Adaptive learning: a practical framework for the implementation of adaptive co-management

Lessons from selected experiences in South and Southeast Asia

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ACKNOWLEDGEMENTS

These guidelines have arisen from a perceived need to synthesise, in an accessible manner, the experiences gained from trying to implement an adaptive co-management approaches to fisheries management in Lao PDR, Vietnam, Thailand, Cambodia and West Bengal in India. Starting in 1999, the Adaptive Learning projects have developed, tested and evaluated the approach in a range of resource systems and some of the lessons learnt are described in this short publication.

The experience, the result of close collaboration between MRAG Ltd, (London, UK) the RDC (Savannkahet, Lao PDR), Mekong River Commission (Vientiane, Lao PDR), WorldFish Center (Penang, Malaysia), Departments of Fisheries and Agriculture in West Bengal (Kolkata, India) and the Central Inland Fisheries Research Institute (Barrackpore, India) could not have been gained without the help and participation of a vast number of people. In particular, we thank the extension staff from the Department of Livestock and Fisheries, (DLF), in Savannakhet and from the Departments of Fisheries and Agriculture in West Bengal for making their staff, who worked with energy and enthusiasm throughout, available whenever possible. In addition, very little would have been acheived without the interest and effort of participants in all the villages who agreed to participate in the activities and who shared their knowledge and experiences with us. We are extremely grateful to them. We are grateful to Pat Norrish and all those who have taken the time to provide feedback on the original guidelines and commented on early drafts. Thanks also go to the STREAM Initiative who have assisted us with the translation and distribution of these guidelines to Simon Bush who took some of the photos and to Jeff Eden who designed the project logo.

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Cover photo. Sunrise over rice fields in Champon, Savannakhet, Lao PDR taken by Simon Bush

Project logo based on an original by Jeff Eden (j.eden@rbgkew.org.uk).

It is also anticipated that copies of these guidelines will be downloadable from the MRAG website (http:// www.mragltd.com) and the Fisheries Management Science Programme website (http:/fmsp.org.uk).

WHY THESE GUIDELINES?

The aim of these guidelines

For the last five years we have been applying 'adaptive learning' approaches to the management of fisheries systems in South and Southeast Asia. Fisheries, like many renewable natural resources, are often complex and dynamic in both their nature and their management arrangements. This means it is often not possible to say with certainty how the system works, or be able to accurately predict what the outcomes of management actions might be. This uncertainty surrounding the resource system leads to conditions where complete control of the system is not possible.

Our experience with the management of inland fisheries in South and Southeast Asia led us to feel that there has been a lack of guidance for those involved in management under such circumstances. Existing guidelines we have seen often not only suggest some form of 'best practice' but also assume that the resources necessary to implement it already exist. This is different from the sort of complex and dynamic bioeconomic systems we encountered that have so often been characterised by low technology, low skills and a lack of available capital. In these cases, not only is management 'best practice' itself either uncertain or unknown but the resources to implement such practices, even if they were known, are often lacking.

While imposing constraints, we believe these systems also provide many opportunities. Local users may have little financial capital but often have a wealth of knowledge about the resource system, management arrangements, local communities and their needs that can be utilised. Often resource systems, for example paddy fields and reservoirs are both common as well as different in their biology and/or management arrangements. This provides an opportunity to compare differences across systems and learn. In addition, given the opportunity to do so, individuals and communities will often experiment with management over time to better adapt management to local requirements. As well as information from experimentation, communities and individuals have been found to value, and benefit from, opportunities to share experiences with others. These opportunities are also enhanced by the potential of external agents. These agents can complement these attributes with their access to technical and scientific knowledge potential to facilitate communication between users.

These are situations that we beleive are not uncommon in developing countries and that some guidance on dealing with them, would be beneficial. Results have suggested that the adaptive learning approach is a very promising one for the development and co-management of natural resources in such conditions. These guidelines therefore aim to address this perceived gap and are a result of our wish to share our experiences with a wider audience.

What is adaptive learning?

We will discuss adaptive learning in more detail on later pages but briefly, experience with the management of many renewable natural resources has shown that often benefits from management are either less than expected or are not sustained. This is because management advice is either not available or, being provided in a top-down manner, is too general to account for local complexities and the uncertainties they create.

Adaptive learning then is a management approach that clearly accepts that uncertainties exist and that we don't have all the answers. Instead of glossing over these uncertainties however, the approach seeks to reduce them ***at the same time*** as managing the resource. In such cases learning, and reducing uncertainties about the resource system being managed, becomes a vital and integral part of management itself.

GUIDELINES STRUCTURE

PART 1 — Overview

This section of the guidelines introduces the principles of adaptive learning and describes some of the implications these have for implementing the approach. This includes some of the skills and resources that are required, as well as some of the organisational structures and processes that need to be in place. The main stages of the process are outlined and the section finishes by providing a summary of the key learning points and a case study of where the approach has been used to good effect.

PART 2 — Preparing to learn

This section looks in detail at laying the foundations for learning. It includes ideas on how to identify the relevant stakeholders and how to design and set up communication networks between the various groups. This is followed by a description of how to identify what can, and needs to be, learned. The section ends with some key learning points.

PART 3 — Learning

Having laid the foundations, Part 3 looks in more detail at the process of learning itself. Two key aspects of learning are discussed in detail here — how to generate information and how to effectively share information. Real world examples are presented and, again the section finishes with key learning points.

PART 4 — Evaluating learning

No process is complete without evaluation and this one is no exception. This section looks at methods of evaluating both the outcomes of learning and the process of learning itself. This evaluation is key to improving information available and people's capacity to learn.

PART 5 — Resource and reference guide

The final section provides details of some useful references, resources and contact details of relevant organisations.

Who is this guide for & how should it be used?

This guide is aimed at anyone involved in renewable natural resources management in a development context. It will be of particular use to individuals and organisations that are already involved, or who intend to be involved, in assisting communities to learn about and improve the management of their natural resources.

We recognise that every situation will be different some-how and so have developed these guidelines as a sort of tool-box outlining a process and showing some useful methods and how these might be used. Without being prescriptive, the emphasis is very much on how adaptive co-management can be done and the principles upon which the adaptive learning framework is based together with lessons learned from our own experience. We hope that you will find these useful and that you will adapt them for your own needs.

Photo: Villagers and government district staff record catches at a fishing day. Khammouane province, Lao PDR (Source: R. Arthur and C. Garaway).

FOCUS ON LEARNING: PRINCIPLE ONE

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It must be recognised that we may be working with only a part of the community e.g. the fishers. Furthermore, communities are made up of individuals, often with different and sometimes conflicting needs and objectives.

Co-management

It is increasingly recognised that co-management approaches to natural resource management, where responsibility and/or authority for management is shared between governments and the local 'communities' who use resources, can, and has, led to improved resource management. Indeed in many cases, particularly where control over resource use requires the involvement of the community, it is vital to ensure good management. An important point to note here is that co-management means ***shared decision-making*** and not simply shared responsibility for implementing management actions, data collection and enforcement. This means that to be able to make positive decisions, communities also need to be well informed. This in turn has implications for how we can create the conditions in which responsibility can be shared. We must put an emphasis on supporting the sharing of responsibility by treating co-management as a capacity and capability building process.

Why learning?

Unwelcome but true, the management of renewable natural resources often has to proceed despite incomplete information. Natural resource systems are extremely complex and the interactions that exist within and between resources and resource users are often only partly understood, if at all. In addition, resource systems can show local variations that make generalisation difficult. The failure of generalised solutions, often presented as 'blue-prints', in complex and uncertain environments has led to increased focus on management approaches, like adaptive learning, that can potentially provide more location specific and dynamic solutions.

Adaptive learning has its roots in approaches that first began to emerge in the mid 1970's. These approaches have been developing separately in the renewable resources management, economic policy, and development management fields (some references ire provided in Part 5). While the emphasis has been different in each case, these approaches have shared the same fundamental idea. This is that management action is necessary despite imperfect knowledge and management should therefore be part of a structured learning process where ***management*** and ***earning*** are occurring ***at the same time***.

This sort of approach contrasts with more traditional management approaches, particularly in the natural resource fields, where research and learning is usually detached from the decision-making process, and there is an emphasis on learning ***before*** managing.

What is learning?

Much has been written about the nature of learning (see also references in Part 5), and of particular relevance here, organisational learning and the learning organisation. Whilst many views abound, a conceptualisation that we found useful in implementing the adaptive learning approach (and one used again in this booklet) was to see learning as a three-stage process comprised of: information generation, information sharing and information utilisation (see diagram). The

Photo: Analysing data on stocking patterns in brackishwater rice-fish systems in West Bengal (Source: R. Arthur).

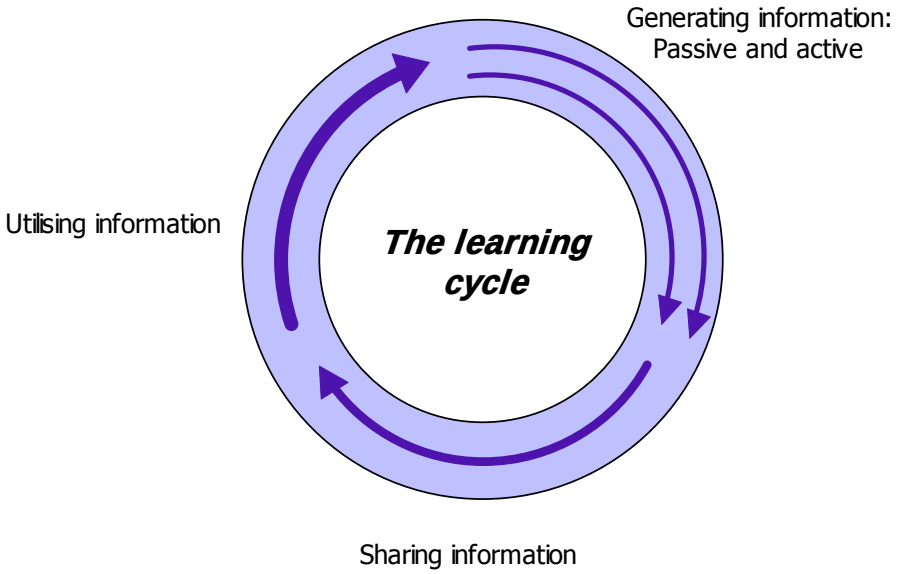


diagram is depicted as a circle because the implementation of the outcomes of learning can lead to more information generation in and of itself.

Generating information

Information generation, as its name suggests, is the development of existing, or creation of new, information. In natural resources management, this information can be generated in two ways: by the observation and analysis of variation already existing in the management systems (passive information generation) or by the observation and analysis of variation that has been deliberately introduced into the management systems for the purpose of learning (active information generation). In both cases the variation can be through either time or space. However it is important that the variation should be large enough to provide necessary contrast (for experimental design issues see p.24)

Sharing and utilising information

Learning as a group can not occur until information has been shared and integrated in a way that makes it broadly available and generalisable to new situations. We feel strongly that the sharing of information is just as important as the generation of new information. Who information should be shared with and utilised by, and the implications of this, is discussed on the following pages.

Key points on learning

Our experiences have suggested that in addition to considering learning as a three-stage process there are two further points related to the focus on learning. These have also influenced the development of the approach and will feature throughout the guidelines:

- The outcomes of management are not only about technical interventions but also how people use and interact with the resource system. We therefore need to understand both the social and technical aspects of the system.
- Learning must be demand-led and appropriate. As well as the focus of learning being on what the user communities want to know, any key information generating activities must be acceptable to them in terms of the risk involved in experimenting (see also p.24).

LEARNING BY ALL: PRINCIPLE TWO

We have, in the last section, established that there is a need to involve the user community in the process of generating information if the information is going to truly reflect their needs rather than what we assume their needs to be. However, bringing learning/research into management requires that another group of stakeholders, the researchers - frequently not involved in hands-on management, are also involved in the process.

An effective learning partnership

More on stakeholders and stakeholder analysis can be found on p.16.

A learning partnership between stakeholders including, but not restricted to, government, non-governmental organisations (NGOs), local users and researchers has the potential to build on the particular strengths, skills and knowledge of each. This can thereby improve the quality and scope of learning as well as the number of people benefiting from it. We identified three key points that we feel are crucial considerations when thinking about building effective learning partnerships and that should be borne in mind when working collaboratively with different stakeholder groups.

