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Forestry, Forest Users and Research:
New Ways of Learning

A. Lawrence (ed.)

FORESTRY, FOREST USERS AND RESEARCH:
NEW WAYS OF LEARNING

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NEW WAYS OF LEARNING

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CONTENTS

FORESTRY, FOREST USERS AND RESEARCH: NEW WAYS OF LEARNING

Anna Lawrence

Forests and their management are the subject of intense public and political attention, requiring foresters to adapt to changing social and environmental expectations. This book examines ways in which local knowledge, and new ways of creating and sharing knowledge, contribute to this adaptation.

The European Tropical Forestry Research Network links researchers and practitioners to facilitate research related to forests, trees and people. In April 2000 it brought together members from 15 countries, to participate in a workshop entitled 'Learning from resource users: a paradigm shift in tropical forestry?' and examine the implications of recent experience involving local knowledge in forestry. The debate looked at both studies of local knowledge, and ways of creating new knowledge. This book is the result of that debate; most of the chapters began life as papers at the workshop while others have been added to create a book which illustrates the diversity and innovativeness of research with forest users, and which we hope will stimulate reflection on the future of forestry research. It is principally a book for researchers, but we believe it will also be valuable to forestry and development practitioners, to research funders, development donors and policy makers.

This introductory chapter guides the reader through a summary of the chapters, and a discussion of key themes emerging from these contributions. The introduction concludes with recommendations which we hope will inform policy and funding decisions, research directions and the role of participatory learning processes in forestry practice.

INTRODUCING THE CONTENT OF THIS BOOK

The book is divided into four sections: overviews; learning from experience; academic research; and discussion. This arrangement helps to group the perspectives of the authors. In section 1, authors analyse the role of local knowledge in forestry, while the next two sections present case studies. Practitioners reflect on innovative learning processes in section 2, and more formal, theory-informed research is presented in section 3. Finally, section 4 summarises the workshop discussions and recommendations.

In the overview section, Wiersum begins with a chapter which considers whether the changes in forestry, to incorporate indigenous knowledge, consist of profound philosophical shifts which might be construed as a paradigm change, or whether the changes are more gradual and adaptive. He sets out three different perspectives which foresters may have, in deciding to incorporate indigenous knowledge, and relates these different objectives to their implications for change. Hence indigenous knowledge contributes to the *adaptation* or *diversification* of forestry through the incorporation of new empirical information, for those who simply want to manage forests to maintain the resources for human benefit; or *institutional change* when forestry accepts the organisational differences in indigenous management.

Only when indigenous perspectives are incorporated in order to transfer decision-making power, can the changes be considered more than adaptive, and represent a real *paradigm change*.

Recognition that approaches to local knowledge and practice depend on individual perspectives is a good starting point for reading the next two chapters. Michon, and Sinclair and Joshi, draw on their own experience and the literature to discuss ways of consolidating the work that has been done in researching local knowledge, and seeking general patterns or theories. Michon is concerned with the way in which such studies have led to the accumulation of lists of practices or useful plants, but have not yet enhance our understanding of the context for such uses. She argues that researchers must go beyond the utilitarian, and seek to understand and synthesise the social and symbolic aspects of knowledge (including access to, and control of, resources; and the role of ritual), as well as the political constraints within which knowledge is applied. This calls for a broader range of tools to be used by researchers, and a recognition by foresters of the value of anthropology. Sinclair and Joshi's chapter takes a different, pragmatic view, explicitly supporting the value of focusing on utilitarian knowledge, and recognising the difficulties of holistic understanding of the whole world view of local forest users; instead, they argue, we should focus more realistically on partial sets of knowledge, relevant to a defined problem. Their exposition of logic-based methods to collect, analyse and compare knowledge enables them to begin to make generalisations about the kinds of knowledge tree users have in different cultures, and how this complements scientific knowledge. Their approach is a practical one, aiming to make local knowledge research as useful as possible in refining research and extension processes.

The last chapter in the overview section, by Lawrence and Green, reports on a survey of research priorities for participatory forest management. Comparing forest users, managers, researchers and policy-makers in six countries, the study highlights a different way in which researchers can learn from the resource user – by understanding their perspectives on how outsiders can contribute to improved management. The chapter shows just how much demand for improved communication there is. Forest users and managers want research to be more relevant and applied, and want to be able to learn more about others' experiences and decision-making processes. All of these if incorporated into research strategies could contribute to the real integration of different types of knowledge and efficiency of its application, advocated by the previous authors. But what the study also indicates, is the widely perceived need for more participatory approaches to research; in forestry these are still relatively scarce, but several are illustrated in the following section, 'Learning from Experience'.

The section begins with a particularly clear and frank chapter by Muraille, which documents a case study in Laos where foresters dramatically changed their approach to joint forest management, by recognising mistakes and learning from local people's response. She shows how difficult it is to plan the involvement of local people in forest management using models which have been successful elsewhere, and how important it is to create opportunities to change direction based on analysis of early experience. It is highly unusual for a donor-funded development project to document a learning process in this way and the chapter provides important lessons.

Muraille concludes that 'learning-by-doing' is essential; without trying new ideas in practice, it would be difficult to understand their impact – but beyond that we need to learn from and adapt the practice to improve it.

The second chapter in this section, by Basha, Omar, Ely, Fakih and Wild, provides another case study where outsiders have attempted to introduce more participatory methods in forest resource management. The chapter is a valuable documentation of the foresters' experiences, and their reflections on the challenges and rewards of engaging the community. Like Muraille, they found that there are political and institutional implications of such work, and it is not only the community which will change by such learning processes. Both Basha *et al*., and Muraille, comment on the enhanced trust which can result between government institutions and forest-dependent communities, as a result of such research.

Learning-by-doing is a phrase used throughout the next two chapters, focusing on experiences of *research* with forest users in Nepal. The chapter by Branney, Malla and Neupane is another highly unusual case– probably the first documented experiments in forest management and silviculture to be conducted in collaboration with forest users. Branney and his colleagues are really at the frontiers of research methodology here, and provide us with a valuable description of participatory research (so often confused with participatory rural appraisal, or PRA). The methodological challenges are greatest for the researcher, who will have to adopt new approaches if he or she is to help develop site-specific technological or social solutions to forest management. If forest users can participate in such research, where problems are identified and solutions tested together, there may be real scope for the type of *empowering* integration of local and scientific knowledge indicated by Wiersum. The next chapter, by Dahal, Gibbon, Kafle and Subedi, describes similar kinds of research, but takes a step back and looks at the political context, recognising the power differences between outsiders (researchers) and insiders (local forest users), and between them and policy-makers. They consider important questions about the role of the researcher, concluding that 'The challenge for researchers to convince donor agencies and research fund managers of the importance of developing local ownership of a research process will, we suspect in future, be as important as the manner in which research is carried out.'

The last two chapters in this section, return to the question of differences between local and scientific knowledge. Both authors reflect on personal experiences to highlight aspects of local knowledge which outsiders tend to overlook, and ways to approach these differences. Lettmayer deliberately uses the word 'foreign' to describe non-scientific knowledge, to emphasise the attitudes of those who use it in what can be seen as unethical ways. For learning to be sustainable, she advocates greater respect for the holistic context of indigenous knowledge and revised roles for researchers in moving away from treating indigenous people as the 'objects' of research. Singhal deals with a different aspect of the power gap, by making explicit some of the reasons for poor adaptive learning between scientists and local resource users in the Indian context; her plea is for improved documentation, communication and adaptation between the two types of knowledge system.

The last group of chapters consists of studies by outsiders, where academic methods and processes have been applied from a range of disciplines, to improve our under-

standing of forestry issues through information obtained from local resource users. These three studies are much more than explorations of 'indigenous knowledge'; they highlight local knowledge, practice, perceptions, beliefs, regulations and responses to policy, all different types of information which outsiders can learn and apply. What is particularly interesting about this section is the range of methodological traditions drawn on, and the types of findings which raise questions about generalisability and the relevance of research in the development process.

The first chapter in this section, by Wall and Wells, is a study of timber supply and regulation in Tanzania. The authors are economists specialising in the construction industry, and they present a detailed description of their approach to the challenges of conducting research into such a complex system where no single actor has an overview of what is happening, where there is great heterogeneity and differences of power among the actors and where some of the activity is illegal (a common problem in social forestry research). The benefits of grounded theory, where theories are allowed to develop while data is being collected, are particularly suitable for outsiders in such a system; but at the same time the authors discuss and defend the role of outsiders in conducting such research, convincingly arguing that there is a need for researchers trained in analytical skills. The focus on developing theories allows them to attempt broad conclusions with national implications.

The other two chapters in this section also have implications for national and donor policy. Gram's chapter, based on sociological methods used to document case studies of project experience in Latin America, seeks to question generalisations based on experience imported from other cultures. His work with indigenous people in Bolivia, Peru and Mexico strongly suggests that organisational issues around sustainable timber management projects need to be revisited, that models developed in South Asia and elsewhere relate to community structures which indigenous people in Latin America find inappropriate and threatening to their culture. Instead he advocates more participatory approaches which involve the forest users in planning a project structure more suitable to their own culture. The last chapter in the academic section, by Schmidt-Vogt, presents a detailed ecological study from northern Thailand showing the value of indigenous knowledge and practice which is being lost under the pressure of economic change. His findings suggest that indigenous forest management systems might contribute more to biodiversity and sustainability than the newer cash-cropping systems, and support the need for new community forestry legislation.

The final section of the book summarises the discussions at the workshop. The workshop brought together researchers and practitioners from a wide range of backgrounds, each with strong learning experiences to share with others. The range of methods and conclusions provided an opportunity for all of us to look for the common themes, challenge our own preconceptions and highlight priorities for future directions in forestry research. The workshop was a catalyst; it did not provide all the answers, but helped us to think in new ways about studying indigenous knowledge, making the learning process more empowering, and revising the role of the forestry researcher. Above all we felt that the challenge for foresters is to learn *with* the resource user, whether or not we manage to integrate the different kinds of knowledge.

DISCUSSION: FORESTRY AND LOCAL KNOWLEDGE

In participatory development change is brought about through new knowledge, which is treated not merely as a product to help decision-makers, but as a process of empowerment where local communities take over their own development. This has two important implications for researchers: development can involve the creation of knowledge; but conversely research where the learning processes are only one-way can reinforce power structures which block participatory development. This discussion looks at how the research and learning approaches presented in this book can affect that process. But first, we need to take into account the changes in forestry and the people involved in forestry, reflected in the contributions to this book.

Forestry and the resource users

Historically, the discipline of forestry lies somewhat uncertainly between an applied science, and an administrative system, in which foresters have from time to time been characterised as policemen whose main role is to keep out illegitimate forest users. Increasingly the technical content has shifted however, from science to social science, and foresters need to involve local users in the management of those resources. Many of the chapters reflect on this shift in focus, and the diversification of forestry. Wiersum, and Michon discuss the historical development of forestry, highlighting the traditional 'separateness' of forests from other natural resources, in the eyes of foresters.

Muraille's experience in Laos echoes this as she reports how villagers' views contrasted explicitly with those of foresters, by seeing forests as just one component of their natural resource system. Other authors reflect diversification of the forestry resource: Sinclair and Joshi, and Lawrence and Green, emphasise wider perceptions that forestry must relate to trees on farms, and farmers as the resource managers, as well as the more traditional forests and plantations, while Schmidt-Vogt notes the shift of attention to secondary forests, and fallow systems.

It is not only the objectives and resources of forestry that are seen in their variety here. This book is about learning processes which involve the resource users. While there is understandably a focus on the rural poor, and often specifically on indigenous peoples living in or near the forest, the chapters reveal the involvement of a complex range of actors. As well as gender-related aspects of resource use, foresters have to take account of ethnic and other social diversity. The majority of forest users now are likely to have moved from elsewhere. The resource users are likely to include women, men, indigenous people, colonisers, the landless, farmers, and shifting cultivators. They may be using resources for subsistence, or to sell; indirect users continue up the market chain (see Wall and Wells), and include not only locals, but 'outsiders': loggers, beneficiaries of the watershed, and the 'public'. Consequently roles can be reversed: resource users may be outsiders, and researchers may be insiders (see Dahal *et al*).

Researching local knowledge in forestry

Research into indigenous and local knowledge has already provided a rich harvest of documentation, and our concern here is more particularly with the debates arising as forestry becomes more diverse and more inclusive.

The idea of 'local knowledge' embraces many definitions, and the contributors include between them local technical knowledge; cultural beliefs and values; local customs and laws; decision-making systems; perceptions of the law, of institutions and of project objectives; and resource management practices. All of these can lead to improved understanding of practices as a result of beliefs, knowledge systems, and perceptions, as well as reasons for success or failure of project interventions. Such understanding can enhance opportunities to work together.

Forests and trees have cultural significance for many, and in this context it is difficult to limit the discussion to technical knowledge. It is here that some of the strongest philosophical differences are expressed by contributors. Sinclair and Joshi advocate a focus on utilitarian knowledge while others are concerned that this cannot be separated from a more holistic context and world view of indigenous people (see Lettmayer, and Michon). The differences are not irreconcilable however; all three chapters debate ways of studying and analysing local knowledge at a remove from the creators of that knowledge. All three contrast with those who regard it as impossible to make knowledge explicit, and instead work with the *results* of knowledge – the more observable practices of local people (contributors who implicitly research at this level include Basha *et al.*, and Schmidt-Vogt). We come back to the question of *why* we are conducting the research and what is the best way to do it. A pragmatic conclusion is that if we study local knowledge, we should do so not because it is a true representation of the world (any more than scientific knowledge is so) but rather as a means to understanding the perceptions and actions of the people who have that knowledge.

New methods for tropical forestry research

A study by the International Centre for Forestry Research (Nair *et al.*, 1995) concluded that much forestry research was wasted because it was irrelevant, excluded people and their knowledge, and treated trees as an isolated system, with poor communication of research results. As forestry moves to become more local, and more empowering, it is the methods rather than the data which will be most sought after. As Lawrence and Green conclude, the need for technical, social and institutional solutions to be developed locally, implies a need both for action research and for sharing of experience across current disciplinary and cultural borders, to broaden options for researchers and facilitators.

The range of methods is enormous. Between them, the contributors include anthropological approaches (open interviews, participant observation); grounded theory; experiments; inventory and ethnobotanical surveys; comparative case studies; sample surveys and semi-structured interviews; learning-by-doing, participatory action research, participatory monitoring and evaluation, and participatory rural appraisal (PRA); formal representation and computer-assisted analysis of partial knowledge-based systems; *post hoc* reflection and documentation of experience, and literature reviews.

Amongst this diversity, one group of chapters refers again and again to the same kind of methods: authors in section 2 focus on participatory action research, participatory monitoring and evaluation, and 'learning by doing', as well as reflection and documentation of experience by participants.

The contributions highlight the new currency of the term 'learning-by-doing', but also warn us against casual over-use of the phrase; Branney *et al.*, and Dahal *et al.*, explain in detail the careful steps of the cycle which are needed to ensure that participants can learn most effectively from their experience.

It is salutary to see the range of learning-by-doing approaches. Participatory research (whether 'action research', participatory technology development or participatory monitoring and evaluation) has moved faster in agriculture than in forestry for several reasons: forests are a 'public' or multipurpose resource; trees are slower growing and take longer to research; the culture of forestry has tended to separate forests and people; and complex systems are in general more difficult to research than single components such as crop varieties, or trials of multi-purpose tree species. The challenges for participatory research in forestry are particularly demanding and exciting because we are dealing with a contested, multi-owner, multi-purpose resource.

Complementing the participatory approaches, specialist training and roles for analysts allow them to reach a depth of understanding which may not be possible using more rapid or participatory approaches. The three chapters included in the 'academic' section of this book all have important implications for policy, and all required methods and understanding specific to certain academic research field (sociology, economics, ecology). Wall and Wells explicitly address the limitations to analysis with local people, who have much more restricted access to information than outside researchers, and consequently may be inhibited in attributing causality.

Consolidating the changes

To build on the changes in forestry and research, the contributors show that it is now a priority to generalise, integrate and institutionalise the approaches they describe. We can think of knowledge and learning in participatory forestry as having three roles: knowledge for local use (e.g. through action research); knowledge for cross-learning (where one group learns from the experience of another); and knowledge for meta-analysis (where reflection and analysis of a range of experience lead to better understanding of the principles of using local knowledge in forest management, and hence to improved predictions about what will work). All of these levels of learning can focus on the methods, or on the content. While methods are more generalisable than content, there are general patterns which can be detected in the kind of knowledge people have.

There is another side to the call for generalisation however. As noted by Lawrence and Green, much of the development in participatory forest management has taken place in Nepal and India. The different cultural, ecological and political contexts found elsewhere may require different ways of working, and contributors to this volume highlight some of the dangers of assuming that processes and techniques which work there, will work elsewhere (see especially Muraille, and Gram).

