equipment, workshops for sharing information)	24,114
Stocking costs	12,995

5.2 Benefits of information gain

The adaptive learning approach has been designed so that information generation is a clear objective of management as well as the generation of benefits to users. For this reason, the evaluation will focus on the value, or potential value of this information gain.

While the results of the rice trials were disappointingly inconclusive the results from the fish stocking did produce some useful information. In addition valuable information was generated about the benefits and costs of different types of management. The results indicated that greater harvests of both stocked fish and wild fish were possible from very low cost changes in management practice.

While It is still too early to be able to see the actual impact realised from the sharing of the information gain on the practices and livelihoods of those involved (let alone elsewhere), it is possible to examine the potential benefits that might be realised given that information sharing was considered successful. The way that this has been done in each case is to examine the outcomes of changing practice across the waterbodies and compare this with outcomes prior to experimenting and during the experiments with all inputs held at similar levels. Thus any differences arising can be attributed to participation in the experiments and to the value of the resulting information. This analysis is based on the models describing the relationships between inputs and outputs reported in Arthur *et al.* 2005.

Results from the experimental trials at the 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 the potential for further increases in yields through manipulation of the stocking mix.

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, as can be seen from Figures 7 and 8, 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, 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 1030 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.

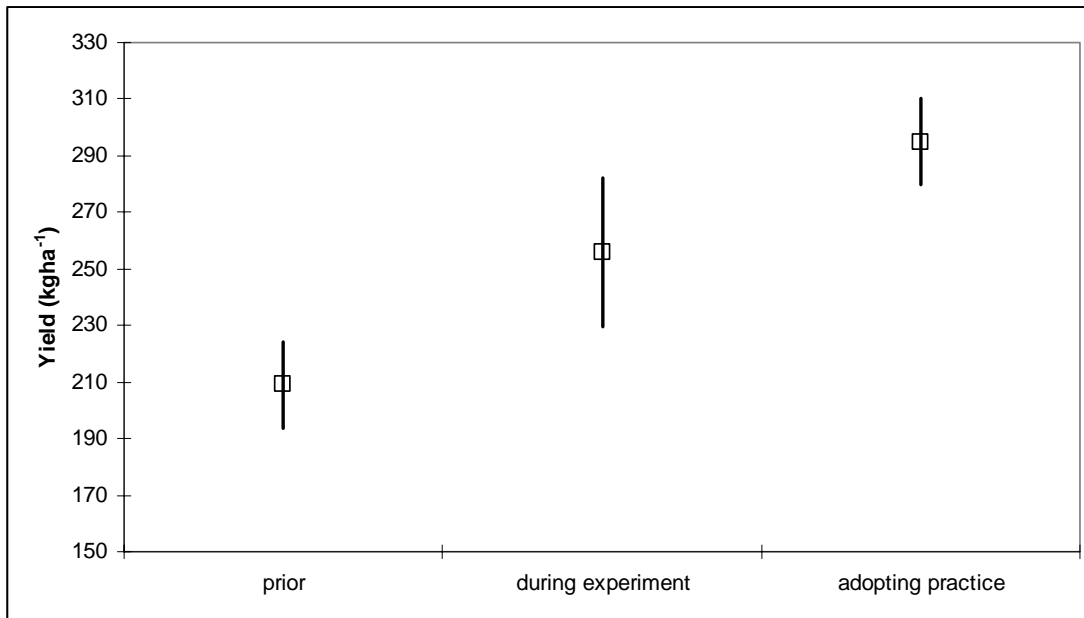


Figure 7. Yields of brackishwater fish and shrimp yields prior to project (predicted), during experiments and after adopting recommended practices (predicted). Bars represent 95% confidence intervals.