Photo: Example of the capacity users have to monitor and enforce regulations—guard hut and boat used to patrol waterbody in West Bengal (Source: R. Arthur).

Photo: Staff from CIFRI and the Department of Fisheries discuss seasonal land use with fishers in Tangramary village, West Bengal (Source: R. Arthur).

1. People will only work together if they can see the benefits of doing so

While this may seem obvious, in practice it is not always considered. Sometimes we assume that because we come with good intentions then it follows that people will want to work with us, or with each other. However time spent participating in adaptive learning comes at a cost. Therefore there has to be a commitment to transparency, developing skills, in empowerment and explanation. This is vital. Only by doing so will it be possible to develop trust and mutual respect, including of different knowledge types, that is so crucial to successful co-management.

2. Build on existing assets

The process of creating a learning partnership should be ***asset-based***. This is to say that we should be building on existing strengths rather than focusing on gaps and weaknesses.

There is a need to recognise the different

Strengths	Local communities	Government	External researchers
Capacity to make management regulations	☑☑☑	☑☑	
Capacity to monitor & enforce regulations	☑☑		
Knowledge of local resources and needs	☑☑☑	☑☑	☑
Scientific knowledge	☑	☑☑	☑☑☑
Traditional research skills		☑	☑☑☑
Access to experiences of others	☑	☑☑	☑☑☑
Financial resources	☑	☑	☑☑
Capacity to bring different stakeholders together to share experience		☑☑	

Table: This table shows the relative strengths of the different stakeholders identified in southern Lao PDR.

perspectives, skills and knowledge of participating stakeholders and use these as the foundation for the partnership. Close collaboration between government, managers, researchers and resource users will bring the greatest benefits but is often a huge challenge. Frequently it is the case that each group has a different perspective and ways of thinking and doing. Addressing this challenge is a fundamental component of adaptive learning.

The table above shows the skills and strengths of the different stakeholders that were identified in southern Lao PDR Characterising these strengths and weaknesses early on in the process enabled us to start identifying the possible roles and methodologies for each group in information generation. The methodologies that we used to do this are explained on pages 16 and 17.

As can be seen in the table above, strengths varied, but with careful planning they could complement each other and increase the learning potential of all in a process of ***participatory research***.

3. Develop appropriate sharing mechanisms

Information needs to be generated and shared in an appropriate and timely fashion. This means facilitating the learning process in locally appropriate ways and creating mechanisms that allow people to develop their own understanding and knowledge. This requires a clear communi-cation strategy from the start that identifies communications pathways and the best methods and media for communicating between stakeholder groups. Identifying the strengths and weaknesses of the different stakeholder also enabled us to begin to identify the methodologies that would facilitate effective information sharing. These issues are dealt with in various places over the coming pages.

Techniques for conducting participatory research are well documented. (see references in Part 5 for an introduction). Some ideas are also discussed later in this booklet.

LAYING THE FOUNDATIONS

What facilitates a productive learning partnership?

In the previous pages we talked about the key principles of adaptive learning but, before starting off, it is useful to start considering what is required to successfully implement such a learning-based approach. The primary requirement is that local resource users are already managing / co-managing their natural resources or are interested in doing so. Your organisation must also be committed and able to work with these people, as without this, any learning partnership obviously becomes meaningless. But there are also other things to think about. The following statements and questions have been designed to help you and your colleagues identify and discuss your current learning capabilities and needs. Whilst not crucial from the outset, they are characteristics to work towards to enhance likelihood of creating a successful learning partnership. The important thing is to be realistic about what is achievable now and build from there for the future. Dramatic changes in organisations are unlikely to be as sustainable as small incremental steps, building on current strengths.

Photo; Identifying and discussing needs & capabilities in a workshop setting: RDC 2001 (Source: R. Arthur & C. Garaway).

1. The approach requires that all are open to learning. This does not only include individuals but, crucially, organisations themselves. Openness to learning within an organisation can manifest itself in several ways. Below are some characteristics to consider.

Organisational characteristic	Some examples of questions to think about
Open to critical evaluation	a. Do you have set procedures for monitoring organisational activities? b. Do you regularly have meetings to evaluate performance of these activities and is everybody involved given the opportunity to participate? c. Does your organisation encourage people to be frank and honest about 'failures', seeing them as learning experiences? Or is failure seen as something negative to be 'covered up'? d. Do you have active and ongoing discussions, about how performance can be improved?
Commitment to skills development and enhancing staff's capacity to learn	a. Is there an active in-house training system in your organisation? b. Do staff regularly go on training courses to outside organisations? c. Are there courses available that will improve learning skills? What about 'learning to learn' training? d. Are staff regularly informed about the training options open to them and are they actively encouraged to participate?
Mechanisms for sharing information	a. Are there structures and processes in place that allow staff to share skills and experience on a regular basis? b. Are their effective feedback systems to share new knowledge?
Organisational flexibility	a. If, through a process of stakeholder participation, original plans need to change, to what extent, and how quickly can your organisation do this? b. Can you backtrack on original aims? On your method of working? On who you are working with? On budget or timing issues?

Information about Training organisations in the South/ Southeast Asian region can be found in Part 5.

2. Adaptive learning requires bringing together different stakeholders and creating a situation where all are able to meaningfully and actively participate. As an organisation implementing adaptive learning, you will have a key role in facilitating this process. Some key mechanisms facilitating this are presented below.

Organisational characteristic	Some examples of questions to think about
Well developed communication links	a. Are you in direct contact with all relevant stakeholders and how well established are your relationships with them? b. Do you have well established and effective methods of contacting them and how frequently do you have face-to-face contact? c. Are relevant stakeholders in touch with each other and how well established are their relationships? d. Are relationships between all stakeholders non-existent, strained or good. Do you have established ways of improving the situation?
Methods for discussing ideas with people of possibly different educational, cultural, ethnic backgrounds.	a. Do you already have different ways of communicating with different types of people and are they always effective? b. Do you set aside time to discuss within your organisation, and with the affected groups themselves, what are the most effective ways of communicating with different groups? c. Do you have staff trained in communication skills and are such skills recognised as crucial in your organisation?
Appropriate places for discussions/ meetings/ workshops	a. Do you have access to places for discussing ideas that stakeholders will be comfortable in, and that are appropriate and convenient? b. Are you able to go to them if they cannot come to you? c. Do you have the resources to transport stakeholders to meetings etc. if they do not?

3. Whilst the above will help create enabling conditions, meaningful participation will not occur without strong commitment to the concept from all involved, and the resources and skills to see the process through. Reaching agreement via participatory decision making is often a difficult, time-consuming and expensive exercise.

Organisational characteristic	Some examples of questions to think about
Organisational will and mandate	a. Is a commitment to the active involvement of stakeholders in decision-making part of your organisation's ethos and part of the ethos of those organisations you must answer to (funders, umbrella organisations etc)? b. Are organisational activities already organised via a 'bottom up', demand-led approach or do instructions come from above? c. Do you have the mandate to organise activities in a more bottom-up way, if desired? d. How flexible is your organisation? (See questions on page10)
People skills	a. Do you already have skills to facilitate participatory decision-making. These could include skills in facilitation, translation, consensus –building, negotiation and conflict resolution b. If not already existing, are you committed to developing these skills and do you know where to get assistance from outside?

Information about training organisations in the South/ Southeast Asian region can be found in Part 5.

THE STAGES OF ADAPTIVE LEARNING

The diagram on this page represents both an overview of the stages of the adaptive learning process, and a framework for the contents of the rest of this booklet. As with the learning cycle, we consider the process to consist of three stages. These are, namely, preparing for learning, learning and evaluating learning. Each of these are described below and are, in turn, dealt with more extensively in the next three parts of this booklet.

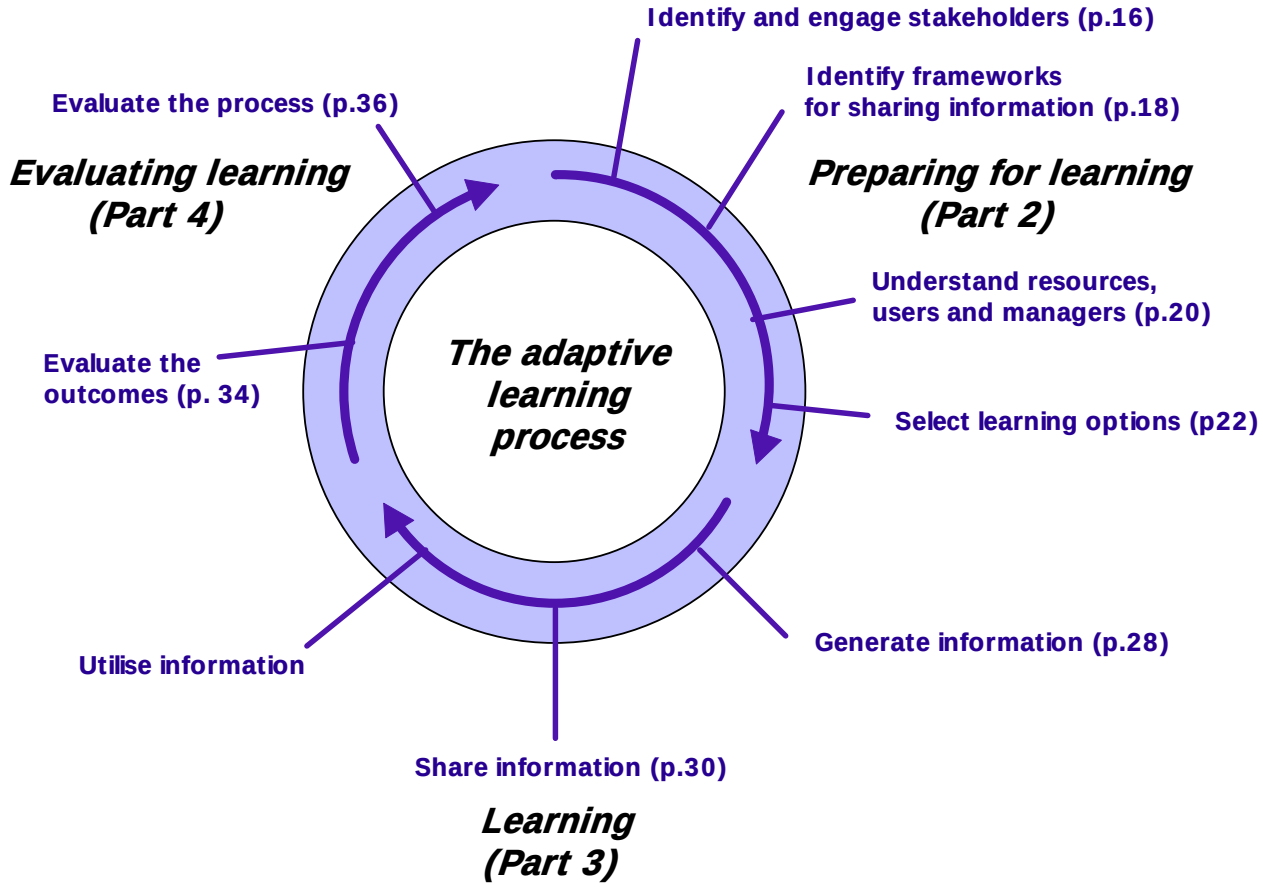
Preparing for learning

The first stage concerns preparation for learning (top right part of the diagram). This stage consists of four different activities to be implemented:

1. Identifying and engaging stakeholders and developing an understanding of the resource management systems in question will enable you, together with stakeholder groups, to identify where current priorities and gaps in understanding lie.
2. Identifying the current pathways and nature of information exchange

Photo: A resource mapping exercise with villagers in Kamardanga village, West Bengal to help in developing a common understanding of the resource system (Source: R. Arthur).

Diagram: The adaptive learning process. Refer to appropriate part of the booklet or page number for more detail on each relevant part of the process.



A FRAMEWORK

between stakeholders will enable you to identify current opportunities and constraints for generating and sharing information in the future.

3. Together, these activities will lead to the creation of a common understanding of the resource system amongst the stakeholder groups that will provide a basis for identifying and evaluating the different learning options open to you.
4. You can then formulate a learning strategy that will generate the required information combining a number of the available options based on cost and attitudes towards risk of the stakeholder groups.

Preparing for learning is a critical part of the process. This is where collective decisions are made regarding management experiments, what information should be generated and how. It is also where decisions are made about how the information will be shared and what the roles and responsibilities of each stakeholder group will be in the rest of the process.