The discussion chapter highlights a general call from contributors for integration of local and scientific knowledge, but there is also a recognition that before we can formally do this, much more research is needed. The question of integration brings us back to the debate about the need to explicitly represent local knowledge (see Sinclair and Joshi,

and Michon; as well as the constraints identified by Singhal). Documentation of local knowledge brings its own questions of representation, ownership and access, and there is as yet no consensus on the need for, or means to, 'integrate' indigenous knowledge and scientific knowledge, partly because it is not clear that this dichotomy exists; and partly because both kinds of knowledge are evolving and adapting – and to some extent implicitly integrating elements from each other.

Change in research practice begins with individuals, and *ad hoc* exchange between different disciplines, but for sustainable change to take place, the new approaches to learning need to be formally incorporated into institutions. There are three promising routes based on the methodologies reviewed above: participatory monitoring and evaluation as a tool for institutional change (Branney *et al.*; Dahal *et al.*); the involvement of senior staff, government foresters and others who are usually 'outsiders' in research (Muraille; Basha *et al.*); and effective dissemination.

But changing roles for forestry researchers also need to be recognised within those institutions. The contributors to this book share a strong sense of our responsibility as researchers, and recognition that this responsibility is particularly complex in research involving local resource users. As Wiersum points out, the objectives of the forester will depend on his or her values, which affect the choice between 'maintaining forests' and 'working towards equality'. Clearly the role of the researcher is changing, from one who experiments and analyses results on behalf of others, to one who facilitates learning with others, and can be seen as an intermediary, in a position to communicate research needs and results to those who can use them or respond to them by facilitating or enabling change.

All of this will require changes in funding for research. Some contributors highlight the constraints of the academic research culture (see especially Wall and Wells; and Dahal *et al.*). Funders want short time-frames, and widely applicable results. In the context of research with resource users, this can most effectively be achieved through a focus on learning *methods* (see Branney *et al*.) or on analysis of general principles and patterns in local knowledge (e.g. Sinclair and Joshi, and Wiersum). Other more location-specific learning processes may be better carried out in the context of development funding (e.g. Basha *et al*.).

CONCLUSIONS AND RECOMMENDATIONS

The boundaries of forestry are changing, perhaps even disappearing. This book shows in particular three ways in which this is happening. First, forestry is coming out of isolation; it is not only becoming a multidisciplinary sector, it is also accepting the legitimate participation of a much wider range of actors than before, both directly as resource users, and indirectly as having an interest in the fate or impact of forest management. Secondly, forestry is moving beyond the physical boundaries of forest and plantation, into more 'messy' systems which include on-farm trees and secondary regrowth. Finally, and most significantly for this book with its focus on research, as forests and trees are recognised to be key resources at the heart of (participatory) rural development, the boundaries between research and practice, between user, manager and professional researcher are dissolving.

What are the implications for researchers, practitioners and policy makers? The evidence of this book supports a broader conceptualisation of research, and a re-examination of the role of professional researchers in learning processes which lead to development. This is especially the case where research is taking place in situations of greatly unequal access to power, as is often the case with tropical forest resources. The work presented here is only a sampler, but the debate generated among participants at the workshop gives strength to the group's conclusions, and also highlights areas where more work, or analysis, is needed. Because of the wide reach of the ETFRN, and the diversity of participants in the workshop, it is more valid to make recommendations about research *approaches* than to specify location-specific *topics*, although the latter will follow as a response on the ETFRN website (htttp://www.etfrn.org/etfrn/).

The following recommendations are based on a synthesis of the discussions and conclusions of all contributors.

For **researchers:**

1. Research in areas with unequal power relations (either locally or internationally) places an ethical obligation on the researcher to ensure that the process is beneficial to the marginalised, who are often the forest users; this means that such research must respond to needs identified locally, and contribute to knowledge which is useful to those resource users, otherwise the research itself will be reinforcing such marginalisation.
2. Participatory research methods are under-utilised in forestry, and research involving local knowledge can still be extractive without clear feedback to, and analysis by, the communities involved. Consequently researchers should be aware of the methods, impact and relevance of participatory research, or (less formally) learning-by-doing. This is much more than a participatory *diagnosis* or *appraisal* (such as is often achieved through PRA), and involves joint and structured planning, implementation of change and reflection on that change.
3. In so doing, researchers can strengthen local research capacity so that resource users can initiate and use future research results.
4. Clearly many practitioners (and researchers) are still struggling to develop methods, and researchers should focus especially on developing, documenting and disseminating methodology for research and (especially) analysis which can be carried out with resource users. There is an urgent need to consolidate methodological lessons and make available methodological guidelines for joint learning in community forestry. These need to be adapted and tested in different cultures. Such guidelines must pay attention to the *analysis* of information collected from or with resource users, as this is the area which still appears to cause most uncertainty. They will also help to make 'learning-by-doing' respected, in terms of methodological rigour and transparency of process.
5. There is a need to consolidate the evidence presented here, especially in terms of local criteria, and research should be initiated to conduct participatory impact assessment of research involving local people.
6. To complement such location-specific research, there is clearly a role for academic or conceptual research, and especially a need for research which helps to integrate the lessons from existing studies of local knowledge and

research, and indicates what can be generalised and which factors affect variation between different cultures and contexts.

7. The overview of actors in tropical forestry suggests a need for more research into the knowledge, perceptions and decisions of *non-indigenous* people, who have generally been regarded as less attractive research topics than their *indigenous* counterparts.
8. The potential for *technical* research with resource users has been neglected, and the evidence here shows a lack of locally adapted silviculture and resource management practices; development of such methods with local resource users is a priority for ecologically and socially sustainable forest management.
9. All researchers should define clearly how the results will be made available to, and taken up by, both resource users and those in a position to use the results to improve the enabling environment for local resource users.
10. The value of the researcher's role as 'outsider' can be enhanced by turning it into that of 'intermediary'; this requires them to take the opportunity to disseminate research results to policy makers and implementers, or better still, create a constituency for such results by working closely with policy makers to keep them informed of such research from the beginning.

For **forest managers and development practitioners,** the contributions to this book suggest:

1. Incorporation of participatory action research into forest management activities. This does not imply that management is confused with conventional research activities, but rather that opportunities for learning can be consolidated through cycles of planning, implementing and evaluating change, together with key actors in the forest management process.
2. Focus on developing, documenting and disseminating methods, as these are most transferable and empowering, in particular through networking with researchers about methods.
3. With all research or data collection, provide opportunities for feedback, analysis and action by forest users and relevant local organisations.
4. Link with policy makers and government institutions, not only in forest departments but across a range of relevant sectors including agriculture, as well as with the public, to promote the understanding of forestry as a multidisciplinary and participatory field.

For **forestry educators**, the discussion in particular highlights the need to incorporate social and policy issues into training curricula for foresters, and to both use and teach participatory learning methods in such training.

Finally, the book has implications for **policy makers and donors**. Amongst these the following are highlighted repeatedly:

1. The experience of many contributors is that donors are directive, and have little appreciation of the benefits of allowing forest users and local institutions to influence the research process. However, collaborative or participatory research can enhance trust between government agencies and communities; it also helps to ensure the topics addressed are relevant to the communities involved, and results are likely to be used.

2. Participatory learning leads to ownership of new relevant knowledge, and is part of an empowering development process. Consequently, research and development are closely linked; in forest related issues particularly, participatory learning approaches can help with conflict management, institutional development, silvicultural management and monitoring sustainability. Donors and government institutions may therefore need to be less rigid in separating research, extension and management functions.
3. Donors need to be aware of the time needed to establish participatory research processes, and the reasons for their effectiveness, which are closely linked to the direct involvement of so-called beneficiaries; consequently that results cannot simply be transferred between communities, but groups of resource users must be supported to develop solutions based on their own knowledge and experience.
4. Donors should also be aware of the difficulties of transferring 'successful' research or development projects from one area to another, and the importance of local knowledge, values and organisational practice, in shaping successful forest management; conversely, the evidence here highlights the greater transferability of appropriate methods.
5. Priority areas for research are highlighted under the recommendations for researchers; these require support for research on methodologies, analysis of local forest management knowledge and practice, and participatory technical research.
6. Furthermore, research priorities need to be established locally, in the countries in question and where possible with the participation of representatives of forest users.
7. Donors should support, and demand, greatly improved dissemination and uptake of results, and in particular support learning opportunities between researchers and practitioners, and between forest users, e.g. through workshops and networks. These need to bring together actors both locally, and between regions, to optimise communication and learning.

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REFERENCES

Nair, C. T. S., Enters, T., and Payne, B. (1995). *Report on the Workshop on Barriers to the Application of Forestry Research Results.* CIFOR Occasional Paper no. 5. Centre for International Forestry Research, Bogor, Indonesia.

SECTION 1: OVERVIEWS

1 INCORPORATING INDIGENOUS KNOWLEDGE IN FORMAL FOREST MANAGEMENT: ADAPTATION OR PARADIGM CHANGE IN TROPICAL FORESTRY?

K.F. Wiersum

1.1 INTRODUCTION

During the last two decades much attention has been given to the adaptation of formal forest management towards the forest-related needs of local people in tropical countries. These new approaches to forestry started in the late 1970s as a result of the identification of the 'poor man's energy crisis' (e.g. Eckholm, 1975). It was recognised subsequently that the forest use of local communities was not restricted to (fuel) wood, but included many other non-wood products such as food, medicinal products and livestock fodder (e.g. Falconer and Arnold, 1991; Hladik *et al.*, 1993). Moreover, local communities were seen to value forests for cultural reasons in addition to utilitarian reasons. Alongside these emerging insights into specific forest-related needs of local communities, it was accepted that the fulfilment of such needs is best assured when local communities are actively involved in forest management. This understanding was based on both pragmatic and normative considerations. On the one hand it was considered that involvement of local people would improve utilisation of human resources, and hence would be instrumental in improving forest management. On the other hand, it was considered that community development should not only focus on meeting forest-related needs of local people, but also on providing the means for local people to fulfil their own needs. The result was the so-called social forestry strategies that gradually evolved from the early 1980s and aimed not only at adjusting forest management towards the needs of local people, but also at encouraging their self-reliance (Wiersum, 1999a).

The first social forestry strategies were based on scaled-down versions of conventional professional forestry practices (here the term 'professional forest management' is used to refer to forestry systems that are managed by professionally trained people, without necessarily implying a level of skill). But from these early efforts increased understanding emerged about the role of trees in the livelihood strategies of local people. It was found that local communities not only exploit forests to meet a variety of household needs but that, in many cases, they also actively manage forests and trees. Due to the importance of forest resources for the local communities, they have developed their own specific forest management systems. Management practices include purposeful protection of native forests, transformation of native forests into resource-enriched forests, establishment of mixed forest plantations and establishment of agroforestry systems in which crop and/or livestock production is integrated with care for forest resources (e.g. Anderson, 1990; Shepherd, 1992; Wiersum, 1997a).

Moreover, it was found that many local communities had developed their own institutions for controlling access to, and exploitation of, forest resources (Fisher, 1989; Poffenberger, 1990; Arnold, 1998).

In order to understand community perspectives and practices regarding forest resources, increasing use is being made of actor-oriented research approaches. These approaches are based on the assumption that knowing and active actors have the capacity to identify problems, process information and make strategic decisions in dealing with other people as well as resources (Long, 1989). One of the premises of the actor-oriented approach is the idea that local people, on the basis of local needs and knowledge, may develop their own indigenous methods for forest utilisation and management, and that these methods are not necessarily similar to those considered by professional foresters. The specific nature and development relevance of indigenous knowledge about management of natural resources has received increasing attention since the early 1980s (Richards, 1979; Brokensha *et al*., 1980). Since that time, forestry science studies have focused increasingly on the nature and specific characteristics of indigenous forest management, assessing the possibility of merging indigenous and professional forest management (e.g. Gomez-Pompa, 1991; Redford and Padoch, 1992; Kajembe, 1994; Clarke, 1994; Van Leeuwen, 1998; Pandey, 1998; Wiersum, 1999b). As a result, much new information concerning specific features of indigenous forest utilisation and management has become available during the last decade, and significant progress has been made in understanding ways in which local communities use, maintain and/or augment forest resources, the dynamics of these systems, and the significance of such systems for forestry development.

This chapter questions whether recognition of the need to incorporate indigenous knowledge into professional forestry should be considered a paradigm change in forestry. The concept of paradigm relates to an internally consistent set of values, concepts, methods and actions, which tell scientists and professional practitioners within a certain discipline what is important, legitimate, and reasonable to carry out without having to refer to lengthy normative and methodological discussions. It refers to a set of (often subconscious) mutually supporting group commitments of scientists and professional practitioners on the nature of a scientific discipline, the types of problems to be considered and the relevant methodologies for research and development. The concept was originally proposed by Kuhn (1970) in reference to natural science, but has since been applied to describe implicit assumptions underlying and guiding practical science and professional practice (Chambers, 1993; Blaikie *et al*., 1996; Wiersum, 1999a).

1.2 MEANING AND RELEVANCE OF INDIGENOUS KNOWLEDGE

The study of indigenous forest management is often considered to belong to the domain of research on indigenous knowledge systems. Knowledge systems concern the way people understand the world, and interpret and apply meaning to their experiences. Such knowledge is built through the complex process of selecting, rejecting, creating, and transforming information, and is inextricably linked to the social, environmental and institutional contexts in which it occurs (Arce and Long, 1992). Indigenous knowledge systems are those that have evolved within local communities and have been handed down by cultural transmission. Over time, external information may become incorporated, and indigenous knowledge should therefore not be considered

as being isolated from external influences. Neither should it be considered to concern only traditional knowledge dating from the past, since it also includes local knowledge that has evolved more recently in response to changing conditions and needs. However, since indigenous knowledge emanates from specific environmental and cultural contexts, it is often unique to a specific culture or society. In many tropical regions, indigenous knowledge is a major element in local decision-making processes relating to the use and management of natural resources and in the organisation of specific management practices. Indigenous knowledge reflects a society's intimate understanding of its ecological and social environment (Warren, 1991).

Scientists, policy-makers and development project planners are increasingly convinced of the need for protection and conservation of indigenous knowledge of natural resources. Such knowledge is considered relevant because its use incorporates three types of values (Warren, 1991):

- *encyclopaedic value:* indigenous knowledge systems involve a large variety of (often location-specific) information on options for using and managing natural resources, which are not yet described scientifically;
- *efficiency value:* indigenous knowledge provides information which can be blended with professional knowledge in making the process of technology generation and transfer more effective;
- *emancipation value:* the incorporation of indigenous knowledge and practices in development projects supports efforts to enhance active participation and to stimulate self-determination of local communities.

Appreciation for these three kinds of values varies amongst users of indigenous knowledge. For instance, development workers may appreciate the encyclopaedic value of indigenous knowledge as useful information to be used in the rehabilitation of land-use types (such as shifting cultivation) that were formerly considered unsustainable. Encyclopaedic value can also be appropriated by commercial firms for developing new technologies, e.g. by using indigenous knowledge about medicinal plants for developing new medicinal products. Development workers may also appreciate the efficiency value of indigenous knowledge and consider it as a means of improving communication practices, by using local idioms and classifications, in the introduction of modern management. Alternatively, the efficiency value of indigenous knowledge may be used by them as a starting point for negotiation processes, in which locally-specific management practices are construed between local people and external organisations. Finally, social activists may especially appreciate the emancipation value of indigenous knowledge, by viewing it as a means of empowering local people to exercise their own management skills (Blaikie *et al*., 1996).

Hence, although indigenous knowledge is increasingly considered an important element in developing sustainable forest management, there are divergent interpretations of why indigenous knowledge is important. Interpretations vary according to different views of the nature of the development process emerging primarily from state-sponsored professional organisations, market forces or local communities (Blaikie *et al*., 1996). These different positions are not specified in many statements regarding the importance of listening to indigenous knowledge. Consequently, many discussions of the importance of indigenous knowledge use the term 'indigenous knowledge' as a sensitising concept

rather than an operational concept. This is reflected in discussions in which a dichotomised vision of the presumed nature and value of indigenous and 'Western' professional knowledge is presented. Such polarisation may be defendable on two grounds. Firstly, it may serve as a means of being more sensitive to the needs and value of indigenous knowledge (cf. Li, 1996). Secondly, it may serve as a means of drawing attention to critical differences between indigenous and science-based professional knowledge in development endeavours (Mazur and Titilola, 1992; Blaikie *et al*., 1996) and power (Agrawal, 1995). However, this polarisation limits understanding of the operational nature of indigenous knowledge and its relation to forest management. Therefore before reviewing the significance of incorporating indigenous knowledge in formal forest management, this paper discusses the relationship between indigenous knowledge and indigenous forest management.