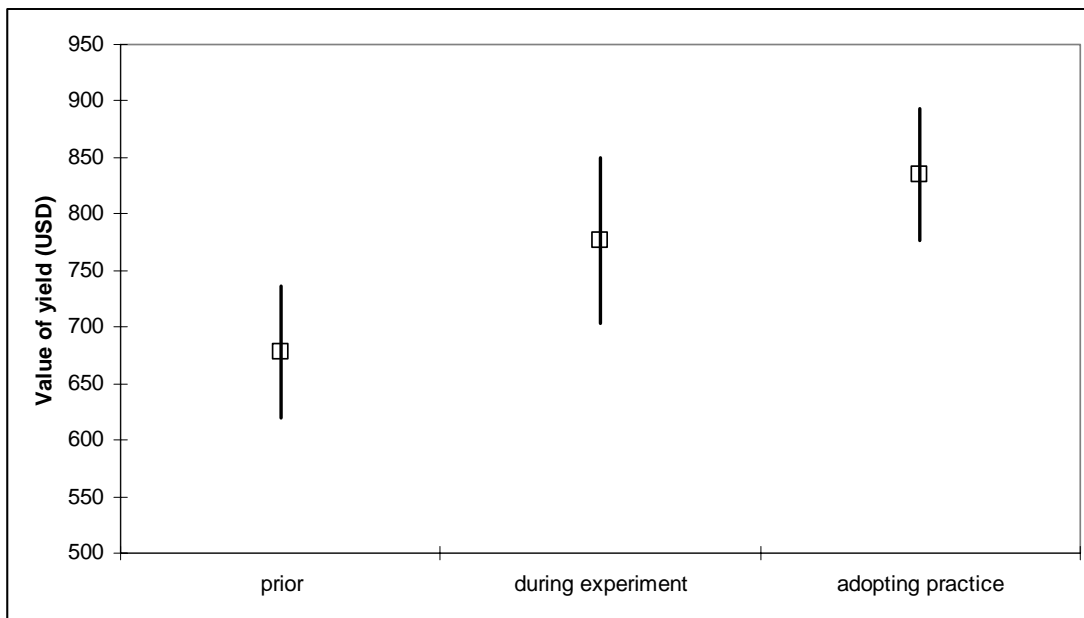


Figure 8. Value of brackishwater fish and shrimp yields prior to project (predicted), during experiments and after adopting recommended practices (predicted). Bars represent 95% confidence intervals.

In addition to the benefits that may be seen at the study sites there is considerable potential for adoption elsewhere. 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. The involvement of the district staff in the process meant that they understood the results, their implications and the farmers experiences and views on the process and results. This in turn means that they are better equipped and far more likely to be able to evaluate themselves whether farmers might be interested in adopting and able to describe how the recommendations can be put into practice.

The benefits described above are those that relate directly to the farmers (or renters) who are managing the waterbodies. In addition to these there are benefits from the freshwater systems to the wider community (see Arthur *et al.* 2005 for further details of these benefits). The information from the study was also of use to the village development committee who were able to see the costs and benefits from the systems as they were managed and in the year following the experiments the lease prices on several of the waterbodies were increased by around 12%. The income from these increases will benefit the landowners as well as the wider community at the freshwater sites.

At the brackishwater site the increases in yields that were observed were mainly due to increased catches of wild fish from the waterbody due to a reduced predation effect. These wild fish are often small, relatively low value species and are therefore important to the rural poor in the area. Indeed a questionnaire study across the sites revealed that there was a preference for these small wild fish over the stocked species amongst the poorer households. Thus in addition to the direct benefits to those managing the waterbodies there are some important additional benefits to others, including the landless poor.

5.3 Further results on outcomes from Lao PDR

The project has provided an opportunity through the work undertaken in the Mekong Basin through the MRC to revisit the study sites that were participating in R7335. Data collected at the sites indicated that involvement in the adaptive learning process had brought the participating communities a range of direct and indirect benefits and that local government staff were of the opinion that both management and village solidarity was greater in those villages that had participated compared to other villages in the same area (see Arthur *et al.* 2005b for further details).

The final technical report for R7335 (available from www.fmssp.org.uk) had indicated that looking at the information from the stocking experiments alone, changes in stocking practices could provide significant increases in yields (and village incomes) over either yields prior to or during the study.

Quantitative analysis of the data that had been collected for the same waterbodies for the fishing year 2003/04 was compared with the earlier results (Figure 9). The results suggested that the actual yields that were being achieved were similar to the yields predicted during the study. This is not to say that the study was solely responsible as

other factors including stocking densities and information from other sources will also have affected the results but it is encouraging that the yields have not reduced overall. It had been found in some circumstances, and outlined in section 4.3 above, that there were occasions in these systems where the production potential was valued over maximising the yields and therefore technical recommendations aimed at increasing yields do not always have that effect. Government staff have also been active in promoting the recommendations from the study and there are now at least another 15 waterbodies in the study area that are now being managed as community fisheries. In addition the staff have been trying to promote the results outside the study area with workshops held with government staff and village representatives from four other provinces in southern Lao PDR.