While many participatory processes have an action planning component to them, we feel that adaptive learning differs is in that planning is linked explicitly to learning, i.e. that ***learning is an objective of doing***. Learning strategies, whether relying on existing variation or creating variation, should be based on experimental design principles to ensure that they will, in fact, produce the required information.

Learning

As discussed previously, learning as a collective is not only about generating new information (in fact this may not even be necessary) but is also about disseminating information effectively to those who need it. Importantly, dissemination must be done in a way that enables information to be assimilated, utilised and also generalised to new situations.

It is only when information has been assimilated to create new knowledge, and management has been adapted in the light of this new knowledge (information utilisation), that learning is complete. The learning stage therefore includes not only activities for generating information, such as monitoring systems for data collection and analysis, but also methodologies for sharing it amongst all relevant stakeholders.

Evaluating learning

Hopefully, by this stage, new information has been generated and/or shared and this has led to a reduction in uncertainty, and adaptation and improvement in natural resource management. However, evaluation is still critical. We want to be able to reflect on ***what*** we learned, i.e. was the information gain what was expected? If not, why not? We also want to evaluate ***how*** we learned, i.e. were the methods we used effective in increasing knowledge? If not, why not?

Even if the process was successful, were the benefits gained from the new information worth the costs incurred to acquire it? Such critical reflection of ***outcomes*** and ***process*** will increase understanding, enable methodological adaptation and improve the performance of any future iterations of the cycle.

Photo: Villagers complete questionnaires designed to monitor the effectiveness of communication following a planning meeting at Tangramary village, West Bengal (Source: R. Arthur).

KEY LEARNING POINTS (PART 1)

What?

- Adaptive learning is a management approach that clearly accepts that uncertainties as to 'best practice' exist and that we don't have all the answers. Instead of glossing over these uncertainties, the approach seeks to reduce them at the same time as managing the resource. This sort of approach contrasts with more traditional management approaches, particularly in the natural resource fields, where research and learning is usually detached from the decision-making process, and there is an emphasis on learning ***before*** managing.
- As is obvious from the title, the approach emphasises learning, which is seen as a three-stage process comprised of: information generation, information sharing and information utilisation.
- Adaptive learning is a form of co-management and this requires shared decision-making and not simply shared responsibility for implementing management actions, data collection and enforcement.
- Shared decision-making requires that all are well informed and a key element of the approach is the development of effective mechanisms for communicating and sharing information and ideas in order to form an effective learning partnership.

Who?

- The learning partnership may include, but is not restricted to, collaboration between government, non-governmental organisations (NGOs), local users and researchers.
- Bringing together these people has the potential to build on the particular strengths, skills and knowledge of each, improving the quality and scope of learning as well as the number of people benefiting from it.

When and where ?

- The approach can be used in situations where management of renewable natural resources is being carried out in a development context. It will be of particular use when there is a desire to assist communities in learning about and improving such management
- The approach is also useful in situations characterised by low technology, low skills and a lack of available capital. In these cases, not only is management 'best practice' itself either uncertain or unknown but the resources to implement such practices are often lacking.

How?

- Prior to implementation it is necessary to scrutinise the characteristics of your organisation and those of others who may be involved in the process. Key areas for scrutiny are: whether your organisation is open for learning; whether communication methods and networks exists; and whether there is a real commitment to participation. While absence of these characteristics does not preclude an attempt to implement the approach it will constrain what is achievable. It is necessary to be realistic.
- Implementation of the approach is recognised as a three-stage process: Preparing for learning; learning; and evaluating learning. These are the subject of the remainder of these guidelines.

A CASE STUDY FROM SOUTHERN LAO PDR

Community fisheries and adaptive learning

Photo: Fishing day at Dong Noi village, Savannakhet Province (Source: R. Arthur & C. Garaway).

In southern Lao PDR, stocking of small waterbodies (typically 1 – 20 Ha) by releasing small, hatchery produced, fish has been actively promoted by the government to increase fisheries benefits. Many of these waterbodies are managed by local communities, collectively, to obtain benefits for the village as a whole. Besides much needed cash income, these 'community fisheries' can also produce other material benefits, such as fish for poorer households at times of household emergency (e.g. funerals), and non-material benefits such as increasing village managerial capacity and awareness of the importance of aquatic resource management. Where they exist, these community fisheries are often one of the principal, if not only, ways that villages can generate communal income to improve livelihoods and pursue village development priorities, such as improving the village school or contributing towards the cost of bringing electricity to the village.

However, experience had shown that whilst stocking was potentially beneficial, the actual outcomes (in terms of production, distribution of benefits, institutional sustainability etc.) were often different from those initially expected. This was not that surprising as there is always a lot of uncertainty surrounding exactly what will happen when a technology is introduced into a new specific biological and social situation. Whilst those introducing the new initiatives lacked location and context specific information, the villagers involved in stocking and managing, lacked experience and technical knowledge and, being isolated from each other, their learning was slow. To address these needs a Department for International Development (DFID, UK) funded project, brought together researchers, extension workers, waterbody managers and waterbody users to form a learning partnership. Over a period of three and a half years, 38 villages managing community fisheries, in collaboration with all the other stakeholders engaged in locally relevant experimental research. The how, what, why, when and where of this research was determined by those involved. Such collaboration in all aspects of the research process required significant time spent on building trust and mutual respect between groups, understanding and defining differing needs and wants and finding effective means of facilitating discussion, communication of ideas and collective decision-making. Many of the details of how this was done are discussed in the following pages of this guide. Whilst never straightforward, the process brought some significant benefits to all who were involved.

The management experiment resulted in new recommendations for stocking, based on waterbody productivity. The pre-existing management knowledge of many village members as well as new experience gained during research process were effectively shared and generated valuable information about the social and economic benefits and constraints of different management systems. The immediate result of this increase in knowledge has been increased fish yields and community income for villages, and an increase in the technical and socio-economic understanding of all involved. However, this was by no means the only, or possibly even the most important benefit. With emphasis on developing a process that had true partnership in learning as its core principle, the skills developed, and the information generation and sharing network created has laid foundations for continued learning in the future.

WHO SHOULD BE INVOLVED AND HOW

As a starting point it is necessary to establish who the appropriate partners in an adaptive learning approach are. A first step towards this is to conduct a stakeholder analysis.

What is a stakeholder analysis (SA) ?

Stakeholder analysis is an approach for systematically identifying the key stakeholders in a system, and, as in the adaptive learning case for example, assessing who has interests and/or influence in the management of the natural resources in question. More simply, it is about asking questions like: who are possible beneficiaries? Who might lose out? What are the power differences and relationships between stakeholders? What relative influence do they have?

In adaptive learning research is ***combined*** with management and hence, groups from both sectors, who may not usually work together, must be identified. Note: SA should not be confused with techniques to facilitate stakeholder involvement or input in managing natural resource projects or conflicts. SA may be part of the stakeholder approach to management" but it is **not** the same thing.

There are many different versions of the activities to be undertaken in a Stakeholder Analysis, but here we outline a suggested 5-stage process:

1. Identify key stakeholders.
2. Investigate stakeholders' interests, characteristics and circumstances.
3. Identify patterns and contexts of interaction between stakeholders.
4. Assess stakeholders' power and potential roles.
5. Assess options and use the findings to make progress.

For tools and steps on conducting a stakeholder analysis, the following web site was found to be particularly useful. http://www.iied.org/forestry/tools/stakeholder.html. Other references are given in Part 5.

1. Example questions for initial identification of stakeholders

· Who are potential beneficiaries?
· Who might be adversely affected?
· Who has existing rights?
· Who is likely to be voiceless?
· Who is likely to resent change and mobilise resistance against it?
· Who is responsible for intended plans?
· Who has money, skills or information?
· Whose behaviour has to change for success?

2. Examples of questions to investigate stakeholders' interests, characteristics and circumstances.

- What are the stakeholders' experiences or expectations?
- What benefits and costs have there been, or are there likely to be, for the stakeholder?
- What stakeholder interests conflict with the goals of the approach?
- What resources has the stakeholder mobilised, or is willing to mobilise?

Questions here are adapted from the IIED Website mentioned above. Stage 5 is also described in more detail on this website.

3. Method for identifying patterns and contexts of interaction between stakeholders

The IIED website suggests a method known as 'the four R's' to aid identification.

Rights	**Responsibilities**
Relationships	**Revenues**

For more information on this see http://www.iied.org/forestry/tools/four.html.

4. Example questions for identifying stakeholders' power and potential roles.

- Who is dependent on whom?
- Which stakeholders are organised?
- How can that organisation be influenced or built upon?
- Who has control over resources?
- Who has control over information?
- Which problems, affecting which stakeholders, are the priorities to address or alleviate?
- Which stakeholders' needs, interests and expectations should be given priority?

IDENTIFYING & ASSESSING STAKEHOLDERS

Photos. Key stakeholders identified in the southern Lao PDR Case study:

1. ***village waterbody 'committees'***
2. ***Villagers***
3. ***district extension staff***
4. ***provincial fisheries staff***
5. ***External researchers***

(Source R. Arthur, C. Garaway & S. Bush).

More details on stages 1-4 are provided in the boxes on page 16.

There are a number of ways you can collect information for an SA. Some examples include:

- Identification by staff of key agencies, and other knowledgeable individuals.
- Identification through written records and population data.
- Stakeholder self-selection: Encourage stakeholders to come forward through announcements in meetings, newspapers, local radio or other local means of spreading information.
- Identification and verification by other stakeholders. Early discussions with those stakeholders who are identified first can reveal their views on the other key stakeholders who matter to them.

Having explored the issues relating to steps 1– 4, stakeholders can be categorised and information tabulated to help think about stage 5. There are a number of categorisations of stakeholders that you can use for this but some of the most common include:

- primary/secondary;
- directly/indirectly impacted on;
- positive/negative relations; weak/strong connections;
- influence/importance.

Whilst there is a danger that such categorisations can over-simplify the situation, used carefully they can also help to clarify key relationships and impacts and identify key stakeholders that should be considered by those facilitating the implementation of the approach.

COMMUNICATION FLOWS

Having identified who stakeholders are, the next focus is to investigate how information is going to be shared. This requires looking at current communication networks and their opportunities and constraints.

As mentioned on previous pages, learning is not just about the acquisition, sharing and utilisation of ***new*** information, but is also about improving existing systems of information share to make the most of knowledge already there. It should be remembered that a lot of uncertainty comes from not having ***access*** to information as opposed to it simply not existing. Below is the communication flow for the stakeholders in the Lao case study ***prior*** to implementing the adaptive learning approach.

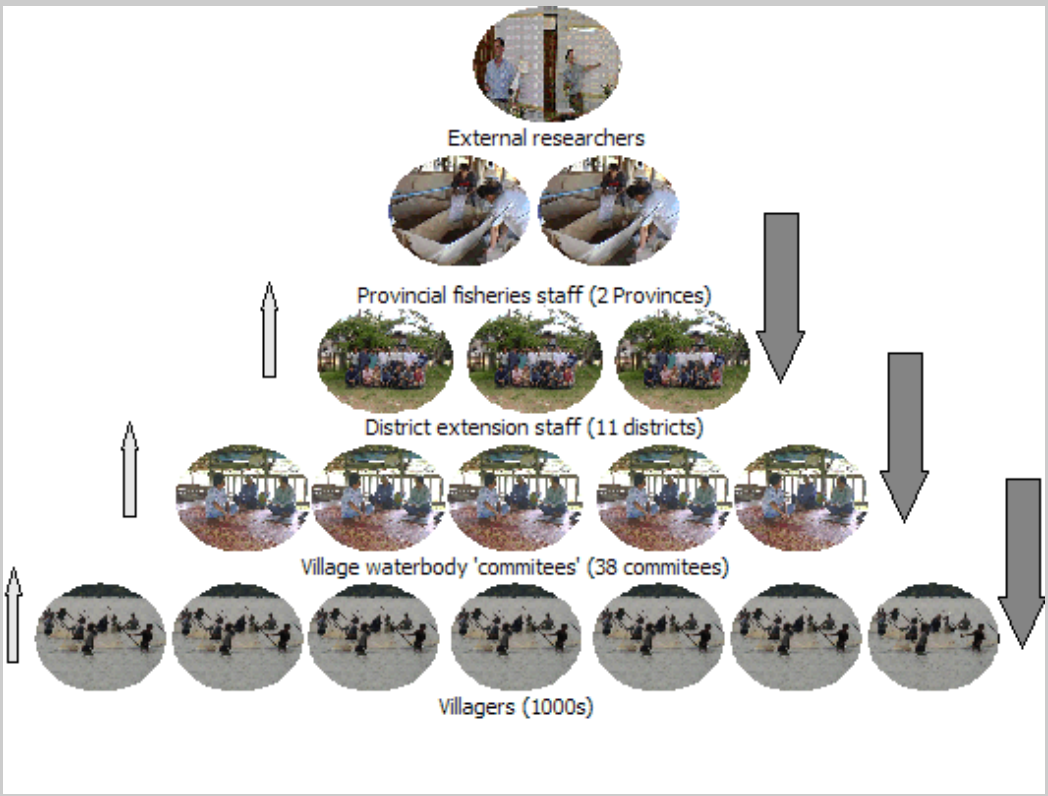


Diagram: The common communication flows amongst key stake-holders in southern Lao PDR prior to adaptive learning.