1.3 PRINCIPAL COMPONENTS OF INDIGENOUS FOREST MANAGEMENT

In studies of natural resource management, the term indigenous knowledge is often used in a rather loose way. Often a clear distinction is not made between indigenous knowledge and indigenous practice. In many instances it is considered that indigenous knowledge can be inferred by observing which type of practices are carried out, and no attention is given to the complex relation between knowledge and practice. Also, clear differentiation is often not made between the practices of forest use and forest management. Many (ethnobotanical) studies focus primarily on identifying which forest products are collected and for what purposes. Little attention has been given to the question of whether forest products are collected freely from an abundant resource, or whether forest resource use is controlled as part of a conscious management system. However, studies are increasingly focusing on practices used by local communities to consciously protect forest resources or even manipulate forest vegetation so as to increase the availability of the principal forest resources.

Some authors have tried to be more specific by identifying various components of indigenous knowledge about natural resources. For instance, Berkes (1999) considers that 'traditional ecological knowledge' consists of three interrelated components:

- local people's *beliefs* about their relationship with the natural environment,
- biological *knowledge* of soil conditions, species and their growing conditions, and possible uses,
- actual exploitation and management *practices.*

The first component, local people's beliefs, indicates that indigenous use and management of natural resources should not be considered a specialised activity with intrinsic significance, but rather an element of the local community's overall relationship with their environment. Most indigenous forest management systems are a component of integrated farming systems, and forest management practices are intricately linked with crop production and livestock production processes. Consequently, many indigenous forest management systems include elements that scientists consider to be agronomic, horticultural or silvicultural (Colfer *et al*., 1997; Michon and De Foresta, 1997; Wiersum, 1997b). Moreover, forest management systems are closely interlinked with a community's cultural system.

The cultural setting greatly influences the way in which local people perceive their natural environment as well as their relationship to that environment (Umans, 1992). Such basic world-views involve not only utilitarian considerations regarding the role of forests in integrated land-use systems, but also religious and spiritual perceptions of the environment. The maintenance of sacred forests is a clear manifestation of such cultural perceptions (Doornewaard, 1992; Ramakrishnan, 1996; Lebbie and Freudenberger, 1996).

It has been argued that local communities view forests in a holistic way (e.g. Posey, 1985). This is the case if one considers that indigenous forest management is intricately linked to a community's cultural understanding of their environment as well as the daily livelihood systems of local people. However, the notion that indigenous communities have a holistic view of their forest should not be interpreted to mean that they value the forest as an integrated ecosystem. Rather, management is based on "a selective respect towards a culturally conceived nature" (Persoon, 1991) and the indigenous management practices are directed at the locally valued forest resources in the form of either specific patches of forest or specific tree species (Wiersum, 1997a).

The second and third components (biological knowledge and actual exploitation and management practices) of the traditional ecological knowledge mentioned by Berkes (1999), indicate that indigenous management is also based on biological knowledge about the presence and use options of forest resources as well as on technical knowledge of various types of management practices. However, Berkes (1999) neglects other factors affecting decisions to put knowledge into practice. This process involves considerations not only of biological and technical features, but also of institutional factors such as regulations on access to forest resources, rules on exploitation of forest resources, and marketing conditions (Fisher, 1989; Arnold and Dewees, 1995; Wiersum, 1997a; Munyanziza and Wiersum, 1999). Therefore forest management involves not only biological and technical knowledge, but also knowledge of its socio-political environment. In many studies of indigenous knowledge concerning forest management this last type of knowledge is not addressed explicitly. Instead, most studies focus on the types of products being harvested and/or the exploitation and management practices undertaken, rather than on the institutional reasons supporting such practices. So, when information is presented as indigenous knowledge but no explicit attention has been given to the question of how different types of knowledge interact in the process of deciding whether to implement a specific practice, the information in fact represents observable practices rather than indigenous knowledge *per se*.

Another important but often neglected feature of indigenous management of natural resources is its dynamic nature. Although the term 'indigenous' refers to knowledge or practices that have been generated within local communities, it is often equated with traditional knowledge and practices which have remained more or less stable (Fisher, 1989). However, many examples show that this is not the case and that over time indigenous knowledge adapts to changing social, economic and environmental conditions (e.g. Gilmour, 1990; Shepherd, 1992; Ghimire, 1994; Arnold and Dewees, 1995; Wiersum, 1997b). Furthermore, indigenous practices may be based not only on indigenous knowledge but also on experimental skills.

Although much indigenous knowledge is common to (certain groups of the) rural community, individual variation occurs depending on the experimental skills of certain people (Johnson, 1972).

1.4 CONCEPTUAL FRAMEWORK FOR CHARACTERISING INDIGENOUS FOREST MANAGEMENT

In order to overcome the often-limited interpretation of the relationship between indigenous knowledge and indigenous forest management and to allow systematic analysis of the various factors impacting on indigenous forest management, there is a need for identification of a common framework for conceptualising forest management. Such a framework should not only help in understanding the various components of indigenous forest management, but should also allow systematic comparison between indigenous and professional forest management.

This framework can be based on the definition of forest management as the process of making and implementing decisions about the use and maintenance of forest resources and the organisation of the related activities (Duerr *et al.*, 1979). Forest management thus involves the combination of two types of arrangements, i.e. social arrangements and technical arrangements (Wiersum, 1997a; 1999a). Social arrangements consist of agreement on:

(i) who are legitimate forest users of a specific piece of forest,
(ii) a structure for making decisions about management objectives, and
(iii) the type of practices to be performed as well as control over the implementation of decisions.

They also include the ability to exclude outsiders from having unauthorised access to forest resources. Within local communities the definition of legitimate forest users and the agreements on forest boundaries are often based on social norms rather than on formal administrative decisions. Such local institutional arrangements are an essential foundation for indigenous forest management. They may be augmented by either a formal or informal organisational framework for making decisions about the types and intensities of forest exploitation and silvicultural practices to be carried out, and about control over the proper implementation of those practices (Fisher, 1989). Technical forest management practices cannot proceed without these social arrangements. Such technical practices aim at efficient use and manipulation of forest resources. They may involve regulations on the controlled use of these resources, as well as measures to consciously protect resources and to enhance the production capacity and regeneration of the resources (Wiersum, 1997a). Hence, indigenous knowledge on forest management involves not only biological and technical knowledge and practices, but also knowledge of social relations and institutional practices.

As discussed above, forest management should not be conceived of as a specialised activity, but rather as being embedded in a specific cultural setting. Indigenous forest management is an important component of the communities' integrated land-use system. Moreover, forests may not only have utilitarian value, but may also be incorporated in religious and emotional value systems.

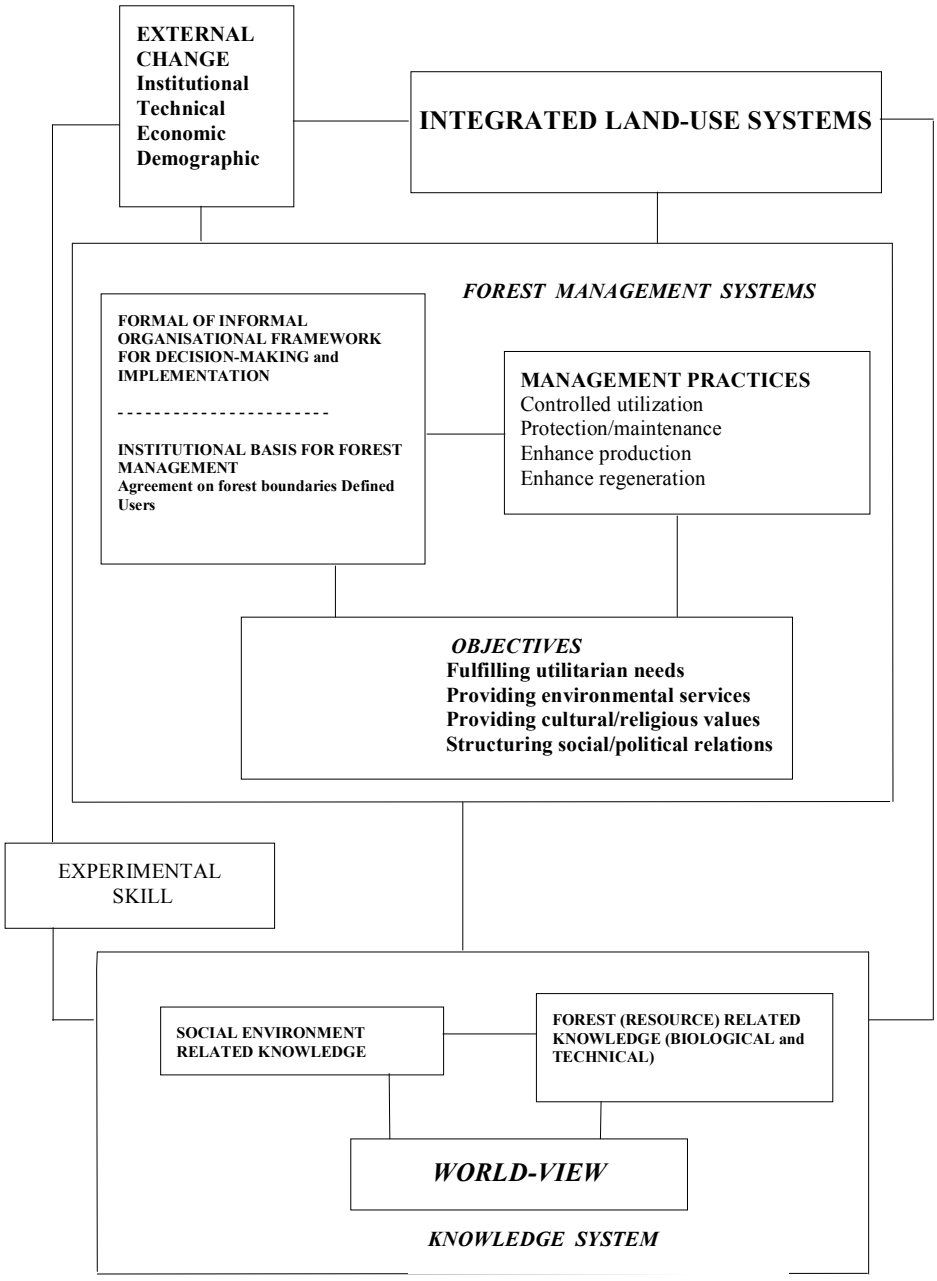

Figure 1.1: Conceptual model of forest management as a knowledge and action system.

Table 1.1: Comparison of 'ideal-type' norms for professional and indigenous forest management (adapted from Wiersum, 1999b).

	Professional	Indigenous
Basis of management		
* Rationale	Commercial production and conservation Segregation of forestry and other land-use Cultural values mostly recreation- and biodiversity-related	Integrated multiple resource use No strict segregation between forestry and other land-use Cultural values religiously- and spiritually-related
* Types of forests considered	(Semi) natural forests and timber plantations	All kinds of (semi) natural and cultivated woody biomass, including forest gardens and other agroforestry systems
* Main products	Timber and selected commercial non-wood products	All kinds of wood and non-wood forest products
* Main environmental services	Watershed protection,	Microclimate, soil fertility
* Major forest resources considered	Legally sanctioned	Locally identified, user-group specific
* Unit of management	Spatial unit climate control	Specific resources management, local water supply
Main management practices		
* Basis for controlling use	Legal control	Social and cultural controls
* Harvesting techniques	Mostly tree felling and coppicing	Pruning, pollarding, leaf/bark harvesting common
* Harvesting schedules	Systematised for efficient production	Mostly opportunistic based on livelihood considerations
* Artificial regeneration	Nursery raised seedlings and seeding	Transplanted wildlings, seed dispersal by livestock, cuttings, some seeding
* Planting pattern	Systematic	In micro-niches
* Stimulation of production	Stand-oriented	Tree-oriented

This cultural setting influences the way in which forests are perceived, and what are considered to be relevant objectives in maintaining these forests. Thus forest-related knowledge systems should not only be conceived of as relating to cognitive elements concerning the biological, technical and social components of forest management, but also as relating to the basic world-view which guides the behaviour of the people with respect to their social and cultural environment.

The various components of forest management, in the context of an integrated knowledge and decision-making system regarding the organisation and implementation of measures for the use and maintenance of forest resources, are summarised in Figure 1.1.

From this conceptual model it can be inferred that when comparing the features of indigenous and professional forest management systems, several factors have to be considered, including:

- The normative basis for forest management
  - The basic world-view concerning the rationale of forest management
  - Considerations of relevant forest resources and objectives for forest management
  - Institutional arrangements for forest management
- The type of forest exploitation and management practices being used and how they have resulted in specific forest types.

Table 1.1 summarises the main 'ideal-typical' differences in features of indigenous and professional forest management. As illustrated in this table, these differences involve not only cognitive factors such as botanical features regarding forest use and forest structure, technical features regarding management practices and social features regarding the institutional framework for forest management, but also normative factors such as the cultural setting and the rationale of forest management.

1.5 INCORPORATING INDIGENOUS KNOWLEDGE IN FORMAL FOREST MANAGEMENT: ADAPTATION OR PARADIGM CHANGE?

As discussed in the introduction, the last two decades have seen increasing attention given to incorporating indigenous knowledge of forest management in formal forestry. It has been proposed that this development involves such an essential change in thinking about what forestry should entail, that it should be considered as a paradigm change rather than an adaptation in the process of evolution of forestry. In contemplating whether a paradigm change is involved, one should consider that the concept of paradigm refers to an assortment of group commitments, and that the concept is not therefore unequivocal. Consequently, when assessing whether incorporation of indigenous knowledge in formal forest management can be conceived as a paradigm change, it should be clarified which set of normative assumptions are considered to be involved. Depending on what are considered the dominant values in developing forestry, three different perspectives on the significance of incorporating indigenous knowledge in formal forest management may be distinguished; namely, that it involves either an adaptive change, an institutional change or a paradigm change.

The 'adaptive change' perspective

According to this perspective, the group commitments underlying forest management focus on the need to protect and manage forest resources for human benefit. As illustrated by the conceptual framework of forest management (Figure 1.1), the characteristics of indigenous and professional forest management are essentially similar. Consequently, the differences between these approaches can be considered as being mainly empirical. Moreover, several technical features of indigenous forest management in tropical countries have, in the past, been incorporated in (professional) forest management systems in temperate regions.

Hence, differences between indigenous and professional forest management vary according to the social and historical setting in which they emerged, indicating that the forest-related needs and actions of human societies are location- and time-dependent. Recognition of the value of indigenous knowledge of forest management should therefore be considered as acknowledgment of the need to further diversify formal forest management and to optimally adapt to location-specific conditions. The adaptive change perspective does not reflect essential differences in perception of the nature and value of forest management *per se*.

The 'institutional change' perspective

Advocates of this perspective consider that group commitments displayed in indigenous and professional forest management are concerned not only with relationships between human society and forests, but also with relationships between people. These human relationships can be reflected in the institutional arrangements for forest management. A major characteristic of indigenous forest management differentiating it from professional forestry is its institutional setting. The 'rules' of indigenous forest management and professional forestry are based on different norms regarding the role of forests and the organisation of forest management. Recognition of the value of indigenous knowledge regarding forest management should be seen as an indication that major changes need to be made in the practices and institutional arrangements of formal forestry. However, in this perspective the ultimate aim of forest management, to fulfil the forest-related needs and demands of human society, is not essentially affected. Incorporation of indigenous knowledge into professional forest management essentially entails an institutional change about how to structure forestry.

The 'paradigm change' perspective

Proponents of this point of view consider that group commitments underlying indigenous and professional forest management relate not only to forest management practices and their institutional setting, but also to perceptions of the role of knowledge in forestry development. Recognition of the need to incorporate indigenous knowledge in formal forest management indicates more than a need for further diversification in forest use and management practices, and for change in institutional arrangements. Instead, it signifies the need to reconsider the role of knowledge in developing forest management. Forest management decisions should no longer be informed by the presently dominant paradigm which considers state-sponsored scientific institutions and professional knowledge to be progressive. In this view scientific knowledge should be transferred to local communities, whose own knowledge is non-scientific, outdated, irrational or even superstitious.

Instead, the new paradigm emphasises the intrinsic value of indigenous knowledge and its role in shaping the identity of local societies. Indigenous knowledge should be considered a medium of empowerment, enabling local people to exercise their management skills and technical knowledge and to obtain greater control over their own development.