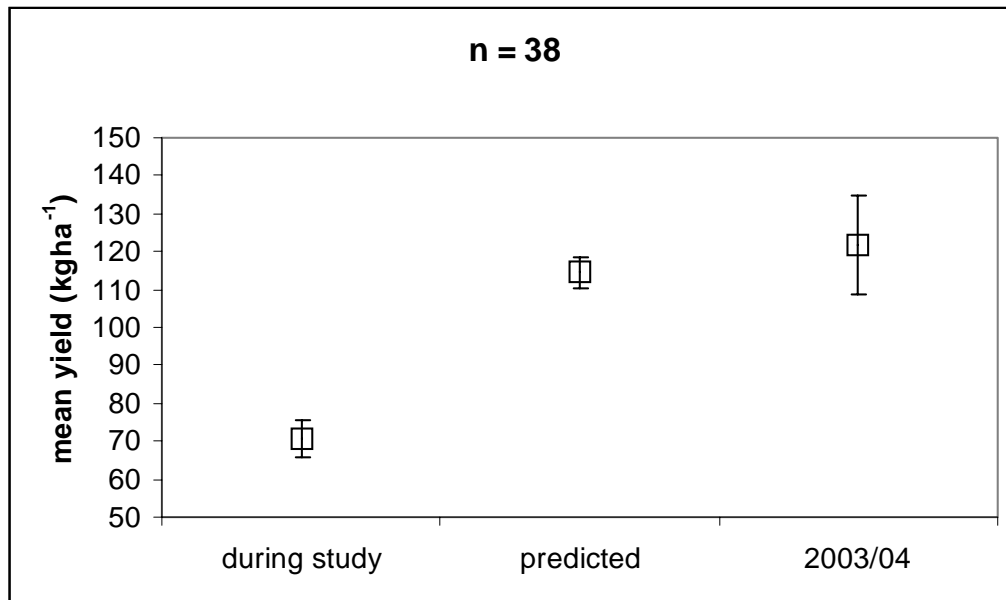


Figure 9. Yields from the waterbodies involved in the adaptive learning experiments in southern Lao PDR during the stocking experiments (2000-2002), as predicted if recommendations were adopted and actual for 2003/04. Bars represent the 95% confidence interval of the mean.

It is also worth considering how the information on stocking and waterbody productivity might have alternatively been generated in southern Lao PDR. Clearly this would have been a subject that it would not have been possible to examine in a research centre this would not have provided the same effects due to interactions with the wild fish population and other environmental conditions. This would have meant that the waterbodies would have had to have been rented from the village administration in each case. While this would have been simple enough in the case of villages that already manage by renting, it might have been more difficult and less acceptable in waterbodies managed by other means. For the calculations it has been assumed that all waterbodies could have been rented for around USD 567 ha⁻¹ (based on the mean rental price recorded in 2001/02). Because of the fact that group fishing systems can provide much greater benefits than this some of the villages may have been reluctant to accept the price and this may well represent a conservative figure (see R7335 outputs for further details of the management systems operated in community fisheries and the benefits

from each). Stocking and many of the monitoring costs may have been similar but it is likely that someone would have had to be employed in order to protect the waterbody from illegal fishing (unintentional or otherwise) and it is estimated that this would have cost about USD 360 per waterbody, based on one person at each waterbody employed for 270 days at an hourly rate of USD 0.33 per hour and four hours per day.

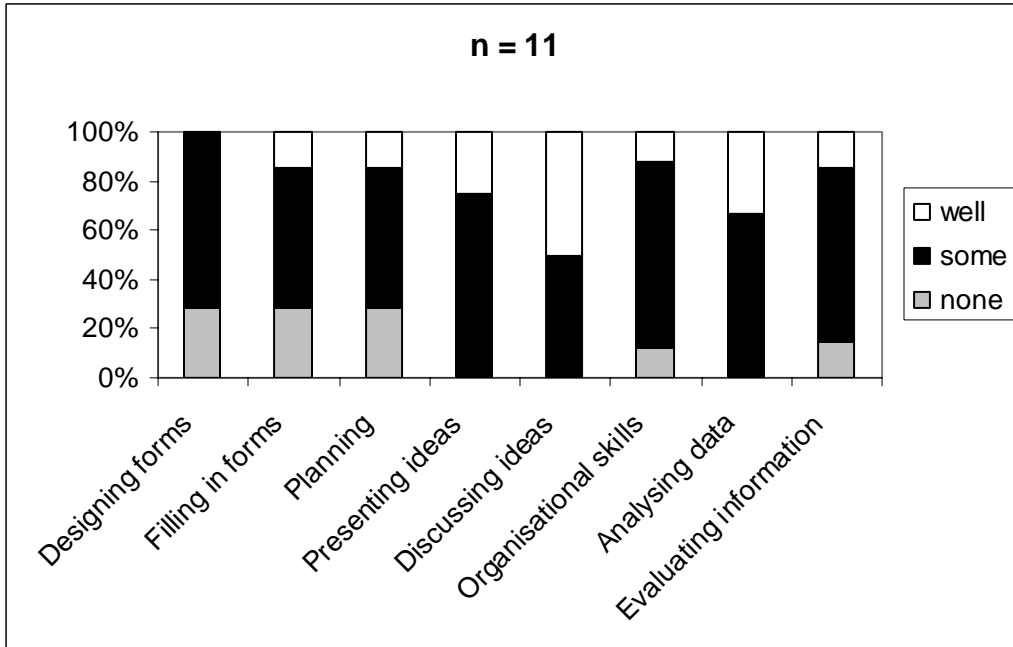
While the total costs would have increased by an initial USD 27,000 (from USD 34,650 to USD 61,650) it is assumed that some of these costs could be recouped by holding a fishing day at which fishers would pay to fish. Based on the mean income per hectare from fishing days during the study period of USD 510.5 ha⁻¹, this would provide an income of USD 10,041. This figure is probably slightly high as there are a number of waterbodies that are unsuitable for this type of system as they are either too small, too large or too deep. However it does give an estimate.