The system was hierarchical with the majority of information flowing downwards. There was some information flowing back up the hierarchy but this was minimal. There was no sideways communication (i.e. within the different stakeholder groups) and there were no mechanisms for any of the other stakeholders to communicate with external researchers.

In this existing network there were many missed opportunities. Villagers and village committees were users and managers of the resources under investigation and, as such, had considerable local knowledge. However, managing in isolation, and with little opportunity to share this knowledge with other villages, or the other stakeholder groups, their learning was slow and the knowledge they had, seriously under-utilised. Likewise with the district staff — their particular strength was knowledge of village problems and priorities, and first hand experience of the effects of government extension initiatives. However, with limited upwards flow of information, and hardly any communication with other district staff, they were seriously constrained in passing on that information and learning from the methods use by others. Finally, Provincial staff, as well as not getting the information from below about what the real needs and priorities should be, they were neither able to tell external researchers what should be being researched, nor benefit from external researchers scientific knowledge.

DEVELOPING A SHARING NETWORK

This system is by no means atypical of other communication networks in the region, particularly those connected with government extension services. As demonstrated by the example in Lao PDR, it contains many missed opportunities for the sharing of information, knowledge and experience.

What is needed is a system that avoids this hierarchical structure and its normal pitfalls. Of course this may not be immediately possible but again it is something to work towards. Firstly, within this structure it might be possible to increase the 'upwards' flow of information and develop the 'sideways' links. However, ultimately learning will be most effective when all stakeholder groups have the opportunity to share their knowledge and experience with each other.

The diagram above shows the information flows that was deemed both desirable and achievable in Lao PDR. As can be seen, the hierarchy has disappeared and instead stakeholders were expected to be able to exchange information with every other group. At the same time, the proposed network enabled village committees to share information with each other, and district staff to do the same. The only communication pathway that remained largely the same was that for the villagers.

Whilst considered highly desirable, it was not considered logistically possible for all villagers to be involved in the learning partnership. Instead, traditional methods for them to express their views (via the village committees) were kept. However, as an additional check that their needs were being considered, time was always set aside for providing and receiving feedback from this group (via the committee).

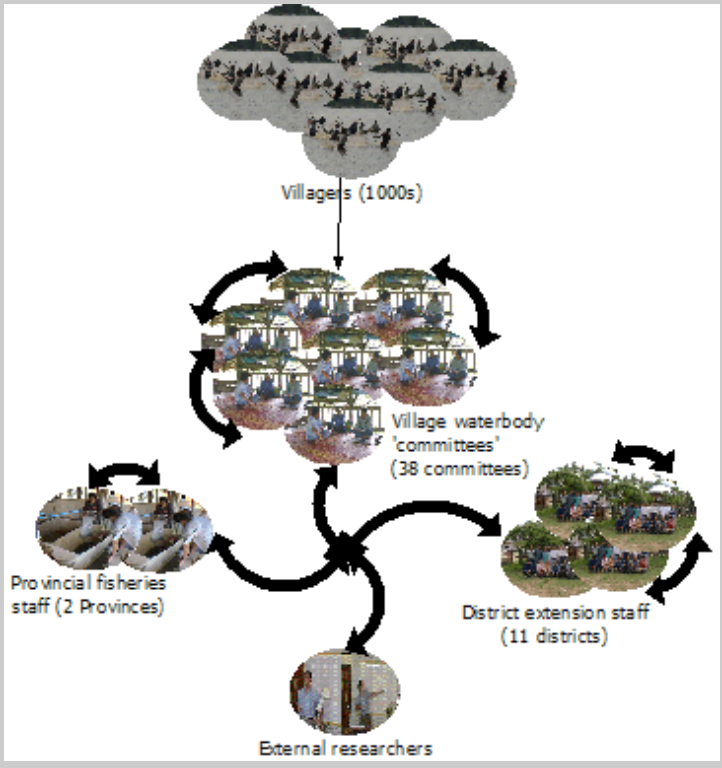


Diagram: The communication flows amongst key stake-holders in the southern Lao PDR during adaptive learning.

In addition when information, coming via the district staff, suggested that there was some conflict arising, village visits were made to allow communication with villagers themselves.

This new desired 'community fisheries information network' was integrated into the overall adaptive learning approach. Exactly how these communication flows were realised is discussed on page 30.

COLLECTING BASELINE INFORMATION

Understanding resource systems

The term 'institution' as used here does not mean the same as 'organisation'. Instead it refers to the rules and regulations in place governing users access and use of the resource as well as their participation in decision-making.

These pages outline the types of information needed to develop an understanding of the natural resource system, another stage in the preparing to learn part of the process. A framework for investigation is presented and some methods that might be useful in collecting information provided.

Developing an understanding will be discussed with reference to one Type of Institutional Analysis and Design (IAD) framework, as shown in the diagram. For a more detailed explanation of this framework, see Oakerson (1992).

The IAD framework

The basic concept of the framework is that the outcomes of resource use are not only determined only by the physical and technological aspects of the resource but also by people's interactions with it. These are in turn affected, but not totally determined, by the nature of rules and regulations set up to govern resource use and how people view these in the light of the nature of the resource. The resource system is described in terms of four main aspects. On the left hand side are those that influence actions of resource users or the resource itself. In the middle of the diagram are the patterns of interaction representing the sum of all individual actions made by all resource users. On the right hand side are the outcomes of these interactions.

Relationships between the aspects are shown as arrows. Some physical/technical attributes of the resource, such as natural productivity, will affect resource outcomes separately from the actions of resource users (top arrow) whilst others, for example size of resource and therefore ease with which regulations can be enforced, may do so indirectly through the effect they have on actions of resource users.

Because the relationship between people, the resource, and the decision-making arrangements all combine to cause the particular outcomes that we see, all should be studied to develop an understanding of why outcomes are as they are.

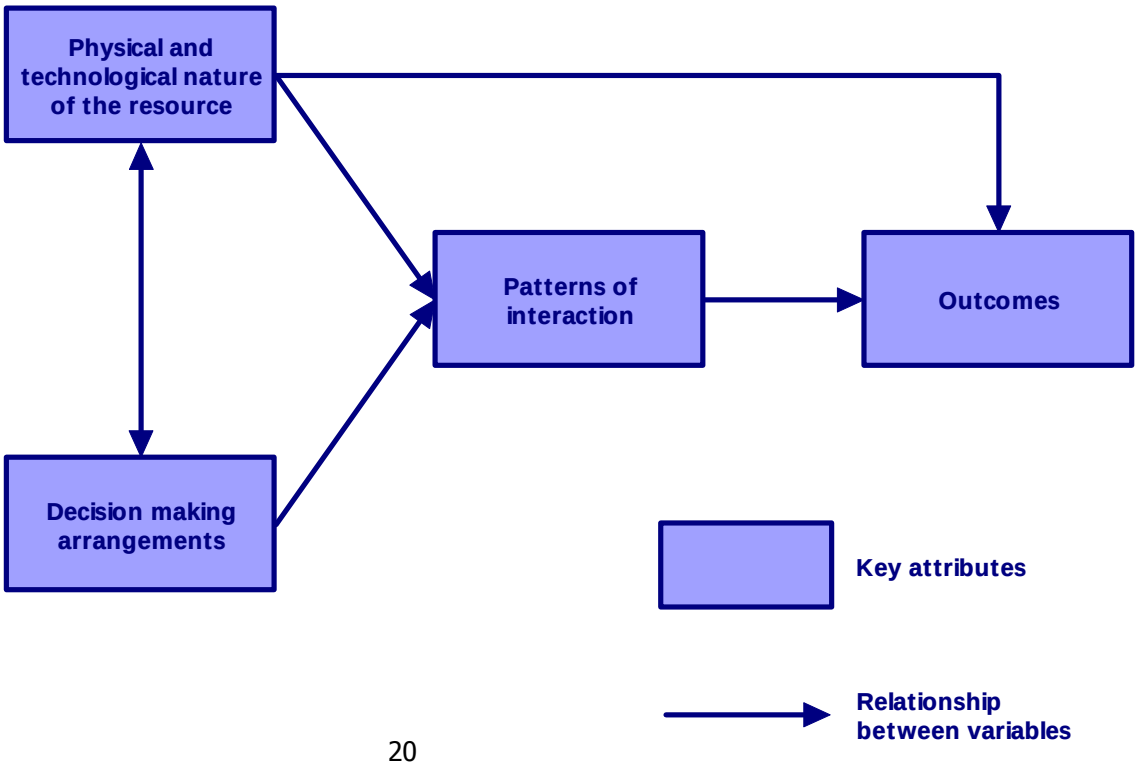


Diagram: Framework for analysing the commons (Source: Oakerson (1992) p.53).

AN 'INSTITUTIONAL' FRAMEWORK

Using participatory methodologies to develop understanding of resource user priorities, Tangramary village, West Bengal (Source: R. Arthur).

Working through the framework

A useful way to approach the framework in practice is to work back through it (from right to left), asking as we go, what is happening, who is involved, why is this happening and how does it occur?

The first step is to examine the outcomes of management, whether these outcomes are considered satisfactory and by whom, and how outcomes are constrained by the physical, biological or technical nature of the resource. The next step is to examine what resource users are doing, including whether they are following regulations or not, and from this develop an understanding of why this is the case by looking at the rules, the resource and how together they influence the actions of users.

Working through the framework in this way, key issues regarding management can be identified such as the user community needs, priorities and objectives — also a requirement from any baseline study. IAD frameworks can help identify a wide range of technical and institutional uncertainties and previously unconsidered potential causal links between management policy, resource use and resource outcomes.

Gaining an understanding of the resource system in this way can help to identify opportunities for either utilising existing knowledge to improve management or generating new knowledge through either passive or active adaptive management. It can also help to identify additional key participants in the management arena that may not have been identified in the stakeholder analysis for one reason or another.

Creating a shared understanding

Having collected the information, it is important that this is then shared with all stakeholder groups and discussed. This provides an opportunity for all stakeholders to have a shared understanding of the resource system and can ensure that your interpretation of needs and priorities is the same as that of the user community.

Possible methodologies

To get the fullest picture of the resource system a wide range of data sources and techniques can be used. Secondary data sources can provide valuable background information. To assess the biophysical nature of the resource direct observation and sampling methods can be used. For other aspects, including user needs, priorities and constraints, we believe PRA techniques and tools may be most suitable.

Tools such as matrices, mapping, wealth ranking and semi-structured interviewing are useful means of collecting information and enabling stakeholders to evaluate their activities while at the same time fostering communications and building trust. Data collection using PRA techniques is less constrained than using questionnaires and forms but requires more training in their use if they are really to be used effectively.

Some useful references on the use of PRA /PLA techniques are included in the guidelines and methodologies section in Part 5.

IDENTIFYING LEARNING OPTIONS

The learning method refers to the type of approach to take given the uncertainty and information available. It may be possible to reduce the uncertainty simply by sharing existing information. Alternatively, it may be necessary to experiment either passively or actively to generate the information.

Baseline studies should give a good understanding of current conditions, needs and priorities. Over the next few pages we shall look at how this information can be used to identify ***learning options*** and use these to develop a ***learning strategy*** based on scientific principles.

The diagram on the opposite page, in combination with pages 24 and 25, provides a tool that can be used to help you determine which uncertainties should be addressed and, in turn, the ***learning method*** to use in each case. This process of selection should be conducted in collaboration with all stakeholder groups to ensure transparency and consensus on the final learning strategy.