These three perspectives incorporate in specific ways the three types of values of indigenous knowledge identified earlier. The 'adaptive change' and 'institutional change'

perspectives incorporate the *encyclopaedic* and *efficiency* values of indigenous knowledge, respectively.The 'adaptive change' perspective considers that professional management organisations either appropriate the indigenous knowledge or use it as a means of expressing local voices. The 'institutional change' perspective considers that professional organisations should both esteem indigenous knowledge and try consciously to incorporate features of 'rehabilitated' indigenous management systems into their own formal systems. To do so efficiently requires major institutional adjustments in the formal system. For instance, the change from the conventional approach in forestry development projects of transferring professional technology to local communities, to an approach of blending professional and indigenous knowledge requires a rethinking of the structure of the forestry administration (Wiersum, 1999a). The 'paradigm change' perspective gives the *emancipation* value of indigenous knowledge a major role, whereby it is valued as an input to a negotiating process between local people and external agents or as a medium of empowerment for local people.

Hence it can be concluded that no unequivocal answer can be given to the question of whether incorporation of indigenous knowledge in formal forest management signifies a paradigm change in forestry. Rather, the answer varies according to interpretations of what is at stake.

1.6 CONCLUSION

Forest management concerns the process of making and implementing decisions about use and maintenance of forest resources in order to meet forest-related needs of human societies and organisation of the related activities. Forest management can be characterised as a knowledge and action system. Conventionally in forestry only the management systems in state-legitimised forests and under professional administration were considered. However, as epitomised by the emergence of the term indigenous forest management a much wider array of arrangements is possible. This term can be considered a sensitising concept indicating that the conventional view of forestry as a professional activity needs to change, and that more attention should be given to local communities' understanding of the role of forests in their livelihood systems and to the wide variety of conditions under which forest resources are managed.

The terms professional forest management and indigenous forest management should not be considered as referring to two systematically different approaches to forest management, but rather to empirical variations in social and technical arrangements for forest management.

This is illustrated by the fact that the basic features of both management approaches can be conceptualised in a similar manner. Regarding the role of indigenous knowledge in contributing to this variation three alternative views are possible.

According to the first point of view, indigenous knowledge about forest management is related primarily to biological and technical features of forest management. This knowledge is valued mainly for its *encyclopaedic* value. Consequently, the incorporation of indigenous knowledge into formal forest management schemes would represent an adaptive change in forestry leading to its further diversification.

The second point of view on the relevance of indigenous knowledge to forest management focuses not only on biological and technical features but also on institutional arrangements. In this case, indigenous knowledge is equally valued for its *encyclopaedic* and *efficiency* value. The efficient use of the indigenous knowledge regarding biological and technical features will not be possible without changes in the prevailing institutional norms for forest management. Hence, the incorporation of indigenous knowledge in formal forest management is considered as representing not only the need for inclusion of new biological and technical elements in forest management, but also the need for institutional change in forestry.

The third point of view stresses the *emancipation* value of indigenous knowledge regarding forest management. In this case incorporation of indigenous knowledge in formal management is not based on consideration of how forest management can be best improved, but on consideration of who should decide how forests should be managed. In this view it is not the knowledge concerning the biological, technical or social features that is at stake, but the relation between knowledge and action. The adoption of this perspective by professional forestry might represent a paradigm change.

So the question of the significance of the incorporation of indigenous knowledge in formal forest management can be interpreted in different ways. Forest management is increasingly characterised by a normative pluriformity regarding the values which it should incorporate (Wiersum, 1999a). The change from forest management as an activity of a predominantly professional society, authorised by a national government, to an activity that is characterised by normative pluriformity could be considered as the most significant paradigmatic change in forestry. It is no longer possible to conceive of forestry as being characterised by one coherent set of normative assumptions, nor for forest managers to base their activities on a standardised set of measures. Rather, professional foresters must learn to deal with different normative perspectives regarding the role of forestry and how to negotiate between adherents of different views concerning what to consider as legitimate forestry activities.

REFERENCES

Agrawal, A. (1995). Indigenous and scientific knowledge: some critical comments. *Indigenous Knowledge and Development Monitor* 3(3): 3-6.

Anderson, A.B. (1990). Extraction and forest management by rural inhabitants in the Amazon estuary. In: Anderson, A.B. (ed.). *Alternatives to deforestation: steps towards sustainable use of the Amazon rain forest*. Columbia University Press, New York, USA.

Arce, A. and Long, N. (1992). The dynamics of knowledge-interfaces between bureaucrats and peasants. In: Long, N. and Long, A. (eds.). *Battlefields of knowledge: the interlocking of theory and practice in social research and development*. Routledge, London.

Arnold, J.E.M. (1998). *Managing forests as common property*. FAO Forestry Paper No. 136. FAO, Rome, Italy.

Arnold, J.E.M. and Dewees, P.A. (1995). *Tree management in farmers strategies, responses to agricultural intensification*. Oxford University Press.

Berkes, F. (1999). Role and significance of 'tradition' in indigenous knowledge. *Indigenous Knowledge and Development Monitor* 7(1):19.

Blaikie, P., Brown, K., Stocking, M., Tang, L., Dixon, P. and Sillitoe, P. (1996). Knowledge in action: local knowledge as a development resource and barriers to its incorporation in natural resource research and development. *Agricultural systems* 55(2): 217-237.

Brokensha, D., Warren, D.M. and Werner, O. (1980). *Indigenous knowledge systems and development*. University Press of America.

Chambers, R. (1993). Normal professionalism, new paradigms and development. In: Chambers, R. . *Challenging the professions; frontiers for rural development.* Intermediate Technology Publications, London, UK, p. 1-14.

Clarke, J. (1994). *Building on indigenous natural resource management: forestry practices in Zimbabwe's communal lands*. Forestry Commission, Harare, Zimbabwe.

Colfer, C., Peluso, N. and Chung, C.S. (1997). Beyond slash and burn: building on indigenous management of Borneo's tropical rain forests. *Advances in Economic Botany* Vol. 11. New York Botanical Garden, USA.

Doornewaard, J. (1992). *Religious role of trees and forests in South and Southeast Asia*. Stichting BOS, BOS Document No. 15, Wageningen, the Netherlands.

Duerr, W.A., Teeguarden, Christiansen, N.B. and Guttenberg, S. (eds.) (1979). *Forest resource management, decision-making principles and cases.* W.B. Saunders, Philadelphia.

Eckholm, E. (1975). *The other energy crisis: firewood.* Worldwatch Paper No. 1. Worldwatch Institute, Washington DC, USA.

Falconer, J. and Arnold, J.E.M. (1991). *Household food security and forestry, an analysis of socio-economic issues.* Community Forestry Note No. 1. FAO, Rome, Italy.

Fisher, R.J., (1989). *Indigenous systems of common property forest management in Nepal*. Working Paper No. 18. Environment and Policy Institute, East-West Center, Honolulu, Hawaii, USA.

Ghimire, K.B. (1994). Coping with deforestation: an analysis of local-level responses. *Unasylva* 45(178): 51-56.

Gilmour, D.A. (1990). Resource availability and indigenous forest management in Nepal. *Society and natural resources* 3: 145-158.

Gomez-Pompa, A. (1991). Learning from traditional ecological knowledge: insights from Mayan silviculture. In: Gomez-Pompa, A., Whitmore, T.C. and Hadley, M. (eds.). *Rain forest regeneration and management*. UNESCO, Paris and Parthenon Publ., Man and Biosphere Series No. 6, p.335-341.

Hladik, C.M., Hladik, A., Linares, O.F., Pagezy, H., Semple, A. and Hadley, M. (eds.) (1993). *Tropical forests, people and food. Biocultural interactions and application to development*. UNESCO and Parthenon Publ., Man and Biosphere Series No. 13.

Johnson, A.W. (1972). Individuality and experimentation in traditional agriculture. *Human Ecology* 1(2): 149-159.

Kajembe, G.C. (1994). *Indigenous management systems as a basis for community forestry in Tanzania: a case study of Dodoma urban and Lushoto districts.* Tropical Resource Management Paper No. 6. Wageningen Agricultural University, Netherlands.

Kuhn, T.S. (1970). *The structure of scientific revolutions*. 2nd enlarged edition, University of Chicago Press, USA.

Lebbie, A.R. and Freudenberger, M.S. (1996). Sacred grooves in Africa: forest patches in transition. In: Schelhas, J. and Greenberg, R. (eds.). *Forest patches in tropical landscapes*. Island Press, Washington DC, USA, p. 300-324.

Li, T.M. (1996) Images of community: discourse and strategy in property relations. *Development and Change* 27: 501-527.

Long, N. (1989). Conclusion: theoretical reflections on actor, structure and interface. In: Long, N. (ed.). *Encounters at the interface. A perspective on social discontinuities in rural development.* Agricultural University Wageningen, the Netherlands, Wageningen Studies in Sociology No. 27, p. 221-243.

Mazur, R.E. and Titilola, T. (1992). Social and economic dimensions of local knowledge systems in African sustainable agriculture. *Sociologia rurali*s 32(2/3): 264-286.

Michon, G and de Foresta, H. (1997). Agroforests: pre-domestication of forest trees or true domestication of forest ecosystems? *Netherlands Journal of Agricultural Science* 445: 451-462.

Munyanziza, E. and Wiersum, K.F. (1999). Indigenous knowledge of miombo trees in Morogoro, Tanzania. *Indigenous Knowledge and Development Monitor* 7(2):10-13.

Pandey, D.R. (1998). *Ethnoforestry: local knowledge for sustainable forestry and livelihood security.* Himanshu Publ., New Delhi, India.

Persoon, G.A. (1991). Ecological balance and innovations: cases from the forest. In: van der Breemer, J.P.M., van der Plas, H.T. and Tieleman, H.J. (eds.). *The social dynamics of economic innovations. Studies in economic anthropology.* DSWO Press, Leiden University, the Netherlands, Studies in Social Anthropology No. 10, p. 113-127.

Poffenberger, M. (ed.) (1990). *Keepers of the forest. Land management alternatives in Southeast Asia.* Kumarian Press, West Hartford, Connecticut, USA.

Posey, D.A. (1985). Indigenous management of tropical ecosystems: the case of the Kayapó Indians of the Brazilian Amazon. *Agroforestry Systems* 3: 139-158.

Ramakrishnan, P.S. (1996). Conserving the sacred: from species to landscapes. *Nature and Resources* 32(1): 11-19.

Redford, K.H. and Padoch, C. (eds.) (1992). *Conservation of neotropical forests*. Working from traditional resource use. Columbia University Press, New York, USA.

Richards, P. (1979). Community environmental knowledge in African rural development. *IDS Bulletin* 10(2): 28-36.

Shepherd, G. (1992). *Managing Africa's tropical dry forests: a review of indigenous methods.* Overseas Development Institute, London, UK, ODI Occasional Paper No. 14.

Umans, L. (1992). *Analysis and typology of indigenous forest management in the humid tropics of Asia.* IKC-NBLF and BOS Foundation, Wageningen, the Netherlands.

Van Leeuwen, L. (1998). *Approaches for successful merging of indigenous forest-related knowledge with formal forest management. How can modern science and traditions join hands for sustainable forest management?* National Reference Centre for Nature Management, Werkdocument IKC Natuurbeheer No. W-165, Wageningen, the Netherlands.

Warren, D.M. (1991). *Using indigenous knowledge in agricultural development.* World Bank, World Bank Discussion Papers No. 127. Washington DC, USA.

Wiersum, K.F. (1997a). Indigenous exploitation and management of tropical forest resources: an evolutionary continuum in forest-people interactions. *Agriculture, Ecosystems and Environment* 63:1-16.

Wiersum, K.F. (1997b). From natural forest to tree crops, co-domestication of forests and tree species, an overview. Netherlands *Journal of Agricultural Science* 45(4):425-438.

Wiersum, K.F. (1999a). *Social forestry: changing perspectives in forestry science or practice?* Dissertation, Wageningen Agricultural University, the Netherlands.

Wiersum, K.F. (1999b). Normative pluriformity in forest management: professional and community perspectives. In: *Pluralism and sustainable forestry and rural development*. p.365-379. FAO, Rome, Italy.

2 INDIGENOUS FORESTRY: HOW TO TURN LOCALISED KNOWLEDGE INTO A RELEVANT FORESTRY SCIENCE

Genevieve Michon

FOREWORD

I have worked for the last 17 years on local knowledge related to forest use, management and domestication by farmers in Congo and Indonesia. I have learned a lot from these farmers and I have been struck by the sterile confrontation between them and professional foresters in the field of local forest management. I have tried my best to promote ideas for an alternative forestry based on the validation of local rights, practices and knowledge. I am therefore convinced that there is a profound need for renewal of the forestry approach and that this renewal should start from local bases and use local knowledge and practices as its foundation. However, the following contribution is written as a note of caution.

Recently, probably as a consequence of the worldwide promotion of 'sustainability' and 'equitability' in the development business, some changes have occurred in the attitude of foresters towards local knowledge: forest development now seems to attach great importance to 'indigenous people' and their 'traditional knowledge'. These changes, which touch research as well as action forestry, have often been more superficial and fashionable than carefully thought-out. Many scientists from various disciplines, as well as many professional foresters, have been stimulated to learn more about local knowledge. However, these people often proceed without the relevant intellectual, methodological and theoretical background, and contribute to the reduction of local knowledge into a set of utilitarian practices. In development, this often translates into standardisation of 'local knowledge' where policy-makers and development agencies retain one or two simple local techniques of forest production and drop the whole socio-ecological context that sustains it. An illustration of this is seen in the proposed extension of local agroforestry practices from southern Sumatra to the whole province by the regional forestry services (Dinas, 1995; Michon *et al.*, 2000).

The main question that should lead our reflection in this volume is the following: are we looking for a catalogue of attractive knowledge and practices, or for a revolution of our own forestry science? My preference is clearly for the second, but if this is to be a viable and really successful enterprise we need to shape it into a solid science. In this respect, my contribution aims at pointing out the dangers, and proposing relevant alternatives, in this foundation of a new field in forestry.

2.1 INTRODUCTION

Forestry is a complex matter: it started from a collection of locally relevant practices on trees and forests and evolved into an institutional field of widely recognised management norms. It is a science – or a particular combination of fundamental sciences

applied to forests as a particular object – as well as a very important sector of economic activities.

The term paradigm can refer either to archetypes and models or to the generally accepted perspective of a discipline. Paradigm in forestry mainly refers to technical patterns or models of forest utilisation derived from examples considered as important, and much less to a theoretical framework allowing the formulation of new theories, laws, and generalisations upon which a new field of science can establish and develop.

Forestry as a formalised science developed in a socio-historical context of juridical separation and on-going economic dissociation between agriculture and forestry. In this context in Europe, from the middle of the last century until now, the dominant users of forest resources were the State and private managers of forest domains rather than local smallholder farmers (Devèze, 1965; Corvol, 1987). The purpose of professional and scientific forestry was more concerned with the production of timber and the protection or restoration of a forest resource 'degraded' by centuries of misuse by farmers, than with farmers' practices related to the management of forests as a complement to agricultural activities and a support to the rural economy (Michon, 1999). The formalisation of forestry started from the rationalisation of existing forest management practices through scientific interpretations and experiments.

This forestry framework was transferred to the tropics through the colonial forest services and perpetuated into the forest administrations of the new post-colonial states (Bergeret, 1995). This history has resulted, after 20 to 50 years of public administration and professional forestry practice, in high rates of deforestation, without any noticeable success in reforestation. In response to this global failure, the need for a renewed forestry for the tropics is emerging in various circles. Central to this renewal is the idea that local users could be at least great inspirers, if not the legitimate managers of the improved use of local forests.

What I want to examine here is the consolidation of this trend into a science and the related impact upon (forest) development.

In the tropical context where a great majority of forest users and managers are still local people, and where a large part of forest lands are totally shaped by local knowledge and not by scientific forestry, local practices are dominant and therefore need to be taken into consideration in any attempt at development and also in applied research. However, in many development circles rehabilitation of local knowledge and advocacy for more local authority in forest management (which I fully support) is very much based on the assumption that local people know how to manage forests *sustainably,* but this assumption is still as much a matter of faith as of scientific or historical evidence. There is a tendency to forget that validation of indigenous knowledge *per se* has been built upon a rapid extrapolation of positive examples taken from particular economic, socio-political and historical contexts, not specifically from inside the forestry sector. The sudden rehabilitation of local users in forestry, a professional discipline that has consistently combated those users over recent centuries, must be carefully examined if it aims at being more than a short-lived trend. Scientists, in particular, have to understand how far these new interpretations, upon which research and policies are based and justified, coincide with facts.