This suggests that even with efforts made to recoup costs, to generate only the information about stocking and trophic status would have cost an additional USD 16,959, a 49% increase in the field costs. In addition, because the village committee would have been less involved in the management the opportunities to create ownership of the results and to build management capacity are reduced. This is likely to have a negative effect on the adoption of the recommendations.

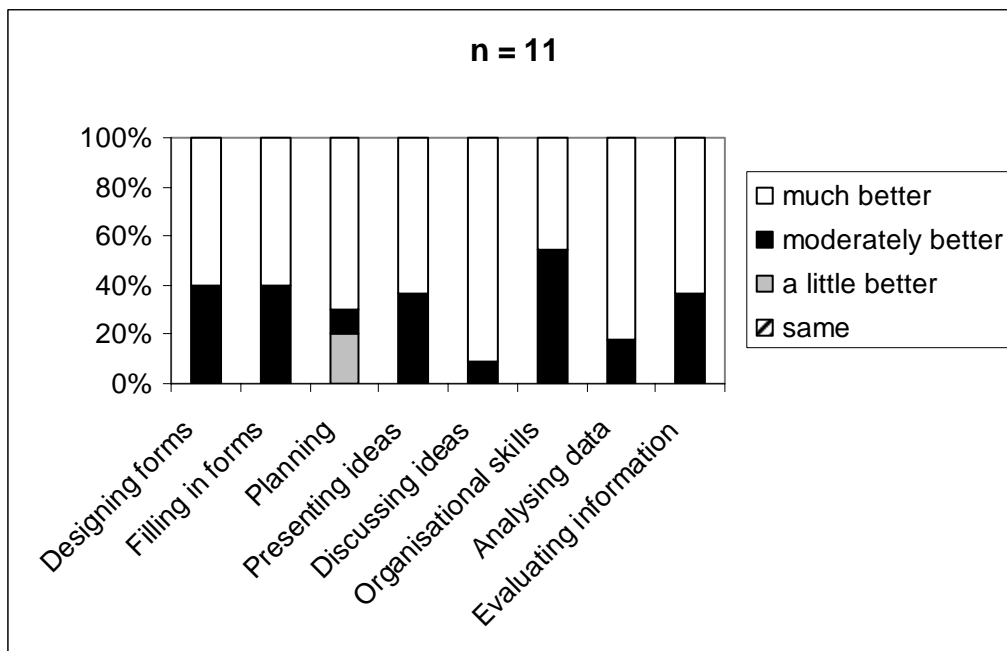
This highlights the fact that in all the cases described above it is important to remember that these were not the only direct benefits of information gain. There was also knowledge and skills being increased in other areas as well including the ability to work together better, increased management capacity, increased skills in fish culture that can be applied elsewhere and so on. The next section deals with this other crucial part of the adaptive learning process which can be potentially be lost through a less participatory and more planned approach to conducting the experiments - the building of skills to provide greater capacity to manage and produce better outcomes in the future.

5.4 Building capacity

Capacity building was a major part of the process. Given that the approach has been about learning there has been a clear and considerable focus on developing the knowledge and skills of those participating in the process (farmers and government staff) as well as generating information that will have wide applicability and influence both farmer practices (e.g. stocking practices) on the one hand and policy towards resource management and development on the other (e.g. the costs and benefits of rental systems). In order to evaluate how capacity had been developed, farmers and district staff were asked to evaluate the extent to which they thought their skills had increased as a result of the adaptive learning approach. The results of these self-evaluations are presented in Figures 10 and 11. As with the changes in knowledge discussed earlier, improvements had been seen in all areas (again not all the questions have been presented here though patterns are similar). In particular there were large gains in the skills relating to presenting, discussing and evaluating information and for the farmers, working with the government staff.