Starting at the top of the diagram:

Step 1

The first stage, using the results of the baseline study, is to identify existing management uncertainties, the reduction of which would be ***relevant*** to local stakeholders. In the first instance you should discard all those that are either not relevant to their needs or not practicable for you to address.

Step 2

The second stage is to classify remaining uncertainties in terms of which learning method, if any, can be taken to reduce them; essentially whether information already exists, needs to be generated or can never be obtained. This will depend, amongst other things, on considerations such as the number of sites available, the extent of the differences between them in relation to what you are trying to discover. These are issues of experimental design, as discussed in the box on page 24.

Whichever of the strategies is required will have different implications for what must be considered when evaluating options.

Step 3

The next stepis to evaluate each of the learning options in terms of what it means to attempt to reduce the uncertainty. Strategies that require simply the sharing of existing information (a) are the least complex, but even here the costs of getting the right people together (in terms of time, labour, money) may not be considered worthwhile. Such costs are an issue for all learning options.

If collecting and analysing new information is required, the capacity and resources to do so (for data collection and analysis) will become an additional criteria for evaluation. If changes to management are required to create variation (c), acceptability will have to be considered on top of these issues. Evaluating each option using these criteria should enable you to discard certain options.

Step 4

Having evaluated and discarded options (a non-trivial matter) you will be left with a range of options that are relevant to the needs and priorities of the user community, are within capacity, are not prohibitively costly and are acceptable to stakeholders in terms of risk.

These options should finally be evaluated in terms of their individual expected net benefits. This should be done quantitatively as far as is possible. This, along with the extent to which the options can be combined with other options to further increase returns to effort, can then form the basis for final selection.

In the end you will have a learning strategy agreed by all stakeholders that can consist of a mix of information to share and information to be generated and then shared. The latter may be either through active or passive experimentation or a combination of both.

A SELECTION PROCESS

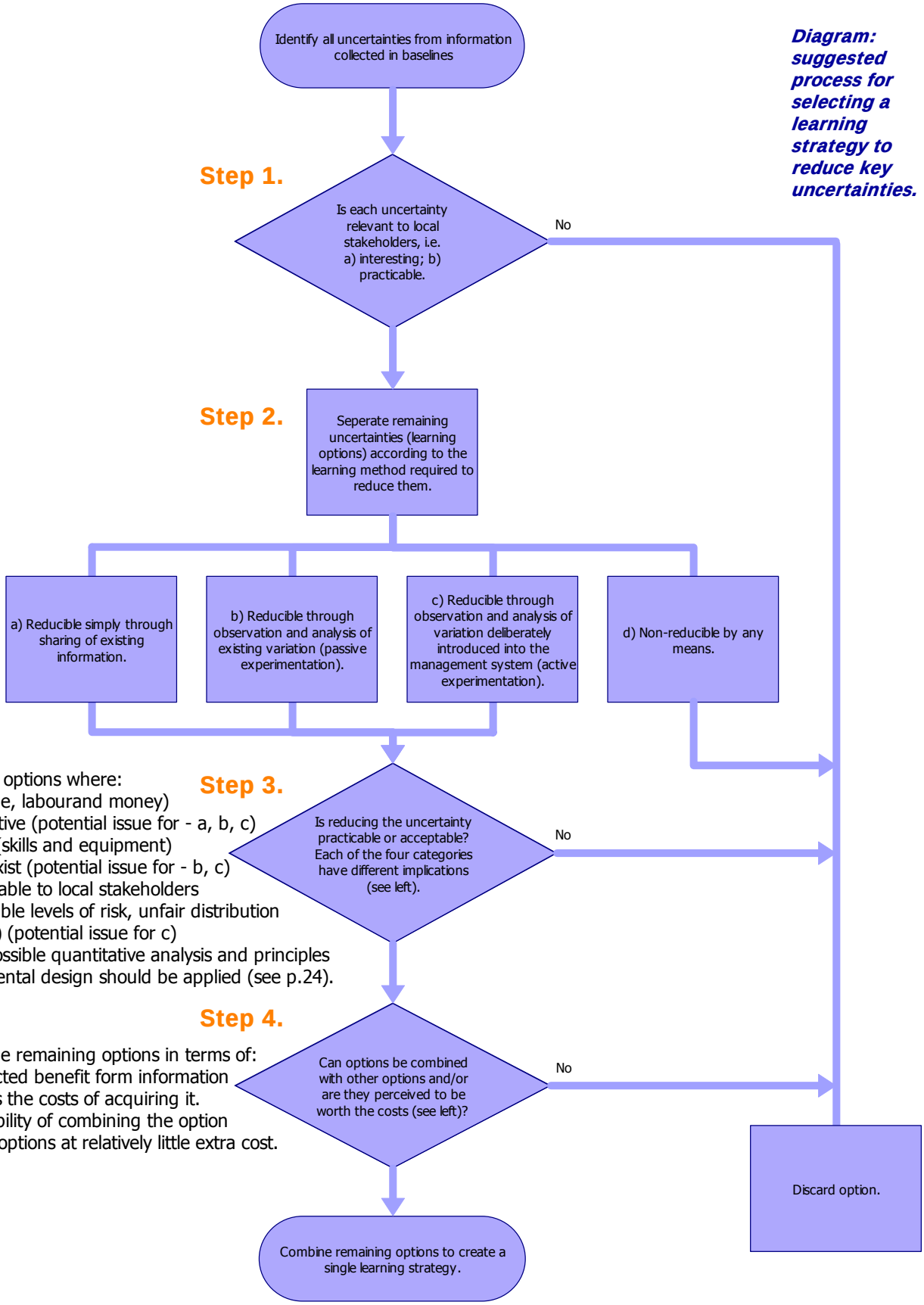


Diagram: suggested process for selecting a learning strategy to reduce key uncertainties.

Discard **all** options where:
- costs (time, labourand money) are prohibitive (potential issue for - a, b, c)
- capacity (skills and equipment) does not exist (potential issue for - b, c)
- unacceptable to local stakeholders (unacceptable levels of risk, unfair distribution of benefits) (potential issue for c)
- Where possible quantitative analysis and principles of experimental design should be applied (see p.24).

Evaluate the remaining options in terms of:
- the expected benefit form information gain versus the costs of acquiring it.
- the possibility of combining the option with other options at relatively little extra cost.

DESIGNING EXPERIMENTS

The focus on learning and making experimentation a part of management is one of the aspects that makes the adaptive learning approach different. However, while experimentation can bring about benefits from the generation of new knowledge, this does not come without cost. In these pages we shall look more closely at these costs and benefits and at how experiments should be designed.

Costs and benefits of different strategies

The previous pages explained the issues that need considering when selecting a learning strategy and how these differ with the different types of learning method. While passive experimentation is on the face of it easier (in that it involves only a comparison of existing practices), proposed experiments should be examined to see if the design is adequate to ensure that it produces the desired information (see box below).

We have seen that there are more issues to deal with in active experimentation than the other strategies. It should also be noted that active experiments can potentially

Photo: District staff in southern Lao PDR evaluate and analyse different learning options using sticky notes (Source: R. Arthur and C. Garaway).

incur the greatest costs. However, active experimentation can also potentially produce greater benefits than passive experiments because appropriate experimental design can, in most cases, generate greater contrast between systems more quickly than relying on natural variation alone. The question is:

Should it be done?

Creating variation can be risky. It can require incurring short term costs for longer term gains. Whether this is acceptable or not depends on stakeholders discount rates (the extent to which they

Designing experiments.

Whether experiments are designed to provide information based on existing ***variation*** in management or by creating this variation, the principles of experimental design (including replication, ***contrast*** and randomisation) should be used to ensure that experiments provide meaningful results. We should be looking to ensure that there is little variation between systems considered as replicates and sufficient contrast in treatment effects. The time the experiment must run before an effect is detected should be considered, as this might be an important constraint.

Implementation and available resources can also both impose constraints on experimental designs and unforeseen events can reduce the planned number of replicates or treatments. This is particularly true for renewable resources management in a development context and for this reason it is crucial that experiments are robust in design. Wherever possible, quantitative tools, such as statistical power, should be used to evaluate proposed strategies, assessing aspects such as sample sizes and contrast between treatments. Possibilities include using data collected in the baseline study to build simple spreadsheet models of the experiment and examine how the power changes with number of replicates and the contrast between treatments. This will help ensure that the designs are both robust and likely to detect desired effects.

Some useful references on experimental design are supplied on p.39.

A PEOPLE-CENTRED APPROACH

Selecting the learning strategy in southern Lao PDR.

In the case of community fisheries systems in southern Lao PDR, among the uncertainties identified in the 38 villages involved were uncertainties as to a) the 'best' management system, b) which species to stock and c) how to control illegal fishing. The baseline study had indicated that there were three management systems, each with a particular set of costs and benefits, and that there seemed to be benefits in stocking carp rather than tilapia in low productivity waterbodies. It was also the case that there was a great deal of experience of managing fisheries within the villages and that there could be benefits in facilitating the sharing of this experience to benefit all.

Following discussions with provincial and district staff and village representatives, a learning strategy was selected that included the following: the sharing of existing information on a number of aspects of management; a passive experiment to look at the costs and benefits of the different management systems; and an active experiment where waterbodies of both high and low productivity would be stocked with treatments of either carp, tilapia or a mix of carp and tilapia and subsequent performance measured. The active experiment was assessed using a model of the system developed from the baseline data. It was designed to ensure that the treatments suggested would provide sufficient contrast in results and therefore that it would be possible to say conclusively how the different species performed.

In order to provide stakeholders with opportunities to discuss the options and assess the implications of proposed learning options, workshops were used as the fora for discussion. A series of workshops were held with district staff and then with village representatives. At these, the learning strategy was finalised and the allocation of treatments was discussed. Where villages had problems with the species mix (treatment) they were to receive, every effort was made to accommodate change.

Photo: Stocking waterbody in Keng Lek village in southern Lao PDR with carp as part of the active experiment agreed as part of the learning strategy with stakeholders (Source: R. Arthur & C. Garaway).

are able to give up short term benefits for greater benefits in the long term) and, a related concept, how risk-averse they are.

In our experience, communities had little ability to endure short term costs and, partly as a result of this, were very risk averse. For them, minimising risk and the costs of learning was more important than maximising the benefits.

Even if these are not constraining factors then creating variation, by its very nature, requires different treatments in different places. Some of these treatments are likely to be, or will be perceived to be, better than others. Allocating treatments requires great care. Differences were only acceptable if they were perceived to be fair, and/or allocated in a fair manner.

Collaboration is crucial

This a part of the process where a commitment to transparency and facilitating communication is vital. In this respect learning strategies that include active experimentation again make their own particular demands. Providing a forum for discussion and negotiation with affected stakeholders is a crucial part of the planning process. Apart from anything else, successful implementation of an active experiment will require the cooperation and coordination of a potentially large number and wide diversity of stakeholders.

KEY LEARNING POINTS (PART 2)

Who learns?

- A range of stakeholder groups, including researchers, extension workers and resource users (who may not usually work together), need to be identified and join forces in a process where learning is combined with management.
- Information sharing is a vital consideration. A lack of access to information can be a major constraint to management.
- Because of the complex and dynamic nature of natural resources systems and the livelihoods of those dependent upon them a common understanding the system and the opportunities and constraints to management presented by it needs to be developed.

Sharing networks

- Different stakeholder groups have different perspectives and may have different knowledge types. These all need to be valued and included.
- Efforts should be made to move towards a non-hierarchical structure for communicating. The goal should be to ensure that the sharing network enables ***all*** stakeholder groups to share their knowledge and experiences with each other.

Understanding the nature of the resource system

- Natural resources systems are both complex and dynamic and management outcomes cannot be understood without looking at both the human and biophysical attributes of the system and their interactions.
- Understanding needs to include the knowledge and perspectives of those dependent on the systems that are often best elicited using participatory methodologies.
- The results of any investigation should be shared with all stakeholders and discussed to ensure there is a common understanding.

Developing learning strategies

- Uncertainties may be reduced by options that include sharing existing information or by generating (and then sharing) new information. Information generation can be through either passive or active experimentation with management.
- Learning strategies should be based on including options that reflect user needs and objectives, are possible within logistic and financial constraints, and are acceptable to stakeholders.

Experimental design

- The design of management experiments, either passive or active should be based on the principles of experimental design including replication, contrast and statistical power.
- While active experimentation can potentially lead to faster learning, it can be more risky and potentially less acceptable.
- Discussing experiments and the potential costs and benefits of them with all stakeholders is crucial.