As with any recent research trend, research on local knowledge in forestry can still be considered in a first phase of data accumulation. However, this trend is 20 years old now, or older if we take into account the pioneering works of anthropologists interested in the relation between nature and society in forest areas (Conklin, 1957; Haudricourt, 1962; Clarke, 1975; Ellen, 1978), who have produced detailed analyses of forest-related knowledge, although not always as the main focus of their work. Besides these anthropological works that contributed to the emergence of a new field of knowledge in *anthropology*, few attempts at scientific formalisation of research on forest-related knowledge have occurred. With some exceptions (e.g. Thorne *et al.*, 1999; Walker *et al.,* 1999; the People and Plants initiative of WWF/UNESCO, and some projects of the global TROPENBOS programme), the bulk of research carried out on forest-related knowledge and practices has not yet produced anything more than fascinating case studies.

In order to be considered a serious research discipline, this field needs to evolve stricter formalisation of its objectives, concepts, methodologies and even theories. What is at stake here is not only the construction of a new field of knowledge, but also the renewal or the definition of a new field of science. In the next section I propose steps to be taken to achieve that.

2.2 THE LOCAL SCIENCE AND SOCIAL LOGICS BEHIND FRAGMENTED KNOWLEDGE

The main difficulty in studying, understanding and using local knowledge in forestry starts with the precise delimitation of the research object.

Techniques of forest utilisation and management constitute a well-defined research object, but forest-related knowledge does not. We can go to the Amazon estuary and undertake research on 'managed forests' where stands of *Euterpe* palm are encouraged by *Caboclos* (riverine populations along the Amazon) through precise enrichment techniques, or to Sumatra to learn about complex agroforestry practices that have established incredibly biodiverse commercial forests of NTFPs. But what and how will we learn about underlying knowledge?

The obvious part of 'local knowledge' and that which is most easily appreciated by non local observers, is precisely that which directly materialises into observable activities - utilisation and management techniques. But technical knowledge is not all that we need to learn about local forest-related knowledge. The next step of integration consists of environmental knowledge relating to the ecological constraints and explanations that support observed techniques. Although not directly observable, this can be accessed through more or less direct questions, asking people what they 'know' as opposed to just observing what they 'do' (Martin, 1995; Sinclair and Walker, 1998; Walker and Sinclair, 1998). But there is another aspect of local knowledge, relating to the socio-political and religious dimensions of forest-related activities. This knowledge is usually expressed in social institutions and religious rituals, through myths and symbols and through codified relations between people. Specific methods for investigating the socio-political and religious dimensions of knowledge have been developed in various fields of anthropology, related to cultural anthropology and to the more recent school of

political ecology or ecological anthropology (see for example Steward, 1955; Vayda, 1969; Vayda, 1983; Descola, 1986; Escobar & Hvalkof, 1998). They can also be revealed to the scientific observer when obvious differences exist between practices (what people do) and technical or ecological knowledge (what people know).

By learning from local users, foresters hope to find immediately workable alternatives to conventional silviculture or to cosmetic social forestry programmes. The bases of research on local forestry usually concentrate on describing practices and explaining the technical or sometimes the economic rationale behind these reported practices. The danger in this very applied approach, is to focus on techniques and practices rather than on the global knowledge system that underlies them, or to their role and place in the society, and to describe these activities *per se*, from an utilitarian point of view (Friedberg, 1996), by asking only 'What benefit does it produce? How is it technically conceived?'.

This is not to say that the utilitarian approach is not useful as part of a global approach (see below) but rather that it is not sufficient. In particular, this approach does not pay enough attention to the meaning of these practices in the overall functioning of the concerned society. It avoids any reference to the social logics that frame these practices and ends in producing catalogues describing highly localised practices or very focused technical or ecological knowledge. These catalogues are very useful - but primarily in their particular context. Their simple extrapolation to other areas with a different social or historical background might prove hazardous. Examples of this can be found in the numerous lists of 'useful plants', or, more recently, of 'successful' agro-forestry practices produced by forest departments, NGOs or research organisations, which fail to pay attention to the underlying organisation of knowledge, to the perception of 'usefulness' in the studied local group compared with that of the observer, or the social or political factors influencing plant utilisation. Such catalogues tend to be used in highly simplified ways in development projects. An illustration can be found in the Integrated Conservation and Development project of Gunung Leuser National Park in Sumatra, where the project proposed generalising the cultivation of benzoin gardens in the buffer zone as an 'ecologically sound' agroforestry practice common in neighbouring areas, while ignoring the social and market problems presently linked to benzoin. The same happened with the recommendations for cultivation of cashew nut in Jambi, or with the generalisation of the cultivation of cinnamon in the buffer zones of national parks in highland areas of Sumatra and Kalimantan.

Research on local knowledge in forestry sometimes tries to elucidate the property regimes or social strategies associated with the collection and use of resources, but it barely addresses the social, political or religious logic that underlies local understanding and interpretation (or 'appropriation') of nature (Barrau, 1970; Godelier, 1984; Descola, 1986; Descola, 1994). This happens because our scientific approach to knowledge is by its nature and through our culture segregated into well defined, very autonomous and sometimes even unrelated fields. The prerequisite for adapting conventional scientific approaches to relevant research about local knowledge is what anthropologists can teach us, to be aware of the fact that in so-called 'non-modern' societies, local science is *not* fragmented in the same way as it is in the occidental scientific culture. Knowledge and know-how underlying practices on nature do not follow what scientists often perceive as a universal segregation into an utilitarian, or technical ('applied')

sector and a non-utilitarian, symbolic or political ('fundamental') domain. Rather, they operate in an intricate, holistic way, which precisely reflects a conception of the world where plants, animals and people are in a relation of complex interdependency (Descola, 1986; Friedberg, 1996; Gille-Escuret, 1998). This interdependency is expressed in utilisation as well as in religious or institutional aspects. By refusing to explore what we perceive as a non-utilitarian aspect of knowledge because this is 'not directly relevant to our applied objectives', we are in danger of missing the global meaning of a reported practice in the functioning of the society that produces it (as an illustration of how symbolic and religious perceptions of the world can be integrated in an applied research programme on plant-related knowledge, see Ghimire *et al.,* 1999). This often leads to important misinterpretations or misuse of this knowledge.

2.2.1 What does this imply for researchers interested in learning from forest users?

It is important that scientists dealing with local knowledge try to go beyond compiling summaries of knowledge to aim at reporting more globally on the local science that underlies management systems, including its very clear and sometimes major social, political and symbolic components.This does not mean that focused, utilitarian approaches are not useful but that they are not sufficient. For example, Sinclair and Walker (1998) argue for a series of partial approaches, each focused on a particular compartment of the global environmental knowledge, to fully understand local knowledge, somewhat similar to the 'deconstruction' process commonly used in anthropological research (see for example Godelier, 1984). Sinclair and his colleagues point to the dangers of conflation of different levels of explanation, leading to misinterpretation. Deconstruction into partial approaches necessarily has to be coupled with a process of scientific 'reconstruction' – or global interpretation – of the knowledge system. This last step is critical since it is where synthesis could be turned into conflation. Many researchers – foresters, agronomists, ecologists, geographers or economists – currently involved in this kind of research lack the appropriate intellectual tools to apprehend the full dimension of local knowledge. I do not suggest that all these scientists must turn to anthropology, but they must recognise that some aspects of local knowledge that they may not perceive as important, have to be integrated (even if not by themselves) into the analysis. If they want to perform in this new field or research, they must become acquainted with some of the relevant concepts and methodologies. They must learn new languages and approaches and find the most effective way of combining them with their own science. At the same time, anthropologists have to support these various non-specialists in the construction of the methodological, conceptual and theoretical framework that will help to build this new field of scientific knowledge, in allowing the applied aspects of knowledge to be related to the less tangible ones.

2.3 REFINING THE RESEARCH FIELD THROUGH CONCEPTS AND METHODOLOGIES

The easiest way to learn about local knowledge systems is that which anthropologists and agronomists have always used: start from observable practices. Practices are usually a very synthetic expression of the integration of technical, socio-political and religious spheres of the manipulation of nature.

But even if they are committed to exploring beyond visible, utilitarian knowledge and related forest utilisation practices, foresters entering this new field are confronted by three questions:

- how to relate utilitarian, social and ritual practices;
- how to analyse the relation between observable practices and knowledge; and
- how to apprehend the global logic of the society that lies behind these practices?

A first conceptual tool that could help synthesise the observed elements relates to the characterisation of forest management systems. These represent the highest directly observable level of integration of the various aspects of knowledge. It is easy to formalise a conceptual and methodological approach, equivalent to the 'farming systems approach' developed for agricultural research, focusing on forest-related aspects of production activities. This formalisation does not aim to provide a global theory of indigenous forest management but rather aims to offer a global framework for observation and analysis of simple technical, ecological and economic reasoning and objectives behind the arrangement of forest utilisation and management practices. This first level of observation relates mostly to utilitarian aspects of local knowledge. It provides valuable information about knowledge relating to environmental and technical constraints or opportunities, and about household objectives, but does not say much about non-utilitarian knowledge underlying relations between the members of the studied society and natural resources.

Information on practices and utilitarian knowledge relates to the technical appropriation of nature. The second set of tools that we must develop relates to the social and symbolic aspects of appropriation. This includes information about formal and non-formal rules, regulations and prescriptions of use and access to forest resources (social appropriation) and analyses of rituals, representations and perceptions of nature and resources (symbolic appropriation). Profound analysis of these aspects of nature appropriation sits in the field of cultural anthropology, but non-anthropologists can easily learn relevant concepts and methods to be able to ask relevant questions and then integrate this gathered information into their global analysis (Weber *et al.*, 1990)

A third sets of tools for research and analysis also relates to the social nature of knowledge. It addresses the relations between the studied society and the 'external world': the socio-political environment in which forest-related activities develop and evolve. Management of forests has always been dominated by political considerations, perhaps more than by technical or economic reasoning, and the political dimension of local knowledge is an important aspect that should not be neglected.

2.3.1 Towards a new integrated discipline?

Research into local forest-related knowledge and practices lies at the crossroads between several disciplinary approaches from ecology and botany, resource economy and agro-economy, and, of course, ethnosciences and anthropology. Foresters and agronomists have more recently started to include the study of such practices in their research agendas. Each of these disciplinary fields touches this research object through recurrent themes – biodiversity and conservation for ecologists, sustainable development for socio-economic sciences. These disciplinary approaches applied to indigenous knowledge and practices tend to relate more to vague or global concepts than to clearly defined

research objectives. They also lack clear interaction or coordination. In spite of real progress in interdisciplinary research processes, the global scientific picture is still made up of scattered, highly site-specific and thematically partial information. Most analyses are still compartmentalised in the disciplines that have generated the information, and each discipline concentrates first and above all on elements able to feed its own agenda.

The scientific challenge for research on indigenous knowledge in forestry – and more globally on natural resource management – is no longer the primitive accumulation of scientific data that is already well under way, nor is it the creation of a true collaboration between natural and social sciences that has already fully emerged with the development of ethnosciences and agroforestry. What is essential now is a global re-organisation and scrupulous formalisation of this scattered knowledge into a consistent field: only through a rigorous confrontation of the different types of information gathered through the different disciplines and over the different sites will we be able to contribute to the emergence of a real scientific field.

One reason for the global failure of conventional forestry in the tropics is the attempt to apply uniform methods to a highly diverse reality. I do not claim here that we have to look for universal alternatives to conventional forestry. Neither do I say that there can be one global interpretation of local forest-related knowledge or indigenous forest management. The diversity of situations reflects the complexity of the relation between forests and people, and this complexity should not be reduced to one or two universal archetypes. But if we want to understand and value this multi-dimensional diversity of the real world, precisely in order to avoid standardisation and reductionist views of local forestry systems, we need to be able to relate similar, as well as diverging cases, to each other through comparisons or contrasts. Our ultimate objective would be to catalyse the understanding of patterns, tendencies, consistencies and inconsistencies as well as critical factors, in the nature and changes of the relations between people and forests. This is precisely the definition of the shaping of a new field of knowledge.

An attempt at formalisation in the field of local knowledge related to resource management was initiated at ICRAF, through the Global Inventory of Agroforestry Systems (Nair, 1989). However, the instigators failed to develop any theoretical framework for the interpretation of indigenous agroforestry systems, their conclusion being that each example was so particular that each new case added more diversity than consistency to the global picture, rendering any global conceptualisation impossible. Sinclair (1999) has criticised Nair's (lack of) analysis as consisting merely of a collation of descriptive information by local technical people.

The construction of this field needs to be carried out through different intellectual instruments in reference to the disciplines that have generated them. The common criticism of the proposed approach to local knowledge is precisely its strength: it works on the boundaries of different disciplines, and constantly crosses them, allowing assumptions, methods, or theories to be broadened and new answers to be sought to old questions. A first important step in the formulation of our founding corpus of theories would be to sort out what can be relevant to our scientific objective among the various assumptions and theories elaborated in each of the above-mentioned fields, in relation to indigenous knowledge, forest/agriculture interaction and the relationship between

nature and society. Then, discussions and confrontation of reasoning among the various academic fields involved in this interdisciplinary research would be needed to boost the emergence of coherent rationales and the identification of relevant research questions for the future.

Beyond assumptions and theories, we also have to work on the thematic keys and methodological tools used to forge the approach to local knowledge, which are necessarily borrowed from these different disciplines. Three broad categories of themes and methods can be suggested at this stage.

The first would be a comparison of case studies, aimed at identifying similarities and contrasts, in order to define the significant or determining factors in these similarities/ contrasts. Secondly, a systematic confrontation of contrasting factors is needed, in order to frame the understanding of relationships between local knowledge and related factors (for example: utilisation practices and biodiversity, or ecological constraints and regulation of access to resources). This approach could frame the comparison enterprise mentioned above.

These two complementary approaches will necessarily contribute to the precise definition of the terms of the most appropriate systems approach for our research object, just as this happened for the farming system approach and the related theory that constituted its fundaments. But comparison is not the final objective of this global research process. A third category of compilation activities would aim at drawing tendencies and consistencies in the profusion of diverse examples.

2.4 CONCLUSION

What this book proposes is clearly a reconstruction if not a revolution, in the field of forest science and practice: learning to utilise local knowledge as the new foundation of local forest development and giving all types of forest knowledge a chance to build a better future for forests in the tropics. The reconstruction consists of the inclusion of new sets of knowledge and practices for further development of forest science. Such an inclusion has not really happened since the first formalisation, at the beginning of the 19th century, of professional and scientific forestry which was itself founded on empirical knowledge and practices of forest management, then further developed through experiments. The real revolution proposed here, would target the globality of farmers' forest-related knowledge and practices, not only those of the dominant class of forest managers (timber loggers and producers).

I have presented a personal vision of how such a revolution should proceed, through a progression from local to global levels. This renewal starts with the definition of the full dimension of 'local knowledge'. It then develops through the definition of a conceptual and methodological framework that will allow characterisation and analysis of single objects in their own complexity. The last level of integration consists of the shaping and the constant tuning of the theoretical body of the paradigm that will allow comprehension of the diversity of the relevant objects and will result in action. But we have to keep in mind that this progression needs constant re-adjustment based on continuous feedback between the global and local levels.

Local knowledge being the central focus of the scientific approach, we might assume that anthropology offers the best intellectual and conceptual framework to refine the analysis. However, our objective depends not only on the definition of a new rationale for the relationship between nature and society, but also on the reconstruction of forestry as a field of economic activity that might discourage anthropologists.

Forest sciences therefore appear to be the appropriate place for the development and implementation of this original field of knowledge, partly because they will be the prime benefactor of this new type of research, but mainly because of their multidisciplinary nature and their applied objective. Foresters might lack skills in anthropological analysis, but, if well trained in relevant concepts, theories and methodologies will have enough capacity in systematic analysis to perform well in this field. And if this might imply a painful conversion of the present generation of interested foresters, the next generation of students can easily overcome this problem if well trained in this new combination of disciplinary fields. For the consolidation of the success of this new trend in forest science, education of forest scientists is essential.

What is at stake here is the whole relationship between forest-related and agricultural practices in the tropical world. This proposed revolution in the forestry approach of its scientific background through the integration of a local knowledge perspective, could constitute a second chance for forestry to successfully address not only forest management problems, but also the interface between forest and agriculture because local forest users are mostly farmers, not isolated forest dwellers. A first window of opportunity opened 25 years ago with the creation of agroforestry as a new field of applied science, able to reconcile agriculture with trees, farming activities with forests and farmers with foresters. But agroforestry developed mainly as an agronomic approach to the management of trees as auxiliaries of agricultural crops in agricultural fields. It did not succeed in touching the global interaction between forests and agriculture, but created a third field in resource management sciences, somewhere distinctly between forest and agriculture but not joining these sectors. This global failure of agroforestry as an integrating science can be partly explained by the choice of its approach, which was dominantly experimental and did not succeed in integrating local knowledge and practice into its research field. Important changes have occurred in the second half of the nineties which give more hope for further development of agroforestry as a really integrative science (Leakey, 1996; Sinclair, 1999). If science based on local forest-related knowledge is to succeed in changing the face of forestry, and not to become a marginalised field in forestry, it should avoid concentration upon single discipline projects and take into account the whole reality of local forest management, from integrated practices of Jivaros Indians to the more destructive practices of swidden farmers in Vietnam.