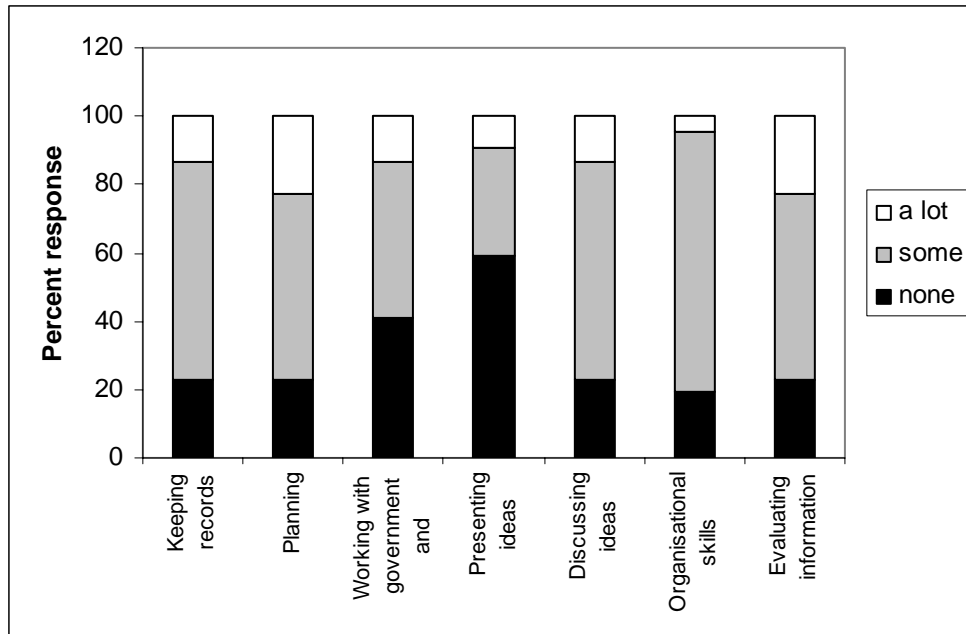


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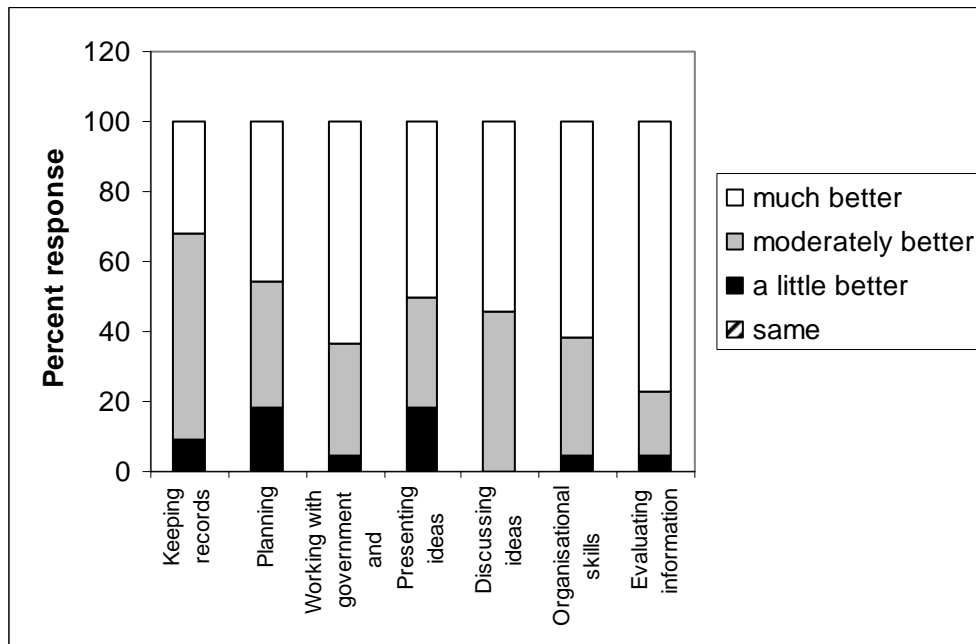


b)

Figure 10. Skills of district staff before (a) and as a result of implementation of the adaptive learning approach (b).



a)



b)

Figure 11. Skills of farmers before (a) and as a result of implementation of the adaptive learning approach (b).

Unlike knowledge, skills development was generally not a result of the information generated from the management experiments. This is an important point as it suggests that the skills had been developed as a result of the way that the project activities had been implemented out i.e. with a focus on active participation, capacity building and

communication. Such results demonstrate the benefits to be gained from working in this way and also why a **participatory** adaptive learning approach can be not only potentially more cost effective (see section 5.3) but can produce benefits far greater than can be achieved by focusing on experimentation and/or information gain alone. The increases in skills over the lifetime of the project indicate that capacity can be built **at the same time** as generating information and does not have to happen before generating information or as something that is undertaken afterwards.