A CASE STUDY FROM WEST BENGAL

Lessons from exploring experimental options for rice-fish systems.

Photo: Local fish seed suppliers, a locally trusted source of fish seed for the active stocking experiments (Source: R. Arthur).

In West Bengal there are many examples of systems that combine rice and fish culture. The systems vary widely in their biophysical nature (including both brackish and fresh water systems) as well as their management. However, in all cases we found there was uncertainty about optimum levels and species combinations for fish stocking and about the most suitable rice varieties to introduce.

The situation in West Bengal was less conducive to establishing adaptive co-management than in Lao PDR. Both the resource systems, and those dependent upon them, were less homogenous. In addition there was a lack of trust between stakeholders. Extension workers appeared not to trust the farmers, and the farmers and their representatives did not trust either the government or each other. This was characterised by statements such as "they won't do what they say they will" and "yes, I want to learn from the experiences of others but I do not want them to know what I do".

This situation highlights some of the most fundamental aspects of co-management and the adaptive learning approach. Firstly the need to develop trust and be prepared to accept failure. It is likely that in such circumstances all will not go to plan but accepting this and using the experience to build trust by showing commitment should lead to improvements in the longer term. This leads to the second point which is to start small and base activities on user priorities. Responding to need and showing that something can work on a small scale can help build confidence in the process and lead to greater investment in the longer term (by all stakeholders). Larger scale, more expensive and possibly more risky activities can be attempted later once the foundations have been laid.

The fact that there were similar uncertainties across the systems meant that it was still possible to use the process described on pages 22-23 to identify experiments that could provide useful information to the farmers. The strategy that was agreed included active experiments with fish stocking that compared a high yielding fish mix with one containing high value species together with a trial of a rice variety that had been developed by one group of farmers. This variety had the potential to reduce the need for expensive pesticides that could also harm the fish. In addition some information regarding fish culture that farmers lacked access to would be provided through training workshops in the farmers' villages.

The process of selecting the learning strategy highlighted again a number of issues with active experimentation. In the first place it became clear that it was important that the managers of all the resource systems received something for being involved. While this was not so much of an issue in this case because the experiments were based on comparing alternatives, it does have implications for experimental designs that require a control. Secondly there were the issues of fairness and risk. It was important, especially because of the lack of trust, that the design of the experiments were perceived to be fair and were fairly risk-averse. However there is a trade-off between this and the need for contrast in treatments. Through the use of simple simulations carried out on spreadsheets it was possible to develop experiments involving treatments that farmers felt were fair and that were still likely to generate the required information.

GENERATING INFORMATION

Having determined learning strategies with stakeholders (last section), the next step is to develop an action plan for implementation and one that is based on ***shared*** responsibilities.

In southern Lao PDR, the approach taken was to negotiate a 'contract' with participating villages. Under the terms of this contract, villages agreed to manage the waterbody specifically for community benefit, to record catches and fishing effort and to come back after a year to share their experiences with all other stakeholders.

In return, the project agreed to stock the waterbodies in accordance with the experimental plan, to provide training and advice where necessary, to collect management data and to share results with stakeholders at the end of the experimental cycle. An important aspect of the contract was responsibilities for data collection and reasons for this emphasis are give below.

Shared data collection systems

Generating new information will obviously require data collection. Who should collect what then becomes an issue and there are great advantages in sharing responsibilities between stakeholders in a way that utilises the advantages of all. For example, it is unlikely that government staff will ever have the resources to collect information about resource use on a daily basis, however, resource users might — particularly if it just requires utilising, or building on, existing recording systems. Knowing what data is already collected, and how, is a good start to designing a data collection system.

Another principle to improve the quality of data collected is to involve those who will be collecting it in the planning and design phases of data collection systems. This will have several benefits:

Involvement in planning will help collectors understand ***why*** data is being collected and this will encourage them (if they agree with the overall objective of collection) to collect the data accurately. Poor data collection often occurs even when people are highly motivated, and this is often a result of not understanding why a particular way of collecting data is as important as it is.

Involvement in design will help to ensure that data collection systems are both practicable and understandable. Equally importantly, it will increase a sense of ownership of the learning process. Both of these aspects will improve the quality of the data collected, and the interest in it.

Following from this last point, the quality of data collected is also likely to be increased if those collecting it are involved with the information ***after*** it has been collected. This can be done in the following ways:

- Design data collection in a way that some or all of the information is of relevance to the collector for their own benefit;
- Involve the collectors directly in the analysis of the data;
- Present the analysed information back to the collectors as soon as possible.

Again, creating this sense of 'ownership' of the data builds capacity and gives people a stake in the process.

Is it working?

The adaptive learning cycle on page 12 emphasises the need to constantly evaluate. This is also true of data collection methods which should be monitored to check that they are working, and if they are not, should be adapted and improved. This will ensure that when evaluation of the whole process is carried out (see p34) data collection systems are not identified as the major constraint. Those in the best position to evaluate collection systems are the designers and collectors themselves.

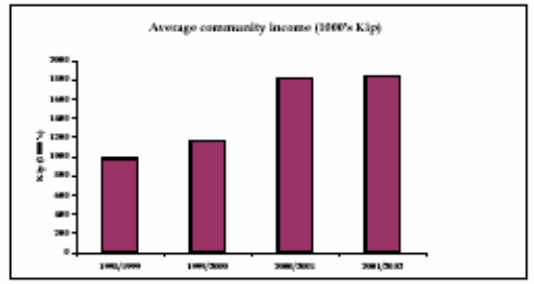
SHARING RESPONSIBILITIES

Involving data collectors in analysis : Results Workshops with district staff in Lao PDR

These workshops were designed to enable district staff to analyse project data, produce graphs and explain results to each other. This 'learning by doing' approach – more usually associated with 'skills' training but here used as a workshop methodology – was possibly one of the most innovative that the project developed. It was time- and energy consuming but proved successful in disseminating experimental results. Not only did district staff understand results better, they also increased their analytical capacity, and gained ownership of the information, which in turn led to more motivation and interest in project activities.

Our basic principle guiding communications activities was that information had to be generated and shared in an appropriate and timely fashion. We examined what was already practised and started from there. In our experience, participants often felt more comfortable in familiar learning environments, such as workshops with presentations, speeches and statements. While perhaps not ideal for sharing and discussing experiences, these methods were familiar. They were therefore kept but gradually, new and more dynamic learning methods – including role-plays and games – were introduced. One new method introduced is described below.

Workshop Format



District staff – working in small groups and assisted by provincial staff – were provided with worksheets containing data they had collected themselves and instructions on how to analyse this data. Each worksheet required the production of a simple graph to illustrate the point being made. It generally required the summing of data and performing simple calculations that all the staff were familiar with.

Graphs were produced using computers, a rare and appreciated opportunity for participants. The staff were then given some 'prompt' questions to help them interpret the implications of their findings. After they had discussed these amongst themselves and with the Provincial staff (who had done the same exercises previously), the staff presented and discussed the finished graphs with their other colleagues. This was generally done using overhead projectors, again a new and welcome experience for district staff who, previously, had only been able to watch this being done. Once everyone had agreed about the implications of the results, a short statement of meaning was written down underneath it. Finally the graphs and statements were incorporated into short booklets that each district staff member took away at the end of the workshop. The district staff could then share, and refer back to, this information and, having created it themselves were in a far better situation to understand it.

Photos: District staff analyse the data they have helped collect, present results and then discuss them (Source: R. Arthur & C. Garaway).

SHARING INFORMATION

The previous page provides a good example of how information can be shared. In this case the district staff were not just presented with new information, instead they were provided with a means of generating that information for themselves, in a context in which they could understand it and consequently discuss. This process illustrates some of the key principles for sharing information in a way that enhances learning. As a general rule, when devising methods for sharing information, the more active and learner-orientated these can be, the better. People can learn by hearing, learn by seeing or learn by doing, and it is generally recognised that these three are on an increasing scale of effectiveness.

Some of the questions it is worth asking yourself when you are considering sharing new information with a diverse group of stakeholders are suggested in the box below. Here we are talking about communicating directly with stakeholder groups. This, whilst desirable, may not of course always be possible and other forms of communication may be required (audio, written, visual). If this is the case, great care must still be taken over appropriate media, and many of the questions below still apply.

Stakeholder communication needs.

Do the stakeholders have similar levels of education, live in the same place, share the same language, require the same information, and are they used to receiving new information in the same way? If the answer to all these questions is 'yes' it may well be possible to share new information with all groups at the same time. However it is far more likely that different stakeholder groups have different communication needs. The questions below may help to identify them.

<u>For each stakeholder group</u>

Does this group need this information? Why?
Does the group see this information as relevant to them, and if not, how are you going to explain this 'need' to them?
What do you want the group to do with the information?

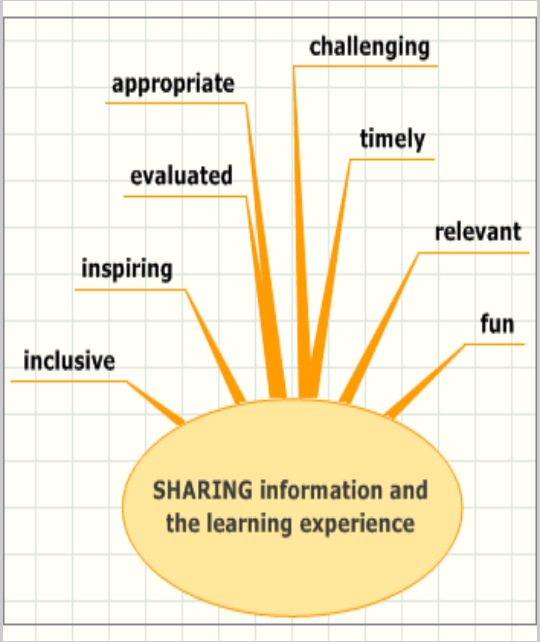
Who is best placed to share/explain this information to them? Does it include people from other stakeholder groups?
Do they currently have the appropriate skills to do this?
Who else is needed to facilitate this process?

How is the target stakeholder group used to receiving information?
Is this an appropriate way of receiving information in this instance and, if not, will alternative methods be acceptable?
Is there a means of making the learning experience more active?
Will this group be able to pass this information to others, do you want them to, and how can you facilitate this process?

What level of detail is required?
What language should the information be shared in and is this equally accessible to everyone?

When is the best time to share information with this group?
Where is the best place to share information with this group?

Sharing new information in Southern Lao PDR



Some principles borne in mind when devising strategies for sharing information in the project in southern Lao PDR.

In the Lao case, the different stakeholder groups had different information requirements, different education levels, were used to receiving information in different ways, shared different languages and lived in different places. This is by no means an unusual situation and great care had to be taken to design a means of getting the right information to the people who needed it in a way that they could both understand it and use it. As in other cases during the process, these differences were overcome by drawing on the assets of the different groups. At the same time, whenever methods for sharing information were being considered, the principles outlined above were considered in turn.

The assets of the different groups

External Researchers	♦ Relatively high educational level enabling analysis of scientific results. ♦ Facilitation and training of trainer experience used to help develop methods with the Provincial staff for facilitating the sharing of information with other groups.
Provincial staff	♦ Ability to communicate in both English and Lao and therefore translate relevant materials so that all information sharing could be conducted in the principal language, Lao. ♦ Facilitation and training of trainer experience that could be used to train the district staff. ♦ Understanding of educational level of district staff and how they were used to learning about things — experience which helped in the design of appropriate methods for sharing with this group.
District staff	♦ Understanding of educational level of village 'waterbody committee' members and how they were used to learning about things — experience which helped in the design of appropriate methods for sharing with this group. ♦ Good rapport with village 'waterbody committee' members making them, with training, excellent 'information sharing' facilitators. ♦ Good rapport with district government which helped to secure appropriate places to hold meetings with villagers.
Village 'waterbody committees'	♦ Flexibility to come together to the district centres and learn about new information that had been generated. ♦ Experience of explaining things to the members of their village. ♦ The respect and trust of village members.

KEY LEARNING POINTS (PART 3)

Shared responsibilities

- The learning strategy should be translated into a management plan that includes clearly defined roles and responsibilities for each stakeholder group. The exact nature of these roles and responsibilities will vary from case to case.
- There are advantages to sharing the responsibility for data collection between stakeholder groups. However, this should not be seen simply as an opportunity to shift the cost of collection but of improving the quality of data collected.