REFERENCES

Barrau, J. (1970). *L'Homme et son environnement végétal en région tropicale humide: L'exemple Malayo-Océanien.* (People and plant environment in tropical humid areas.) No. Fac. de Lettres/ Museum d'Histoire Naturelle, Paris.

Bene, J. G., Beall, H. W., Cote, A. (1977) *Trees, food and people: Land management in the tropics.* IDRC, Ottawa.

Bergeret, A. (1995). Les forestiers coloniaux: une doctrine et des politiques qui n'ont cessé de rejeter de souche. (Colonial foresters: doctrine and policies that constantly resprout.). In: Collective work '*Les sciences hors d'occident au XXème siècle'*. ORSTOM Editions. Paris.

Clarke, W. C. (1975). *The maintenance of agriculture and human habitats within the tropical forest ecosystem*. MAB Symposium on Ecological effects of increasing human activities on tropical and subtropical forest ecosystems, Port Moresby, UNESCO, Camberra.

Conklin, H. C. (1957). *Hanunóo Agriculture.* FAO, Rome.

Corvol, A. (1987). *L'Homme aux bois. Histoire des relations de l'homme et de la forêt XVIIe-XX siècles* (Man and woods. History of relations between people and forests XVII-XX centuries.). Fayard, Paris.

Descola, P. (1994). *In the Society of Nature: A Native Ecology in Amazonia*. University of Cambridge Press, Cambridge. Translation of: Descola, P. (1986). La Nature Domestique. Plon, Paris.

Descola, P. (1986). *La Nature Domestique* (In the Society of Nature). Plon, Paris.

Devèze, M. (1965). *Histoire des forêts* (History of forests). PUF. Paris.

Dinas, K. I. L. (1995). Damar gardens in Pesisir, development and transfer to other areas in Lampung (in Indonesian). In: *Collective work: Damar gardens as a model for community forestry.* Bandar Lampung, Sumatera, Indonesia.

Ellen, R. F. (1978). *Nuaulu Settlement and Ecology*. Martinus Nijhoff, The Hague.

Escobar, A. and Hvalkof, S. (1998). Nature, Political Ecology and Social Practice: Towards an Academic and Political Agenda. In: Goodman, A. and Leatherman, T. (eds.). *Building a New Biocultural Synthesis.* Ann Arbor: University of Michigan Press.

Friedberg, C. (1996). Les droits de propriété intellectuelle: le point de vue de l'anthropologue. (Intellectual Property Rights: The point of view of an anthropologist.). *Nature, Sciences, Sociétés.* 7 (3) pp. 45-53.

Ghimire, S.K., Parajuli, D.B., Gurung, T.N., Lama, Y.C.C. and Aumeeruddy, Y. (1999): *Conservation of Plant Resources, Community Development and Training in Applied Ethnobotany at Shey Phoksundo National Park*, Dolpa. Report to the EC.

Gille-Escuret, G. (1998). *Les Sociétés et leurs Natures* (Societies and their Natures). Armand Colin, Paris.

Godelier, M. (1984). *L'Idéel et le Matériel* (Ideal and Material.). Fayard, Paris.

Haudricourt, A.G. (1962). Domestication des animaux, culture des plantes et traitement d'autrui (Animal husbandry, cultivation of plants and other treatments). *L'Homme* (People) II, pp 40-50.

Leakey, R.R.B. (1996). Definition of agroforestry revisited. *Agroforestry Today* 8 (1), 5-7.

Martin, G. (1995). *Ethnobotany: a methods manual*. Chapman and Hall, London.

Michon, G. (1999). Cultiver la forêt: silva, ager, ou hortus? (Cultivating the forest: ager, hortus or silva). In: Pagezy H. (ed.). *L'Homme et la Forêt Tropicale*. SFEH, Marseille.

Michon, G., de Foresta, H., Levang, P. and Kusworo (2000). The Damar Agroforests of Krui, Indonesia: Justice for Forest Farmers. In: Zerner, C. (ed.). *People, Plants and Justice. The Politics of Conservation*. Chapter 7, pp. 180-205. Cambridge University Press, New York.

Nair, P. K. R. (ed.). (1989). *Agroforestry Systems in the Tropics*. Forestry Science, Kluwer Academic Publishers.

Sinclair, F.L. (1999). A general classification of agroforestry practice. *Agroforestry Systems*. 46: 161-180.

Sinclair, F.L. and Walker D.H. (1998). Qualitative knowledge about complex agroecosystems. Part 1: a natural language approach to representation. *Agricultural Systems* 56: 341-363.

Sinclair, F.L. and Walker, D.H. (1999). A utilitarian approach to the incorporation of local knowledge in agroforestry research and extension. In: Buck, L.E., Lassoie, J.P. and Fernandes, E.C.M. (eds.). *Agroforestry in Sustainable Agricultural Systems.* pp. 245-275, Lewis Publishers, New York.

Steward, J.(1955). *The Concept and Method of Cultural Ecology*. Urbana, University of Illinois Press.

Thorne, P.J., Subba, D.B., Walker, D.H., Thapa, B., Wood, C.D. and Sinclair, F.L. (1999). The basis of indigenous knowledge of tree fodder quality and its implications for improving the use of tree fodder in developing countries. *Animal Feed Science and Technology* 81: 119 – 131.

Vayda, A.P. (ed.) (1969). *Environment and Cultural Behavior: Ecological Studies in Cultural Anthropology.* Natural History Press, Garden City.

Vayda, A.P. (1983). Progressive Contextualization: Methods for Research in Human Ecology. *Human Ecology* 11:265-281.

Walker, D.H. and Sinclair, F.L. (1998). Qualitative knowledge about complex agroecosystems. Part 2: formal representation. *Agricultural Systems* 56: 365-386.

Walker, D.H., Thorne, P.J., Sinclair, F.L., Thapa, B., Wood, C.D. and Subba, D.B. (1999). A systems approach to comparing indigenous and scientific knowledge: consistency and discriminatory power of indigenous and laboratory assessment of the nutritive value of tree fodder. *Agricultural Systems* 62: 87-103.

Weber, J.,Betsch, J. M., & Cury, P. (1990). A l'interface Hommes-Nature: les ressources renouvelables. (Between people and nature: natural renewable resources.). In: Piren, P. E. (ed.): *La recherche et l'environnement.* pp.14. Strasbourg:

3 TAKING LOCAL KNOWLEDGE ABOUT TREES SERIOUSLY

Fergus L. Sinclair and Laxman Joshi

3.1 INTRODUCTION

There has been a sea change in forestry research and development over the last quarter of a century. This has transformed forestry from an ecological discipline, largely about trees and their associated biota, to one which embraces consideration of the people who use forests or want them to be conserved (Westoby, 1987). This change has been forced by practical imperatives. In many developing countries, attempting to keep people out of forests was expensive and largely unsuccessful, so that it became apparent that developing sustainable forest management, either for productive or conservation purposes, required inclusion rather than exclusion of the people in the vicinity of the forest (Oldfield, 1988). As a result, local people who use forests are increasingly seen as legitimate stakeholders in planning forest utilisation and conservation strategies by both public and private forestry initiatives (Bird, 1997). Participatory forest development is in vogue.

There has also been a slow realisation that trees outside forests and modified forests where people farm, may be important for the well-being of forest ecosystems. Trees on farms have critical importance, both because they can renewably supply tree products that might otherwise be unsustainably removed from forests and because tree cover on regional and landscape scales may affect the conservation value of remaining forest fragments. The importance of trees outside forests, the use of natural forest vegetation in agricultural contexts and the deliberate creation of agricultural systems with a forest-like structure are outlined below.

3.1.1 Trees outside forests

There are many examples of the need to domesticate wild trees if they are to be maintained as a renewable resource. The afromontane tree *Prunus africana* from which a cure for benign prostatic hyperplasia is derived, is now on CITES Appendix 2 and threatened with local extinction in Cameroon and Madagascar because of over exploitation (Hall *et al.*, in press). Many other wild trees, such as the shea butter (*Vitellaria paradoxa*) and néré (*Parkia biglobosa*) in West African parklands, the desert date (*Balanites aegyptiaca*) with a main range in the sahel, and marula (*Sclerocarya birrea*) in East and Southern Africa, are similarly important as sources of exported products, local food and wood, or both (Boffa, 1999; Teichman, 1987). Their domestication and utilisation on farm is critical both for preserving rural livelihoods in Africa and the woodlands that remain (Leakey and Simons, 1998). Trees on farms can also provide key habitats, resources and corridors for forest plant and animal species, thereby increasing both local and regional biodiversity (Pimentel *et al.,* 1992). For example, on a national scale, migratory bird species such as the resplendent quetzel (*Pharomacrus mocinno*) and the three wattled bell bird (*Procnias tricarunculata*) that attract visitors to cloud forest reserves in Costa Rica, require sufficient tree cover in the

agricultural landscapes that surround them, to make their seasonal migration (Harvey and Haber, 1999). On a continental scale there are moves to protect a Mesoamerican biological corridor, extending from southern Mexico to Colombia. Trees in pastures, windbreaks, live fences and shade trees on coffee farms are important elements in connectivity of tree cover in this region.

3.1.2 Use of forest vegetation in farming

Farming also occurs within modified forest environments which may constitute either effective buffer zones around natural forest or retain much of the ecosystem functions of forest habitat themselves. Natural vegetation may be used from regeneration, or by removal of some trees and enrichment planting with productive species, or trees may be deliberately planted to create forest like environments. The damar *(Shorea javanica*) agroforests around Krui in Sumatra, have recently been recognised as a legitimate land use by the forest authorities because they have been shown to retain forest functions while providing a living for rural people (Tomich *et al.*, 1999). A further 3 million hectares of Sumatra and Borneo are covered in secondary forest enriched with rubber (Gouyon *et al*., 1993). This 'jungle rubber' is managed on a 30 to 60 year rotation by farmers who slash and burn an area, plant rubber and then allow secondary forest regeneration around it. This creates a much more biodiverse environment than intensively managed monocultural rubber plantations, albeit within a modified rather than natural ecosystem (Michon and de Foresta, 1995; Beukema, in press). In contrast, the *miang* tea gardens of northern Thailand involve less disruption of the natural habitat; farmers simply thin the natural forest and enrich with productive plants, in this case principally *Camellia sinensis* (Preechapanya, 1996). In other systems, such as the Kandy forest gardens in the central highlands of Sri Lanka, productive forest-like environments are created by planting useful trees, shrubs and climbing plants around homesteads (Sinclair and Hitinayake, 2000).

So it is common sense that people who use, or who want to use, forests should be a central focus in forestry, and that trees on farms, and farming in forest or forest-like environments, are critical at the forest margin. This puts resource users, and amongst these, farmers and forest dwellers, at the centre of sustainable forest development. A critical issue then arises about how these people participate in forest development and the respective roles for local practitioners and external research and development workers, in the process of developing and implementing tree and forest management strategies. It is argued here that both indigenous and external perspectives and knowledge are valuable, but that rigorous methods are required to acquire and combine them. It is reasonable to assume that this chapter might be read by people working with resource users. It is unlikely to reach the resource users themselves. It is sensible, therefore, to focus upon what we as research and development workers can learn from resource users, and how we can use this knowledge as part of a participatory approach to development.

3.2 WHAT DO RESOURCE USERS KNOW?

Resource users are many and varied. In the chain of use of tree and forest products, there are those directly involved in harvesting, some of whom are also involved in husbandry, while others exploit resources without taking action to ensure their regeneration. There are also people and organisations involved in collection, transportation, processing and retail. This chapter is concerned with direct resource users, and particularly those who live locally and may therefore be expected to have a stake in sustaining the tree resources around them.

3.2.1 Local knowledge

There are many dimensions to the knowledge that tree and forest resource users have and many ways to go about describing it. We are concerned here with local knowledge, that is, the knowledge held by people in particular localities who use trees. In this context the word 'local' can be distinguished from 'indigenous'. Indigenous knowledge implies knowledge that is culturally specific (Sillitoe, 1998), whereas the concern here is with knowledge about trees and the environment that is locally derived through observation and experience. The significance of this distinction, as will be shown below, is that the local knowledge systems from geographically distant and ethnically different locations but with a similar agroecological context show remarkable similarities.

3.2.2 Knowledge and practice

It is also important to distinguish the present interest in local ecological knowledge from what has been referred to as indigenous technical knowledge (IDS, 1979). Much of what has been written about technical knowledge has actually referred to practice rather than knowledge, but what people *do* and what they *know* are rather different (Sinclair and Walker, 1999). Agricultural practice, for example, has been described by Richards (1989) as a performance, involving the farmer making contingent responses to various events as a season unfolds. Knowledge may be used in making decisions at each point but the resulting field practice, such as a complex intercropping layout, is the result of an interaction between underlying knowledge and a series of events, opportunities and constraints rather than a carefully planned *a priori* design. Knowledge cannot, therefore, be directly inferred only from observation of practice. This is nicely illustrated in Nepal where farmers know that large leaved trees, such as *Ficus roxburghii*, have a propensity to cause splash erosion of soil but nevertheless plant them on crop terrace risers because of their high fodder value (Thapa *et al*., 1995). This represents a trade-off, involving sophisticated knowledge about both tree-crop interactions and the nutritive value of tree fodder on the part of the farmer (Walker *et al.*, 1999). It would be erroneous to assume from their practice of planting the large-leaved trees that farmers did not know they caused erosion. This has immediate consequences for planning research and extension. There is clearly no point promoting an extension message trying to inform farmers about what they already know. There is, however, a researchable constraint relating to how high value fodder can be produced without causing soil erosion. This could be addressed by, for example, breeding smaller leaved trees of the species preferred by farmers or identifying new species with similar fodder value at critical times of the season but with less destructive environmental impact (Sinclair and Walker, 1999).

3.2.3 Levels of explanation

The use of the term ecological knowledge, as described here, also implies that there is some explanatory content to knowledge rather than only heuristic rules of thumb that people may follow but do not know why they work. This has important implications because, whereas explanatory knowledge can be extrapolated to new situations through reasoning, the specificity or generality of unexplained heuristic rules is unknown. Where it has been systematically looked for, explanatory knowledge has often been found amongst rural people. This is consistent with an emerging view of local knowledge as a dynamic resource based upon contemporary observation and experimentation rather than just a legacy from the past (Fairhead and Leach, 1994; Richards, 1994; Thapa *et al.*, 1995; Sinclair and Walker, 1999).

Care is required here, however, because there are often different levels of explanation and their conflation can result in over-emphasis of culturally idiosyncratic explanations involving the supernatural, obscuring pragmatic understanding of natural processes. The supernatural explanations are often at a much higher level than, and distinct from, natural causal mechanisms that are also understood. For example, in Zambia a snake may bite a person who then dies. One level of local explanation of this concerns the mechanism; people know that the snake injects venom and that this is poisonous. Another level of explanation concerns why the snake bit the person, which requires a spiritual explanation which may relate to witchcraft and someone having malicious thoughts towards the victim. Spiritual beliefs more often constrain what people do than what they know ecologically. In Mayan culture it was a belief that people were literally made of maize (Asturias, 1949). This equivalence of flesh and maize meant that indigenous people would not grow maize to sell, but only for subsistence. Commercial cultivation of maize was essentially like trading in people and therefore considered immoral, but did not mean that the Mayans did not know a lot about the ecology of growing maize as a subsistence crop. Conflating spiritual explanations with utilitarian knowledge, as is often done in cultural anthropology (Sillitoe, 1998), may be just as misleading to our understanding of peoples' ecological knowledge, as not recognising a spiritual dimension would be to our understanding of their culture.

3.2.4 Causal understanding

Knowledge of causation is a particularly useful form of knowledge in natural resource management. In some rural communities detailed local understanding of natural causal mechanisms have been found. Figure 3.1 shows a systematic representation of farmers' knowledge about how fodder trees grown on crop terrace risers in Nepal affect splash erosion of soil. It can be seen from this representation that a process locally referred to as *tapkan* describes what hydrological scientists call canopy modification of rainfall. It is clear from this diagram that local people understand how various attributes of trees affect splash erosion. Leaf size, texture and inclination angle, for example, affect water droplet size and hence erosive impact, a causal relationship that was disputed by hydrologists until only a few years ago (Brandt, 1989; Hall and Calder, 1993). *Tapkan* is an important factor abstracted from a much larger causal network understood by farmers about tree-crop interactions, including shading by trees, root competition and fertility contributed from litter decomposition (Sinclair and Walker, 1999).