As well as the skills and knowledge increases it is also interesting to look at how attitudes within the different stakeholder groups changed as a result of involvement in the process. In West Bengal the situation at the outset was characterised by a lack of trust both between and within stakeholder groups. On the one hand the perception and attitude of the government staff was that farmers were not adopting the clearly beneficial technology packages that they were promoting and which would produce the 'optimum' production from the resource systems. This was characterised by statements such as "Farmers do not adopt the correct scientific practices". On the other hand farmers both distrusted the government services to deliver any benefits to them (see also Appendix 1 relating to Output 1 regarding sources of information important to farmers) and also did not trust other farmers.

On the other hand, relations between farmers at many of the sites were fraught with jealousies and divisions that operated on a number of levels including, but not limited to caste and politics. These relations led to feelings that were carried in statements such as "I would like to learn from the experiences of others but I do not want to share my own secrets". As with the skills, it was the way in which project activities were implemented that would lead to the changes in attitudes rather than the information itself. And attitudes did change. While the project lifespan was quite short and the attitudes were not drastically changed it was possible to see that perceptions were changing and a more positive collaborative way of working was developing both between the farmers and between the staff and farmers. These changes are apparent in statements that were being made towards the end of the project by government staff such as "This is a new way of working for us but it is interesting and it has made working with farmers and understanding their problems easier" that indicated more appreciation of the opportunities and constraints faced by farmers, "we can see that some of the farmers practices work well now we should try to understand why they work" that also showed an increasing respect for the farmer practices and "some of the farmers should come to our workshop with the director general so each can see how they are part of the bigger picture".

Farmers attitudes towards others appeared to have softened a bit and they were able to see for themselves some of the benefits from working together with statements such as: "now within the group, discussing with my neighbours has helped me deal with my disease problems better" and "it is good that the government staff listen and try to understand our problems".

It is felt that these positive changes in skills and attitudes were very much due to the importance of active participation by these stakeholder groups in the process as well as the types of activities they were involved in. Participation is a very broad church with many different degrees of participation (from consultative to collegiate – e.g. see Biggs 1989) and types of participatory practice, such as information extraction, shared decision making and for the of implementation activities. There are also a number of different

motives behind the use of participation and participatory methods from providing a mask for a continuation of top-down decision making or as a token measure to appease donors for instance through use as a means to reduce the costs (in particular of information collection and resource system monitoring and enforcement) to the use of participatory methods as a means to increase capacity and even to empower. Within the adaptive learning approach we have sought to ensure that stakeholders are involved at all stages and that the objective was to improve and support management decision-making and to increase the ownership of the information generated. On the whole this was achieved although it is acknowledged that it would have been much better if the farmers had a far stronger role in the selection of the learning strategy in addition to the contributions made during the appraisals (identifying uncertainties, opportunities and constraints) and in the development and agreement of management plans.

The results of the participant evaluations are all positive concerning how the participants viewed whether they had been given sufficient opportunity within the stage of the process to contribute (see Figure 12). It is interesting that the scores for the government staff are lower, this may reflect the fact that the primary focus was on ensuring relevance and practicality for the farmers. It is also interesting to see that for both sets of stakeholders the scores have increased over the lifetime of the project. This probably reflects increasing ease and familiarity with the way that the project activities were implemented as well as efforts by those who were implementing the activities to ensure that there were real opportunities for participants to put forward their view and that these were then subsequently acted upon.

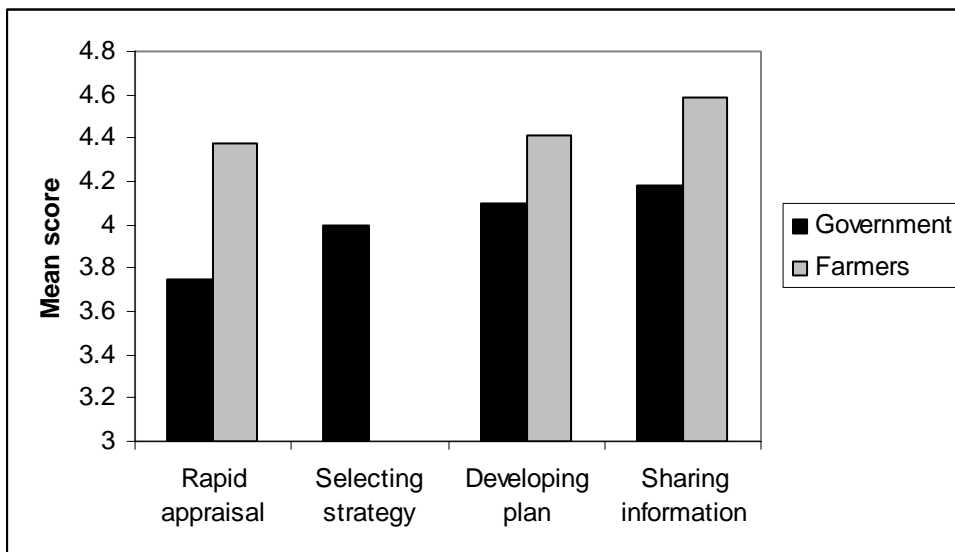


Figure 12. Results of self evaluations by farmers and government staff who were asked whether they felt that they had had sufficient opportunity to contribute for key stages of the adaptive learning process (maximum score = 5).