Building on existing monitoring systems

- Make use of data collection systems that are already in place. They may need to be adjusted in order to ensure all the data that is required is included but they have the advantage of being familiar.
- Involving those who will be collecting the data in the design and planning phases as this can improve the quality of data collected because the collector understands why the data is needed. It will also ensure that the system developed is practical and that the collector is familiar with how it operates.
- Motivation for data collection can be increased if the collector is involved with the information at a later stage. Ways to achieve this include ensuring that some of the data is of direct relevance to the collector, involving the collector in the analysis of the data and presenting the results of data analysis back to the collectors as soon as possible.
- Ensure that the data collection system is evaluated, including by the collectors, to ensure that the methods are working.

Communicating with stakeholder groups

- Essentially, and in order of increasing effectiveness, people learn by hearing, learn by seeing and learn by doing. This should be borne in mind when considering methods for communicating with stakeholder groups.
- It is also crucial to consider the audience and their assets to know what their communications requirements are. Depending upon level of skill, language, education, and information needs these might be quite different.
- Because the stakeholders that you are dealing with will have other demands on their time, you should consider very carefully both the timing and location of any information sharing activities. Holding an event in the middle of a busy harvesting period for example is unlikely to be well attended.
- As with all activities associated with the adaptive learning process, we consider that it is vital to monitor and evaluate any information sharing activities so that they can be improved over time.

HOW IS ADAPTIVE LEARNING DIFFERENT?

Learning as an objective of doing

Adaptive learning is different. We have all heard of approaches that are participatory and approaches that have developed methods for participatory decision-making but we feel that adaptive learning goes further than this. Adaptive learning is different because it is not just about identifying user needs and planning management actions with stakeholder participation. The approach goes further in that it is about putting learning and information at the heart of management. With adaptive learning we are talking about a systematic approach with a particular role for research in the management process. We wish to involve both researchers and managers in a process where the managers help in defining the research questions.

At what stage should we learn? Traditionally we have thought that we need to research and then manage. Identifying practices that work and 'success stories' and promoting these. However it has often been the case that this 'blueprint' approach does not always work in the sorts of dynamic, heterogenous and uncertain environments in which natural resource management takes place. In such circumstances we need to find a new place for learning. Lately there have been increasing calls for us to learn from our actions and from our mistakes, acknowledging that we can often learn as much, if not more, from why things did not work as we expected as from when they do. In addition the value of sharing experiences is increasingly acknowledged and advocated.

More than simply sharing experiences

As an approach, adaptive learning is based on learning throughout. Research at the start can provide us with some ideas about what might work and learning at the end can help us identify what did work and why. However, we also want to put learning at the centre with management used as a learning tool. Management actions are designed and decided in order to test our ideas and yield information about the resource systems at the same time as benefits to users.

Photo: Discussing possible management experiments with villagers in Tangramary village, West Bengal (Source: R. Arthur).

So, adaptive learning is about managing and learning and using management to learn. When discussing learning, as these guidelines make clear, we are not talking only about experiences and enhancing the sharing of experiences (although this is indeed an important element of the approach). We are also advocating a systematic approach that includes using research methods and experimental design principles to identify information needs (on the basis of the requirements of those dependent on the resource system) and then the management actions that, if implemented, would yield this information.

Depending upon the circumstances and available data, this process could involve some quite sophisticated modelling of the resource system to examine the dynamics of the system. In addition, by putting learning at the centre, there is the additional benefit that data collection systems can be tailored to collect only what is needed. This is important because often resources are scarce and we must prioritise what data should be collected. Similarly we must remember when talking about participatory monitoring that data collection has costs to those involved in the collection activities.

EVALUATION

Of all stages, evaluation holds the key to learning, as it is only when situations are open to scrutiny that one can understand the extent to which activities have been successful and, if they have not, where improvements must be made. Too often, however, evaluation falls short of achieving this; either by coming at the end of a project cycle, if it is carried out at all, or by only evaluating the ***outcomes*** of an activity and not the ***process*** undertaken to achieve it. In such cases, important opportunities for learning are missed: you may know that objectives have not been achieved but, without critical evaluation of process, you may have little clue as to why.

As an iterative process, adaptive learning requires that both outcomes and the process followed to achieve them are under constant evaluation and review. Several levels of evaluation can be identified.— evaluation of:

- Learning process: Has the desired information been generated, shared and utilised?
- Learning methods: Were methods used to generate and share information effective?
- Learning outcomes: Are the benefits from information gain worth the costs of acquiring it?

The framework illustrated on the next page was developed during the Lao project to guide evaluation both during and at the end of each experimental cycle. It combines evaluation of process with evaluation of outcomes and is organised as a diagnostic tree to enable you to pin point where any potential problems lie. The following pages 34 — 38 deal with each part of this framework in turn, giving examples, where appropriate, of what was done in the Lao case.

Was the information generated what was expected?

Gaining information about how a natural resource system works is not just a useful by-product of the adaptive learning approach to management, but one of its principal aims. As such, whether the experimental process has produced the information it was designed to generate is of critical concern, and one of the main factors setting it apart from other management approaches.

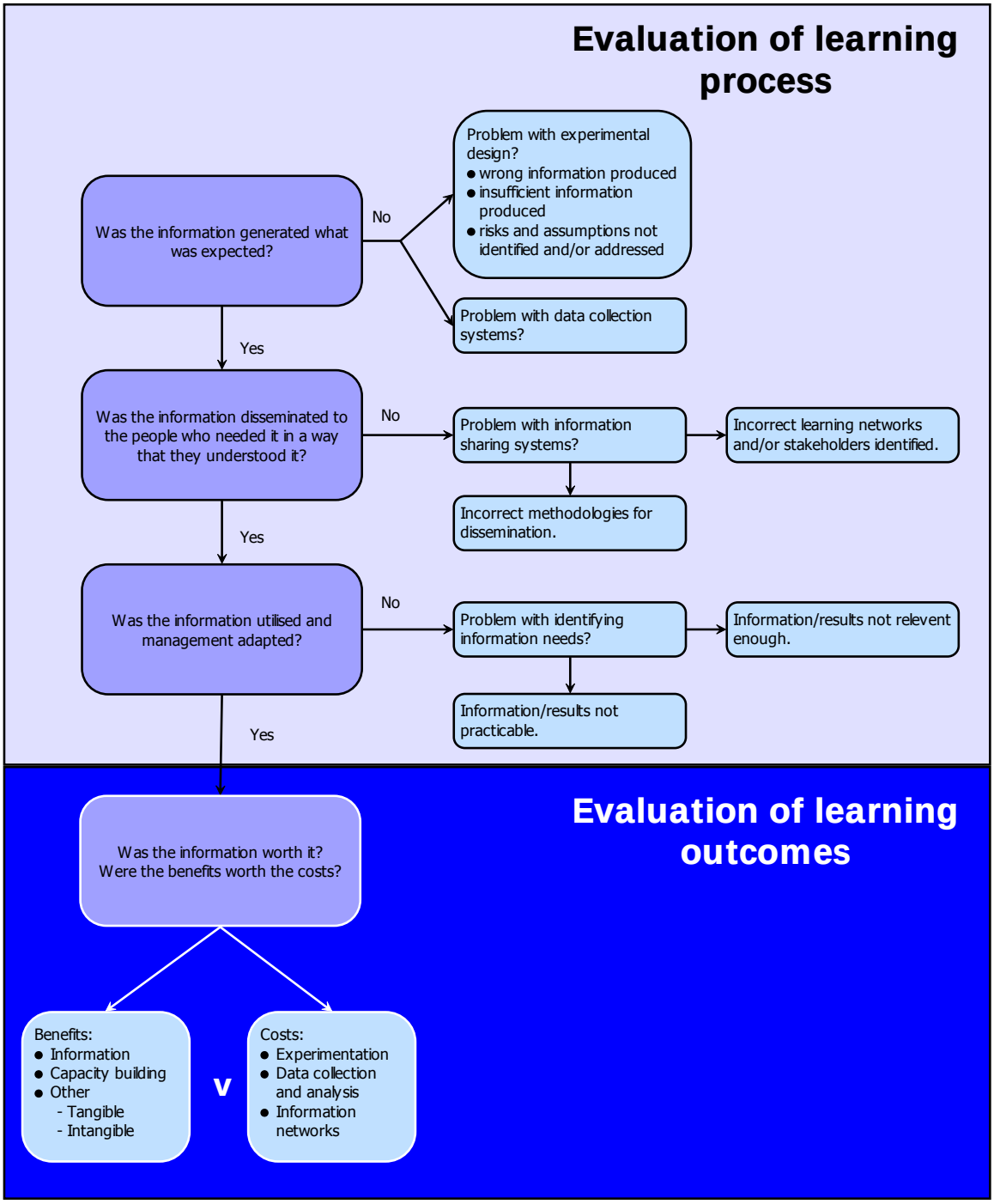
After each experimental, or information generating, cycle, the information gained must be critically evaluated. Did it reduce the uncertainty that the experiment was originally designed to reduce, and if not, why not? Reasons for lack of success may be due to a failure in the initial

Learning from 'failure' in Lao PDR

As mentioned on earlier pages, the adaptive learning approach piloted in Lao PDR asked the question —"which species of stocked fish do better in which type of waterbody?" Waterbodies were stocked with different species mixes and at the end of the first year, fish were harvested. Unfortunately, only a very small percentage of the fingerlings stocked were recovered making it impossible to draw any conclusions about the original question. However, a critical review was undertaken to establish what had gone wrong and where the fish had gone! Data collection systems had already been evaluated and improved indicating that this was not the cause. Instead, several risks and assumptions had not been adequately identified in the experimental design, including risks associated with transportation and predation. The 'post mortem' enabled us to improve on subsequent design and get answers to our questions in the following year.

Photo: Transporting fingerlings to villages in the experimental stocking carried out in Southern Lao PDR (Source: R. Arthur & C. Garaway).

THE KEY TO IMPROVEMENT



experimental design (i.e. even if everything had gone as anticipated, the uncertainty would not have been reduced). For example maybe there was not enough variation between sites, or not enough sites to really answer the question you were trying to pose. Alternatively the problem may have been down to data collection systems which, in the end, could not deliver the information in the way that it was needed. Alternatively it may have been a combination of both, with the risks and assumptions in experimental design and the data collection systems not having been adequately addressed. The most important thing here is that those evaluating are encouraged to point out and discuss, rather than hide behind, 'failures'.

EVALUATION

Was the information effectively shared ?

The next step in adaptive learning evaluation is to determine whether information is getting to the people who need it in a way that they can understand it. Several different methods of assessing information share were carried out in the case studies, both during, and at the end of, each experimental cycle.

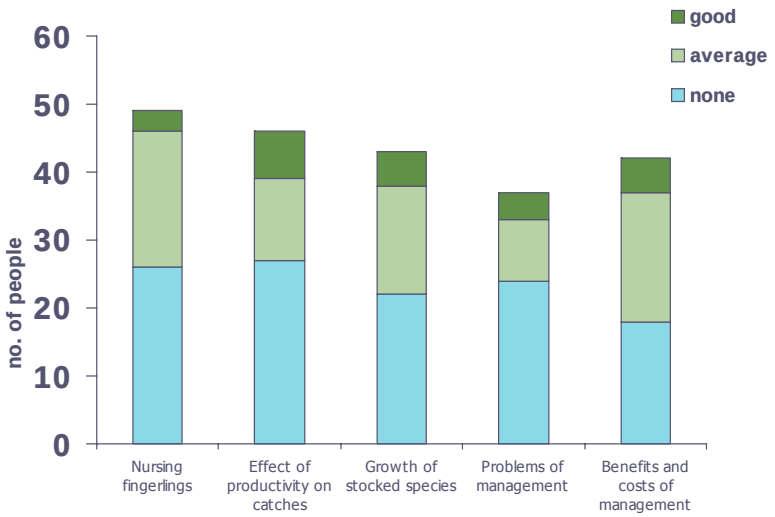
Our principal forum for information exchange was via workshops. Different workshops were held with different stakeholders (some have already been described in these guidelines) but at the end of each workshop, activities were evaluated, through questionnaires, by both the participants and the trainers. The participants were asked specifically about whether the objectives of the workshop (including the sharing of information) had been met and if they felt they had learnt something, whilst the trainers critically evaluated the methods they had used and their own performance in carrying them out. Excerpts from the form used for trainer self-evaluation are shown below. The self evaluation and consequent trainer group discussion was one of the most important ways in which methods for information share could be improved for the next experimental cycle. Whether improvements made on the basis of these discussions actually resulted in better information share was also evaluated. This was done by comparing the participants' feedback year on year and seeing whether, on average, assessments had improved. In the Lao case, there were dramatic improvements each year, showing that not only participants but also trainers were learning too. A great result!