Furthermore, farmers take these tree attributes into account in deciding where to grow trees on their farms (Thapa, 1994). Bamboo for example, which is considered competitive with crops, is not grown on crop terrace risers. We can be fairly sure that this is relatively new knowledge, based on contemporary observation because growing trees on farm land is a practice that has intensified recently in the mid hills of Nepal in response to declining access to common property forest resources (Carter and Gilmour, 1989).

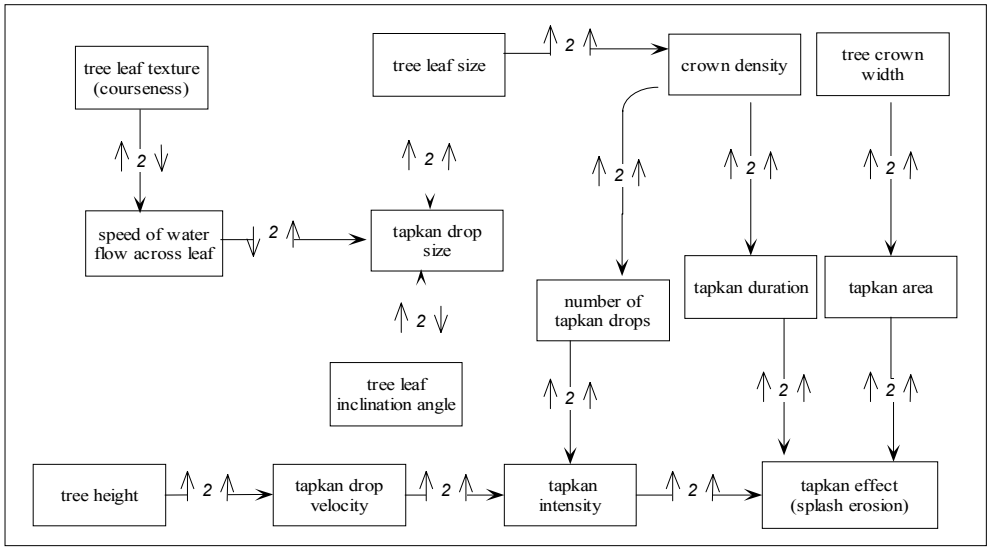

Figure 3.1: A systematic representation of farmer's causal knowledge of how trees affect splash erosion of soil in Solma village in eastern Nepal. Nodes (boxes) represent attributes of components of the agroecosystem. Horizontal arrows represent a causal influence by one node on another node. The small arrows signify the direction of change of values of the causal attribute (left hand side) and the affected attribute (right hand side) (↑ for increase, ↓ for decrease). The numeral '2' signifies symmetry of causation so, for example, if ↑ *x causes* ↓ *y*, then it also follows that ↓ *x causes* ↑ *y*. Not all causal relations are symmetrical, for example it is possible to get older but not younger. Source: adapted from Sinclair and Walker, 1999.

3.2.5 Generality

It may seem a contradiction in terms to seek generality in local knowledge but there is mounting evidence of regularities in the way people understand ecology across cultures. The seminal work of Brent Berlin (1992) has revealed common features in the way plants and animals are named and classified in various non-literate societies, suggesting that recognition of patterns in nature is more important than the culturally specific context from within which they are observed.

When it comes to knowledge about processes involving trees, recent research reveals both locational specificity associated with people's experience of different species and generality in terms of concepts and terminology. Joshi and Sinclair (1997) revealed

that the *tapkan* concept, articulated by farmers in one Nepalese village (Solma) and presented in Figure 3.1, was common knowledge across the entire command area of Agricultural Research Station, Pakhribas, comprising the eastern mid-hills of Nepal.

While the term and its conceptualisation were common across the area, knowledge of specific tree attributes affecting *tapkan* varied according to people's experience of different species displaying such attributes (Figure 3.2). So, nearly all respondents (>90%) said that leaf size affected *tapkan*, consistent with some common trees such as *Ficus roxburghii* having very large leaves and hence a destructive *tapkan* effect, but few people (<10%) mentioned leaf inclination angle because only a few uncommon trees have drooping leaves that affect *tapkan*. While people's knowledge was frequently different between sites (people more dependent on resources being more knowledgeable about them), there were few differences between men and women or between wealth groups (Figure 3.2). This pattern was repeated for a series of concepts associated with tree-crop interactions and tree fodder value including: rukhopan (tree competitiveness with crops); *posilopan* (nutritive value of fodder) and *obhanopan* (digestibility of fodder).

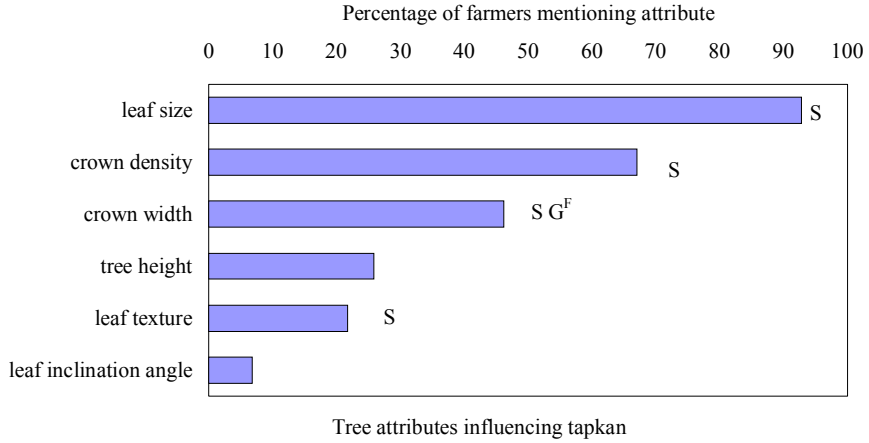

Figure 3.2: Mean percentage of farmers mentioning tree attributes that affect *tapkan*. A random sample of 221 farmers, stratified according to site, gender and wealth, was interviewed in the eastern mid-hills. The four sites, were contrasting in terms of forest access and remoteness. Significant differences in numbers of farmers: at different sites are marked 'S', of different gender 'G' (superscript indicates which gender was higher). Source: adapted from Joshi and Sinclair (1997).

The same terms and concepts surrounding tree fodder have been reported from the central and western hills of Nepal (Rusten and Gold, 1991; Pratap Shreshtra, pers. comm.) and similar criteria for evaluating fodder have been reported from Uttar Pradesh in India, suggesting some commonality in local knowledge about fodder trees across the Hindu Kush (Walker *et al.*, 1999). The persistence of knowledge systems on a regional basis has profound implications. It makes it possible for analysis of local

knowledge to drive the agenda of frontline research and extension agencies that work on a regional mandate, as well as making it feasible for local knowledge to directly inform the process of policy formation.

It has been established then, that a sophisticated local system for the evaluation of tree fodder stretches across the Himalayan region. This has also been shown to be largely complementary to what is known biologically (Walker *et al.*, 1999; Thorne *et al.*, 1999). The *posilopan* descriptor was found to relate to protein supply to the duodenum in cattle, once the inhibitory effects of tannins on protein degradability were taken into account while *obhanopan* corresponded to overall dry matter digestibility. Fuzzy system decision evaluation tools, that combined local and biological information, have further revealed the rationality of farmer decisions given their objectives, constraints and what they know about the nutritive value of the tree fodders available (Thorne *et al*., 2000).

The framework that Nepali farmers use to evaluate fodders and make feeding decisions differs from that of animal nutritionists, but is remarkably similar to criteria used by hillside farmers in similar agroecological circumstances in Kenya (Thorne *et al.*, 1999). This is explainable by the differences between farmers and scientists in both:

- *what they can observe*: scientists reduce feeds to constituents *in vitro* and it is difficult to predict their integrated effect on cattle because tree fodders have complex chemistry in which phenolic compounds interfere with degradability in the rumen, whereas farmers feed the fodders and then observe effects on productivity and health of whole animals; and
- *what they choose to value:* scientists assume simple objectives of maximising digestible feed intake, farmers have complex suites of objectives and constraints, including requirements to satisfy animal appetite and hence control animal behaviour when feed is scarce causing them to favour less digestible feeds, in such circumstances.

There is good reason then, from the comparability of farmers' local criteria in hillside systems in Nepal and Kenya and their contrast with conventional biological approaches to feed evaluation, to hypothesise generality in the way farmers in similar agroecological circumstances evaluate and decide about feeding tree fodders. This hypothesis merits further testing in a wider range of hill farming circumstances in which tree fodder is fed to ruminants on a cut and carry basis.

Tree fodder is not an isolated case. Similar regularities are discernible in farmers' description and evaluation of tree-crop interactions. Farmers in a range of environments describe interactions between plants as being mediated via effects on soil. In Nepal farmers describe trees as either *malilo* or *rukho* depending upon their competitive effect on crops. *Malilo* trees contribute to soil fertility via rapidly decomposing and nutrient-rich litter and have deeper, less competitive root systems, whereas *rukho* trees have shallow spreading roots and their litter decomposes slowly (Thapa *et al.*, 1995). Farmers managing the multistrata forest gardens in the villages around Kandy in central Sri Lanka describe some plant species as being either *sitelaiy* or *seraiy* (Southern, 1994). In general use, the term *sitelaiy* means cool, cooling or cold and *seraiy*, hot, heating or burning. In relation to ecological interactions, *sitelaiy* species such as banana (*Musa acuminata*) are said to have a positive effect on other species because the soil around bananas remains or becomes moist, thereby providing a favourable micro-climate for

other plants. In contrast, *seraiy* species such as clove (*Myristica fragrans*) are perceived to have a negative effect on neighbouring plants and the soil under clove trees is considered unsuitable for cultivation.

Similarly, Khmu and Thai people in northern Thailand, who produce '*miang*' (fermented tea leaves used for chewing) by growing *Camellia sinensis* and *C. oleifera* in thinned hill evergreen forest, use similar terms to distinguish between impacts on the soil of different dominant ground flora species (Preechapanya, 1996). For example, they consider the soil under *Eupatorium adenophorum* to be din yen, which literally means cool but also refers in an agricultural context to moist and fertile soil. By contrast, they describe soil under *Imperata cylindrica* as being *din ron*, which literally means hot, but also refers to dry and hard soil. *Eupatorium adenophorum* is, therefore, viewed as a more desirable ground cover for jungle tea gardens than *Imperata cylindrica*.

The existence of this local knowledge of tree-crop interactions has two major implications.

Firstly, the mechanistic understanding of interactions mediated by the environment makes process-based research on tree-crop interactions directly relevant and interpretable by farmers. This alters prevailing views about what constitutes research relevant to the resource user. Conventionally, adaptive research may be seen as more relevant to rural people than more fundamental research. But, when we know that farmers themselves understand interactions then research on fundamental processes such as root competition can be formulated with farmers and the results communicated to them. This inverts conventional views on how to make research relevant to farmers. We now see that the farmers are often better able to do adaptive research themselves, whereas they can learn from fundamental research, providing that it is targeted at processes they need to understand to improve their systems. There is then a role for researchers in doing research that farmers will find difficult to conduct themselves because the disturbance required is beyond their resources, or the methods of observation required are beyond the tools that they have available. When new knowledge is generated from this research, farmers are best placed to integrate it into their system. This requires common understanding by external researchers and farmers, and effective communication which in turn implies a need for formal acquisition of local knowledge.

Secondly, the generality of local understanding of plant interactions suggests that research with a wide dissemination domain may be derived from analysis of local knowledge. This suggests that analysis of local knowledge can realistically drive on-station and laboratory research as well as more locally situated activity.

3.2.6 Limits to local knowledge

Much of this chapter has stressed the sophistication of local understanding of ecological processes, but it is also clear that there is a lot that local people do not know and that this often constrains their practice. Limits to what resource users can observe often determine limits to their knowledge.

For example, in Honduras, farmers were unaware of the existence of parasitoids (small, solitary wasps and flies whose larval stages are parasitic on insects that damage crops) and entomopathogens (fungal, bacterial and viral diseases that infect and kill insects)

because they could not see them, but when taught about them, were able to manipulate natural enemy populations and enhance biological pest control (Bentley, 1994). Similarly, Nepali farmers know more about atmospheric tree-crop interactions (figure 3. 1) than below-ground processes which are difficult for them to observe. Thus, while they classified 40 out of the 90 tree species found on farms as being either *malilo* - enhancing soil fertility and less competitive with crops, or *rukho* - competitive with crops (Thapa, 1994), their causative knowledge about why trees were classified in these ways included only two elements:

- a gross classification of root systems as predominantly shallow or deep, and
- some knowledge of the speed of decomposition of leaf litter (which occurred above-ground and so could be observed).

This contrasts markedly with the six attributes recognised as affecting *tapkan* and their causal influences. Given that trees were regularly lopped for fodder, a number of issues pertinent to practical management arose with respect to species differences in root system characteristics and the effects of different lopping strategies on root development and competitiveness. These represented issues that farmers were unable to address themselves but, as noted above, would be appropriate candidates for a national, regional or local research service. The implication here is that analysis of gaps in local knowledge is useful in planning extension (if the gap can be filled from existing external knowledge) or research (if the gap requires new research to create new understanding to be filled).

3.2.7 Complementarity

It has already been pointed out above that some local knowledge is comparable with scientific understanding, but where it is also complementary to science there are particularly large gains to be made from integrating local and scientific knowledge. For example, the existence of formally documented records of farmers' and researchers' knowledge about the nutritive value of tree fodder, referred to above, made it possible to compare the equivalence of terms used by farmers and scientists. This was done using automated reasoning procedures on computer (Kendon *et al.*, 1995) and revealed that fodder that scientists described as having a high tannin content tended to be described by farmers as bitter. While scientists had some detailed knowledge about the role of tannins in protein digestion by ruminants and decomposition of leaf litter, they knew very little about the actual tannin contents of the 90 native species used by Solma farmers and how this varied seasonally. In contrast, farmers did not possess detailed knowledge about the mechanism of action of tannins in ruminant digestion, although they did associate leaf bitterness with lower palatability and nutritive value and had extensive knowledge about how leaf bitterness varied in a large number of tree species throughout the season. This demonstrates complementarity between farmers' knowledge of their local vegetation and scientists' knowledge of process that could be exploited in designing appropriate research; indeed, farmers' understanding of intraspecies variability has led researchers to revise strategies for sampling tree material for analysis of its nutritive value (Walker *et al.*, 1999). Clearly, because of this complementarity, the combination of what farmers and scientists know represents a more powerful resource than either knowledge system alone.

Equivalence of terms is not always as straightforward as this, particularly where farmers aggregate knowledge differently from scientists, usually because of contrasts in their

methods of observation. The earlier example of local description of the nutritive value of tree fodder serves as a good example of this. Farmers' knowledge is aggregated in terms of knowing about the effect of supplementation of particular tree fodders on animal productivity whereas scientists disaggregate fodders into their nutritive and antinutritive components. So, whereas farmers incorporate effects of both protein and tannin content in a single index of protein supply to the animal (*posilopan*), scientists measure protein and tannin separately. Thus, while there is no direct correspondence between *posilopan* and routine feed analysis it is possible, with a bit of ingenuity, to interpret one measure in terms of the other (Thorne *et al.*, 1999) This then allows us to take advantage of the complementarity of farmers' knowledge about how *posilopan* varies in local vegetation and scientists' understanding of how protein supply affects animal function.

3.2.8 Biodiversity

Complementarity between local and scientific knowledge frequently stems from local knowledge of biodiversity. As was noted in the introduction, rural people often use a much more diverse germplasm in their cultivation or collection activities than the relatively few domesticated species that have dominated in agricultural and forest science, and also know about inter- and intra- species variation in the vegetation around them.

Much, but not all, of this knowledge may be utilitarian, in that it is associated with the use of plants. Nepali farmers for example understand seasonal variation in fodder quality of different tree species either grown on farms or collected from forest, with close to a hundred tree species being utilised at village level (Thapa *et al*., 1997). Furthermore, they consistently recognise subspecies variation in seven tree species, six of which have not yet been botanically differentiated. These subspecies variants are not only recognised by differences in morphological characteristics, such as leaf size, but are also ranked differently by farmers in terms of fodder quality (Walker *et al.*, 1999). For example *Ficus nerifolia*, locally called *dudhilo* in Nepal, is classified as either *thulo pate* (large leaved) or *sano pate* (small leaved), each with different fodder value. Differences in their fodder quality have been confirmed through laboratory analysis of leaf chemistry that show significantly lower tannin content and higher cellulase digestibility in the smaller leaved variety (Walker *et al.*, 1999). In addition to specific knowledge about components, resource users may appreciate overall levels of biodiversity. For example, typically 30% of plant species found in Kandy Forest Gardens have no apparent use (Perera and Rajapakse, 1991), but attempts to intensify garden productivity by replacing these with productive plants have not been adopted (Hitinayake and Sinclair, 1998). This is perhaps because local people value the diversity itself within their system without necessarily assigning particular value to specific components.