It is also interesting to look at how the process was perceived by the participants and whether they felt that the activities and methods used were appropriate (see project reports on the adaptive learning website www.adaptivelearning.info for more details on the methods used).. As mentioned the adaptive learning approach requires each stakeholder group to work in new and unaccustomed ways and while every attempt was

made to fit with local practices so that it wasn't too different (for example in the timing and format of workshops, appropriate degree of formality) it was possible that the approach would be too time consuming and that participants might believe that the benefits from being involved in the process might not justify the costs (time, inconvenience etc.). However all the mean scores at each stage were above four indicating that the methods were felt to be suitable (Figures 13 and 14).

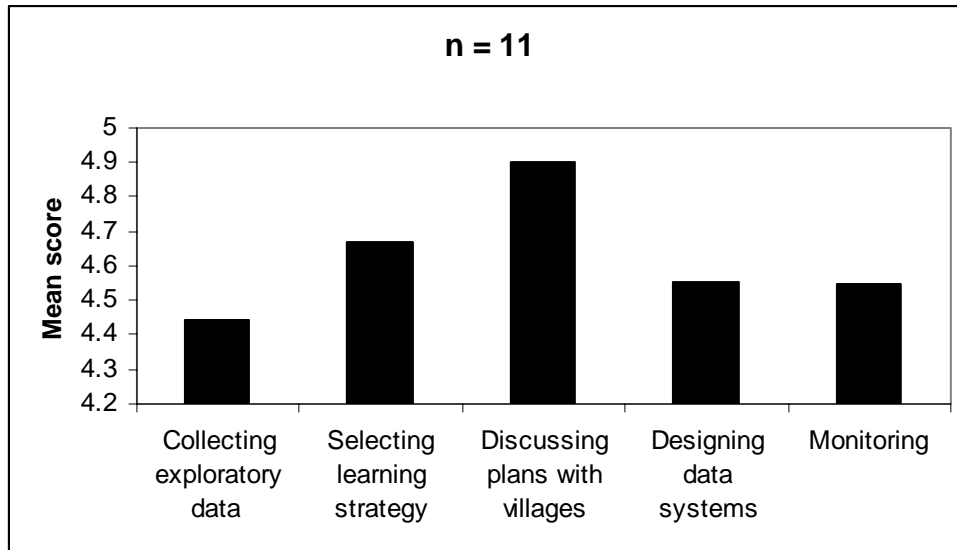


Figure 13. Government staff perception of the appropriateness and suitability of the methods used within the adaptive learning process in West Bengal (Maximum score = 5)

The scores from the government staff (Figure 13) seem to show that there was an increasing familiarity with and appreciation of how the project worked and that this is shown in the increasing scores for the activities. However the scores for designing data systems and monitoring are lower, this may represent the fact that the staff had an important role in data collection and the regular monitoring put additional pressures on the staff who also had a lot of routine work to complete. Overall the process was appreciated and district staff involved in the project activities were keen to discuss the methods used and their experiences with other staff at an annual meeting of staff. This was not planned or facilitated by the project and was an initiative of the staff.

Farmer evaluation scores (Figure 14) were also positive and every indication was that the farmers felt that the methods used were appropriate and that they appreciated them. At the brackishwater site at Tangramari village, a combination of the benefits that were generated through involvement in the project and the the popularity of the approach meant that after 6 months the number of farming households wishing to participate had increased from 20 to 38.