In addition to this at the end of each experimental cycle, all stakeholders were asked to evaluate the extent to which both their skills and knowledge had improved as a result of the process they had been through. This was also done via a questionnaire. Graphs showing results for the village waterbody committee members in the Lao case are presented on the opposite page.

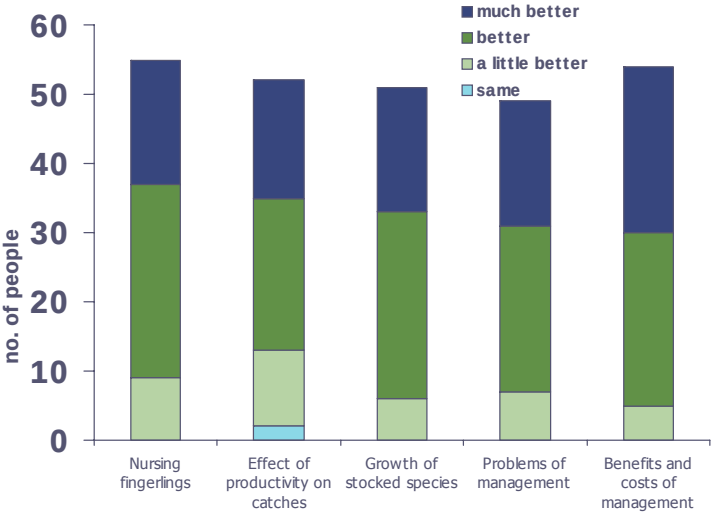
Excerpts from trainer self-evaluation form

Workshop preparation: Did you?	0	1	2	3	4	5	Comment
Identify objectives?							
Identify activities & outputs?							
Was there variation in training methods (whole group, small group, individual work?							
Was there enough time for preparation?							
Presentation:	0	1	2	3	4	5	Comment
Could the participants understand the subject?							
Was it interesting for the participants?							
Was it an appropriate level for participants?							
Was there enough time?							
Did we use the session plan?							
Did the participants learn anything?							
Communication: Did you?	0	1	2	3	4	5	Comment
Speak clearly							
Explain difficult words							
Use clear writing/diagrams							
Answer participants' questions clearly?							
Get feedback from participants?							
Encourage participant contributions?							
Manage feedback sessions well?							
Provide encouragement & motivate participants							

PROCESS AND OUTCOME



Graph showing knowledge of village representatives about certain aspects of waterbody management before implementation of the approach.



Graph showing knowledge of village representatives about certain aspects of waterbody management after implementation of the approach.

Was the information utilised?

Finally in the process section of evaluation, it is important to see whether information generated and shared has actually been utilised. If it hasn't it suggests that, again, the original experimental design was not appropriate. Either a) the results were not relevant to the stakeholders or b) the results were not practicable. The process for identifying options outlined on p.23 should help to alleviate the likelihood of this happening. However, whether the information is being utilised and hence learning has fully occurred must be evaluated. To do this information on the following must be collected and then critically looked at:

- Evidence of appropriate changes in stakeholder actions from year to year.
- Improvement in performance year on year (both management outcomes & the learning process)
- Evidence of whether people actually felt they had more skills / knowledge.

HOW COST EFFECTIVE IS THE APPROACH?

Were the benefits of information gain worth the costs?

Even when the adaptive learning process has led to the successful implementation of an agreed management experiment and resulted in the reduction of uncertainties and adaptation of management, there is still one more question to ask. Was it worth it?

Adaptive learning approaches have the ***potential*** to be more cost-effective than unsystematic trial-and-error management where learning is much more ad hoc. However it should never be automatically assumed that it is so. Quantification of the benefits from the process, and, where possible, the future benefits, should be estimated wherever possible. These should then be compared to the costs of implementation.

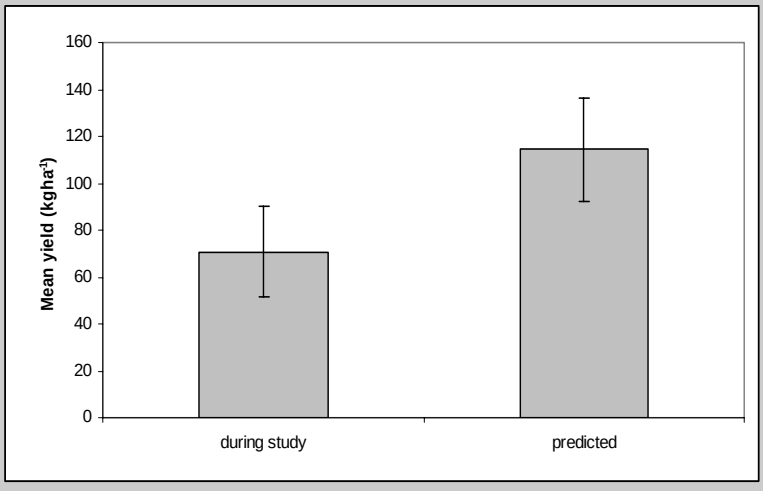
Non material costs and benefits such as 'capacity building' or the increased resilience of the system should also be considered, if only qualitatively. Often these costs and benefits are far more important to groups such as the resource users. For example they may find that the cost of not being available for some other labour is such that it is not worth them participating.

On the other hand, in the case studies a number of villages found that the opportunity to share experiences was a benefit that was more than worth the costs while extension staff found that they greatly valued the opportunity to be doing something that met villagers needs. While difficult to quantify, these benefits were very real to the participants.

Finally, it is extremely important to include the views of all stakeholders on whether they felt that it was worth the cost. Some useful guidelines on monitoring and evaluation are provided in Part 5.

Benefits from the active experiment in southern Lao PDR

Although the active experiment had not produced the information at the end of the first year, by the end of the second year it was possible to make recommendations on the basis of the results. In order to assess the value of just this information, the benefits from all the villages adopting improved stocking mixes according to the results at the same level of fishing effort and stocking densities were calculated (see graph). As can be seen, this information alone could provide significant benefits if used. In addition, the total value of the additional benefits across all villages were compared with the costs of the experiment. These showed it would take less than seven years for the total benefits to be equivalent to the local project costs (including transport, workshops, stocking etc). This is most encouraging and shows the potential value of experimentation.



KEY LEARNING POINTS (PART 4)

Evaluation at every stage

- Evaluation should not be confined to only looking at ***what*** happened, i.e. the outcomes of management. It must also examine the management process. It is only by doing so that we can understand ***why*** things have worked or not and make changes to ***how*** we do things.
- This means that in a learning based approach we need to evaluate not just the learning outcomes but also the learning process and the learning methods.
- Looking at the learning process and methods means not only developing a whole new range of indicators that will let us know what is working and what is not, it also means evaluating at every stage along the way rather than just at the end.

Learning Process

- Failure to generate and share the desired information may be due either to a poor experimental design, poor implementation and data collection or a combination of both. In any event it should be dealt with positively and seen as an opportunity to improve rather than a failure to be hidden.

Learning methods

- Essentially we need to know if information is reaching people in a way that they can understand it. Evaluations by those providing as well as those receiving the information will help understand what works and what does not and allow improvement.
- In addition to the information successfully reaching the target stakeholders, we want to know if they have made use of it. If they have the information and do not use it, this suggests that it was not relevant in the first place and we need to look again at how we identified the needs.
- We can measure utilisation through changes in stakeholder behaviour, improvement in the management process and outcomes and by stakeholders own perceptions of their satisfaction, knowledge and skill levels.

Learning outcomes

- The single most important factor regarding the outcomes is as to whether the benefits from the information gained and shared were worth the costs.
- When considering costs and benefits it is vital to not only examine them from multiple stakeholder perspectives but also recognise, and evaluate, on the basis of non material benefits such as increased resilience and social connectedness as well as the material such as income and yield.

Embrace 'failure'

- This is possibly the most obvious point but also one of the most difficult to accept and to change, especially within organisations. However for the process to be most successful it is vital that everyone involved is open to learning and appreciates that when things don't go as expected this provides an opportunity to learn and to improve that, if hidden, will hinder this improvement.

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adaptivelearning

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LINKING RESEARCHERS

Extending research links

Aquaculture and Aquatic Resources Management, Asian Institute of Technology (AIT), Thailand.
http://www.agri-aqua.ait.ac.th

Australian Center for Integrated Agricultural Research (ACIAR)
Statutory authority supporting research as part of Australia's development cooperation programmes.
http://www.aciar.gov.au

Bay of Bengal Program (BOBP)
Inter-governmental organization mandated to enhance cooperation and provide technical and management advice for coastal fisheries development and management.
http://www.bobpigo.org

International Institute for Rural Reconstruction (IIRR)
Rural development organization based in the Phillipines.
http://www.iirr.org

Network of Aquaculture Centers in Asia-Pacific (NACA)
Inter-governmental organization promoting rural development through sustainable aquaculture.
http://www.enaca.org

Southeast Asian Fisheries Development Center (SEAFDEC)
Inter-governmental body that promotes fisheries development.
http://www.seafdec.org

Fisheries management Science Programme (FMSP)
Developing and applying knowledge related to fisheries management for the benefit of poor people in developing countries.
http://fmsp.org.uk

Useful internet resources

Community-based natural resource management in Asia
http://www.cbnrmasia.org/index.php

International Service for National Agricultural Research (ISNAR) (archive)
http://www.isnar.cgiar.org/index1.htm

International Institute for Environment and Development (IIED)
http://www.iied.org/

The community-based natural resource management network
http://www.cbnrm.net/

Natural resource management changelinks
http://nrm.massey.ac.nz/changelinks/

Eldis development information gateway
http://www.eldis.org/

Support to Regional Aquatic Resource Management (STREAM)
http://www.streaminitiative.org/

Resilience Alliance
http://www.resalliance.org

ABOUT THE ORGANISATIONS

MRAG Ltd The Marine Resources Assessment Group is a UK-based consulting firm dedicated to promoting sustainable utilisation of natural resources through sound integrated management policies and practices. MRAG has a long and productive history, working in over 60 countries, of designing and implementing integrated resource management systems in marine, estuarine, riverine and floodplain environments. A core staff of over 30 full time specialists with a wide variety of expertise and practical and technical experience, provide a multi-disciplinary approach to every project.

RDC The Regional Development Co-ordination for Livestock and Fisheries Development in Southern Laos (RDC) is a government body co-ordinating livestock and fisheries development in the six southern provinces of Lao PDR and linking between external agencies and target populations. Its primary focus has been aquatic resources management and the RDC has taken a low input, low technology approach that provide relatively quick results; when success is observed, it can be a key for opening up other development activities.

WorldFish Center The WorldFish Center is an international research centre focusing on fisheries and other living aquatic resources. Its aims include poverty eradication, a healthier and better nourished human family, reduced pressure on natural resources and people-centred policies for sustainable development. The WorldFish Center is an autonomous, non-profit organisation funded by grants from private foundations and governments and a member of the CGIAR (Consultative Group on International Agricultural Research). The CGIAR is an informal association of more than 60 public and private sector members.

MRC The Mekong River Commission is an intergovernmental body created in 1995 by the governments of Cambodia, Lao PDR, Thailand and Viet Nam. It aims at cooperation in the sustainable development, utilisation, management and conservation of the water and related resources of the Mekong Basin. Its core programmes are water utilisation, the environment and the basin development plan. Among its sector programmes is the Fisheries Programme, which strives to create and communicate information on the Mekong's fisheries, and to facilitate information uptake in national and regional policies and programmes of fisheries development and management.

State Government of West Bengal The Agriculture and Fisheries Departments are major developmental departments of the Government of West Bengal serving a state population of over 80,000,000. Together the departments work for the development of fisheries and agricultural production in the state. This is done by involving peoples within the sectors and through technology generation and extension together with other support services.

CIFRI The Central Inland Fisheries Research Institute (CIFRI) is a premier facility in Asia in the field of inland fisheries research, extension and training. Established in 1947, CIFRI is the oldest fisheries research institute in India, dedicated to the cause of research support for fisheries development of the country. The Institute has a mandate to conduct investigations for proper appraisal of inland fisheries resources of the country and to evolve technologies and strategies for their optimum sustainable utilisation.

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