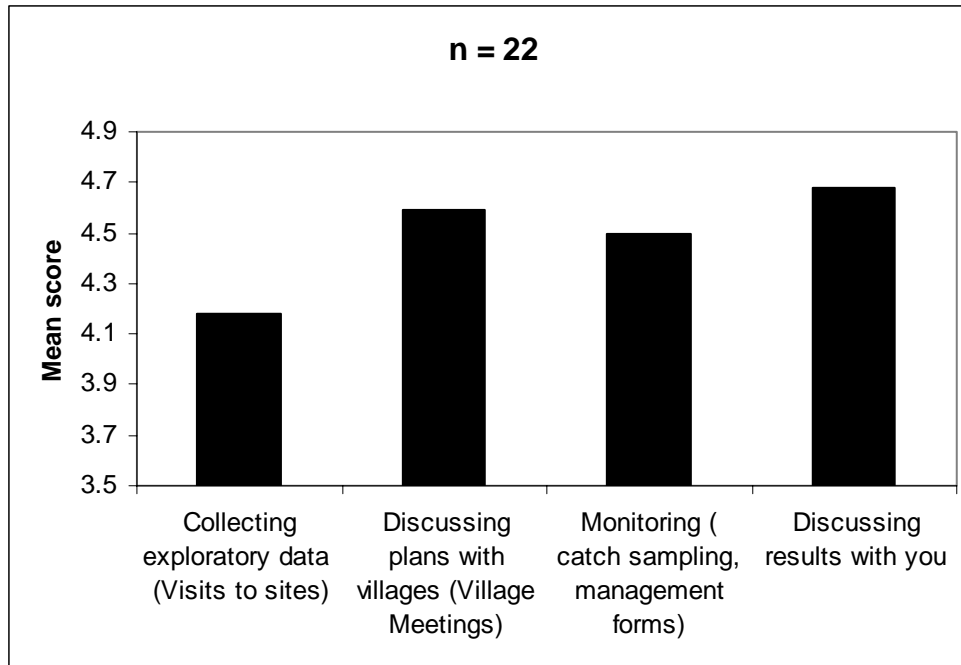


Figure 14 Farmer perceptions of the appropriateness and suitability of the methods used within the adaptive learning process in West Bengal (Maximum score = 5)

6 Summary and conclusions

Overall the implementation of the approach in the various rice-fish systems in West Bengal was considered to have been successful. The information generated from the approach was successful in reducing the uncertainties expected, was shared effectively with stakeholders and, at least in the case of the brackishwater site, is expected to be utilised. The approach has again been successful in building capacity at the same time as reducing uncertainties. In addition, the results from revisiting the Lao sites indicate that the approach can provide relevant and practical recommendations that bring about positive changes to the management of the resource systems that meet local needs. Crucially this can also potentially be achieved at lower cost than more top-down approaches and provide additional benefits over such an approach.

Evaluations during workshops showed that comprehension was high and that there was a willingness at the brackish site to adapt management practices. Stakeholder evaluations of the whole process showed that they thought levels of participation satisfactory and methods appropriate and also showed that they felt that both their skills and knowledge had been increased as a result of their involvement. However the fact that the farmers at the freshwater sites are less likely to adopt the recommendations indicates that there is a need to involve resource users to a greater extent in the selection of the learning strategy to ensure that the recommendations are likely to be relevant given the set of opportunities and constraints that they face.

The constant evaluation throughout the process was important and allowed the activities to be adapted and improved as required so that they were made more effective, as can be seen from the trends in the scores over time.

7 References

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Appendix 1 – Example of a workshop participant evaluation form

Review and evaluation – please score 0 = very poor, 5 = very good						
Did you understand the objectives of the workshop?	0	1	2	3	4	5
Were the objectives achieved?	0	1	2	3	4	5
Was the workshop well organised?	0	1	2	3	4	5
Did you have enough opportunity to contribute?	0	1	2	3	4	5
Do you feel you learnt something?	0	1	2	3	4	5
What were the three most important things for you? 1. 2. 3.						

Appendix 2 – Example of a Project Evaluation Form

Skills & knowledge

How good were your skills before the project and how much have your skills have improved because of this project ?
Fill in the table with ?

	Before project			Improvement because of project				Comment
	0	+	++	same	a little better	moderately better	much better	
Keeping records								
Filling in forms								
Planning								
Working with government and researchers								
Using participatory methods								
Presenting ideas								
Discussing ideas								
Organisational skills								
Evaluating information								

How much did you know before the project and how much has your knowledge has increased because of this project ?
Fill in the table with ?

	Before project			Improvement because of project				Comment
	0	+	++	same	a little better	moderately better	much better	
Fish ecology								
Growth of different stocked species								
Yield and income from high growth or high yield fish								
Yields from different rice varieties								
How to manage the fishery								
Rice cultivation								

Project methodology.

How appropriate was the **way that the project worked?**

(0 = not appropriate methodology, 5 = very appropriate methodology)

Fill in the table with ?

	0	1	2	3	4	5	Comment
Collecting exploratory data (Visits to sites)							
Discussing plans with villages (Village Meetings)							
Monitoring (catch sampling, management forms)							
Discussing results with you							

Any other comments about the way that the project worked?

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	Involvement			Comment
	Too little	Enough	Too much	
Identifying stakeholders				
Rapid appraisal (September – December 2002)				
Selecting the learning strategy				
Designing experiment				
Analysing data (District staff workshops)				
Planning how to implement experiment				
Discussing plans with villages (Village meetings June 2000)				
Designing method of monitoring				
Stocking and planting				
Monitoring (test fishing, district forms, record books)				
Evaluation of information collected and project methodology				