There are also non-utilitarian aspects to local knowledge of biodiversity. Trees often possess spiritual and ritual significance and may be known in this context rather than, or as well as, in a utilitarian role. In Nepal, for example, farmers retain *Ficus roxburghii* on their crop terrace risers, not only because it is a good fodder tree but also because the large leaves have important ceremonial uses. Rural people in many societies have named and have knowledge about organisms in their immediate environment regardless of their utility (Berlin, 1992). This makes resource users a valuable source of information

about local biodiversity, even though local categorisation and naming may not correspond directly with botanical and zoological conventions.

There is an apparent dichotomy between people who assert that local knowledge is entirely based upon what people think it is necessary to know (Niamir, 1990), and those who suggest that, rather like scientific knowledge, local knowledge is essentially an intellectual process, that attempts to explain the complex reality that people encounter (Howes and Chambers, 1980). However, as has been described above, while people's specific ecological knowledge tends to be related to their experience and dependence on particular resources, conceptual understanding is often more universally held. Local knowledge, therefore, displays both a fundamental human need to explain, and pragmatic expediency in relation to what knowledge has been acquired.

3.3 WHEN AND HOW SHOULD WE LEARN FROM RESOURCE USERS?

3.3.1 Knowledge and the knower

The preceding discussion has shown that resource users have sophisticated ecological knowledge that is often comparable with scientific understanding and may complement it. It may seem self-evident then that we, as research and development professionals, should seek to understand local knowledge as a prerequisite to forest research and development activity that may have a local impact. It can be argued, however, that it is the local people themselves rather than their knowledge that needs to be involved in the process. This assertion is based on the premise that in a participatory process that involves resource users, their knowledge will also be involved through the actions and decisions of participants, even if it remains implicit. In such a situation, it can be posited that there is no need for understanding on the part of external researchers of the local knowledge nor any utility in making local knowledge explicit. In the extreme, acquiring local knowledge in these circumstances can be seen as extractive.

These views of attempts to treat local knowledge as seriously as scientific understanding are caricatures that set up a false dichotomy between involvement of people and knowledge. This anxiety stems in large part from the great difficulty that anthropologists have in separating knowledge from the person or people who know it. Such a view causes immediate problems in natural science, since we are clearly willing to see scientific knowledge as separate from scientists and to transmit and use it accordingly. It is useful then to define knowledge for our present purposes as understanding that can be articulated (Sinclair and Walker, 1999). In this scheme information is used as a collective term. The simplest form of information is data, which when interpreted by the human mind creates understanding, some of which can be articulated as knowledge (Figure 3.3). Then it becomes clear that both local people and local knowledge can and should be involved in participatory approaches. But to do this we require formal methods for acquiring local knowledge that make it explicit so that researchers can learn about what resource users already know and use this knowledge in the research and development process.

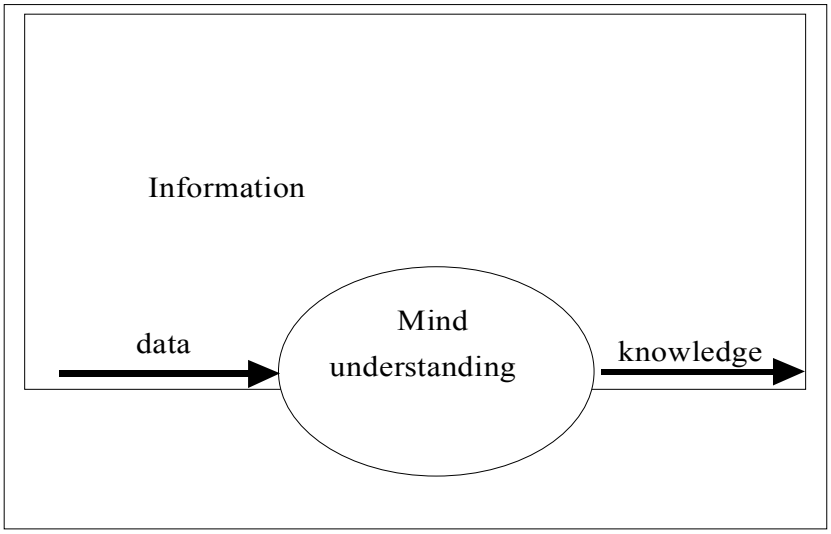

Figure 3.3: A view of knowledge as human interpretation that can be articulated.

3.3.2 Why implicit local knowledge is not enough

Explicit records of local knowledge can empower local communities by improving the dialogue between the community and those with resources and powers that affect them and, where there are similar requirements amongst communities, by identifying research, extension and policy at larger scale institutional levels that are locally relevant. It has been established above that there are often limits to local knowledge determined by limits to observation. While there is ample evidence that resource users experiment, they are often constrained in the extent to which they can afford to perturb the environment and measure the consequences. This means that external research services can offer something which complements what resource users can do themselves but this can only be achieved if there is mutual understanding. Professional research can serve local needs if the researchers understand what local people already know, the priority areas where new knowledge is required and are then able to communicate advances. We should not expect resource users to learn our vocabulary and concepts any more than we learn theirs.

Furthermore, the existence of general patterns in local understanding in similar agroecological conditions makes it feasible and cost effective to drive regional research on the basis of local requirements (Walker *et al.*, 1997). As illustrated above, analysis of local knowledge across a region may identify fundamental research requirements common to many resource users. This requires aggregation of local knowledge from different localities, which in turn requires explicit records that can be aggregated.

3.3.3 Partial views of knowledge

In order to develop explicit records of local knowledge systems, not only do we have to distinguish knowledge from the person who knows it, but we also have to focus on particular areas of knowledge.

This is necessary to create manageable and coherent representations of knowledge that are of practical relevance, can be assembled rapidly and cost-effectively and can then be readily used. This again creates problems in anthropological traditions that demand study of whole cultural systems and see any predetermined focus of study as unduly biasing the research (Sillitoe, 1998).

Ellen's (1998) suggestion that we must elucidate *in toto* the 'encompassing cultural matrix' in which knowledge is embedded if we are to understand practices and knowledge well enough to use them effectively to meet development or conservation goals is not borne out by the material presented here. On the contrary, by focusing on ecological knowledge we have shown great utility in being able to improve dialogue between researchers and resource users and identify problems faced by farmers, that external research services can help to address.

It is important to get beyond an apparent conflict between having a focus for knowledge acquisition and the possibility of introducing bias because there are certain aspects of a system that we want to know about. Vayda (1996) proposes doing this by starting from an action of interest and working outwards to seek explanations for it. This implies only considering as much of the cultural system as is necessary for the purpose in hand. This has parallels with focusing on knowledge of particular processes, such as agroecology, and then only including what is directly relevant to this, as in the formal methods of knowledge acquisition that we have advocated (Walker and Sinclair, 1998). Advocating the construction of partial views of local knowledge systems does not diminish the importance of the cultural context in which they occur but does assert that there is utility in separating out some knowledge and working with it for particular purposes. Indeed, we have shown that such abstraction allows identification of useful generalities amongst knowledge systems that would otherwise be obscured.

3.3.4 Knowledge and power

Knowledge and power are intertwined and, therefore, ownership and control of the transmission of knowledge are of fundamental importance in development. However, this neither precludes there being areas of knowledge that people are willing to share nor the development of systems to protect intellectual property. Knowledge-based systems methods can be used to ensure that the source of information remains attached to knowledge that is acquired (Sinclair and Walker, 1998). Computerised systems have been designed in which the source of a statement, and information about the source, are essential contextual information that are held about any item of knowledge so that it is always possible to see who contributed knowledge and credit them with any value that accrues to it (Walker *et al.*, 1995).

Discussion of intellectual property with respect to local knowledge has understandably been dominated by the possibility of very valuable pharmaceutical products being derived from it. While it is important to ensure that rights to the value accrued from such local knowledge and germplasm are protected, much of the functional knowledge that farmers and forest dwellers have, is of a much more mundane nature, and may be shared to mutual benefit amongst communities of resource users and with external researchers.

Clearly, trust amongst people has to be maintained for knowledge exchange to occur - and this puts an onus on researchers to manage knowledge they acquire responsibly. There should be reciprocity between local communities and external researchers, that involves exchange of knowledge, since it is very difficult to see how researchers can be effective without an appreciation of local knowledge, and if they are effective then resource users will want to know about their results.

3.4 CONCLUSIONS

The main conclusion of this chapter is that forestry research and extension workers need to be able to deal systematically with partial representations of local knowledge systems appropriate to particular purposes rather than attempt to understand entire cultures. This involves creating explicit representations of local ecological knowledge that are dynamic and readily accessible in a cost-effective manner. Knowledge based systems methods and tools have been developed to facilitate this. Where they have been used, generalities in what resource users currently know and what they need to know to improve their management of tree resources have emerged and been found to be both comparable and complementary to scientific understanding. This makes it possible to invest in acquisition of local ecological knowledge at the level at which research and extension activity are planned and policy is formulated.

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REFERENCES

Asturias, M.A. (1949). *Men of maize*. Editorial Losada, SA, Buenos Aires, Argentina.

Bentley, J.W. (1994). Stimulating peasant farmer experiments in non-chemical pest control in Central America. In: *Beyond farmer first* (eds. I Scoones and J Thompson). Intermediate Technology Publications, London, pp. 147-150.

Berlin, B. (1992). *Ethnobiological classification: principles of categorisation of plants and animals in traditional societies.* Princeton University Press, Princeton, NJ.

Beukema, H. (in press). Terrestrial pteridophytes as indicators of a forest-like environment in rubber production systems in the lowlands of Jambi. Sumatra. In: *Agriculture, Ecosystems and Environment* (in press).

Bird, P. (1997). Funder or founder: the role of development agencies in shared forest management. *Commonwealth Forestry Review* 76: 179-181.

Boffa, J.-M. (1999). *Agroforestry parklands in sub-Saharan Africa*. FAO Conservation Guide 34. FAO, Rome.

Brandt, C.J. (1989). The size distribution of throughfall drops under vegetation canopies. *Catena* 16: 507-524.

Carter, A.S. and Gilmour, D. (1989). Increase in tree cover on private farmland in central Nepal. *Mountain Research and Development* 9: 381-391.

Ellen, R .(1998) Comment [on Sillitoe (1998)]. *Current Anthropology* 39:238-239.

Fairhead, J. and Leach, M. (1994). Declarations of difference. In: *Beyond farmer first* (eds. I Scoones and J Thompson). Intermediate Technology Publications, London, pp. 75-79.

Gouyon, A., de Foresta, H. and Levang, .P (1993). Does 'jungle rubber' deserve its name? An analysis of rubber agroforestry systems in southeast Sumatra. *Agroforestry Systems* 22: 181-206.

Hall, J.B., O'Brien, E.M. and Sinclair F.L. (eds.) (in press). Prunus africana*: a monograph. School of Agricultural and Forest Sciences*, University of Wales, Bangor (in press).

Hall, R.L. and Calder, I.R. (1993). Drop size modification by forest canopies: Measurements using a disdrometer. *Journal of Geophysical Research* 98: 18,465-18,470.

Harvey, C.A. and Haber, W.A. (1999). Remnant trees and the conservation of biodiversity in Costa Rican pastures. *Agroforestry Systems* 44: 37-68.

Hitinayake, H.M.G.S.B. and Sinclair, F.L. (1998). Categorising complex agroforestry practices for farming systems research and extension (FSR/E): the case of forest gardens in Kandy district, Sri Lanka. In: *Changing agricultural opportunities: the role of farming systems approaches* (eds. Ranaweera, N.F.C., Gunasena, H.P.M. and Senanayake, Y.D.A.). Asian Farming Systems Association, Perideniya, Sri Lanka, pp. 173-188.

Howes, M. and Chambers, R. (1980). Indigenous technical knowledge: analysis, implications and issues. In: *Indigenous knowledge systems and development* (eds. Brokensha, D. , Warren, D.M. and Werner, O.). University Press of America, Lanham, Maryland, pp. 329-340.

IDS (1979). *Rural development: whose knowledge counts?* IDS Bulletin 10(2). Institute of Development Studies, University of Sussex, UK.

Joshi, L. and Sinclair, F.L. (1997). *Knowledge acquisition from multiple communities.* Report, School of Agricultural and Forest Sciences, University of Wales, Bangor, UK.

Joshi, L., van Noordwijk, M., Wibawa, G., Vincent, G., Hardiwinoto, S. and Sukandi, T. (2000). Gap replanting – an emerging trend in rejuvenation of jungle rubber agroforests in Jambi, Indonesia. Paper presented at workshop "Evolution and sustainability of intermediate systems of forest management", 28 June-1 July 2000, Lofoten, Norway.

Kendon, G., Walker, D.H., Robertson, D., Haggith, M., Sinclair, F.L. and Muetzelfeldt, R.I. (1995). Supporting customised reasoning in the agroforestry domain. *The New Review of Applied Expert Systems* 1: 179-193.

Leakey, R.R.B. and Simons, A.J. (1998). The domestication and commercialization of indigenous trees in agroforestry for the alleviation of poverty. *Agroforestry Systems* 38: 165-176.

Michon, G. and de Foresta, H. (1995). The Indonesian agro-forest model: forest resource management and biodiversity conservation. In: *Conserving biodiversity outside protected areas: the role of traditional agroecosystem*s (eds. Halladay, P. and Gilmour, D.A.). IUCN Forest Conservation Programme, Andalucia.

Niamir, M. (1990). *Community forestry: decision making in natural resource management in arid and semi-arid Africa.* Community Forestry Note 4, FAO, Rome.

Oldfield, S. (1988). *Buffer zone management in tropical moist forests*. IUCN, Cambridge.

Perera, A.H. and Rajapakse, R.M.N. (1991). A baseline study of Kandyan forest gardens of Sri Lanka: structure, composition and utilization. *Forest Ecology and Management* 45: 269-280.

Pimentel, D.U., Stachow, D.A., Tackacs, H.W., Brubaker, A.R., Dumas, J.J., Meany, J.A., O'Neil, S.D., Onsi, E. and Corzilius, D.B. (1992). Conserving biological diversity in agricultural/forestry systems. *BioScience* 42(5): 354-362.

Preechapanya, P. (1996). *Indigenous ecological knowledge about the sustainability of tea gardens in the hill evergreen forest of northern Thailand.* PhD thesis, University of Wales, Bangor, UK.

Richards, P. (1989). Agriculture as a performance. In: *Farmer first* (eds. Chambers, R., Pacey, A. and Thrupp, L.A.). Intermediate Technology Publications, London, pp. 39-51.

Richards, P. (1994). Local knowledge formation and validation: the case of rice in Sierra Leone. In: *Beyond farmer first* (eds. Scoones, I. and Thompson, J.). Intermediate Technology Publications, London, pp. 165-170.

Rusten, E.P. and Gold, M.A. (1991). Understanding an indigenous knowledge system for tree fodder via a multi-method on-farm research approach. *Agroforestry Systems* 15: 139-165.

Sillitoe, P. (1998). The development of indigenous knowledge: a new applied anthropology. In: *Current Anthropology* 39: 223-252.

Sinclair, F.L. and Hitinayake, G. (2000). Ecosystem services of forest gardens in Sri Lanka. In: *Forests in sustainable mountain development: a state of knowledge report for 2000* (eds. Price, M.F. and Butt, N.). CAB International, Wallingford, pp. 153-155.

Sinclair, F.L. and Walker, D.H. (1998). Qualitative knowledge about complex agroecosystems. Part 1: a natural language approach to representation. *Agricultural Systems* 56: 341-363.

Sinclair, F.L. and Walker, D.H. (1999). A utilitarian approach to the incorporation of local knowledge in agroforestry research and extension. In: *Agroforestry in sustainable agricultural systems* (eds. Buck, L.E., Lassoie, J.P. and Fernandes, E.C.M.). Lewis Publishers, New York, pp. 245-275.

Southern, A.J. (1994). *Acquisition of indigenous ecological knowledge about forest gardens in Kandy District, Sri Lanka.* MPhil thesis, University of Wales, Bangor, UK.

Teichman, I. von (1987). Notes on the distribution, morphology, importance and uses of the indigenous Anacardiaceae. 2. The importance and uses of Sclerocarya birrea (the marula). *Trees in South Africa* 35: 2-7.

Thapa, B. (1994). *Farmers' ecological knowledge about the management and use of farmland tree fodder resources in the mid-hills of eastern Nepal.* PhD thesis, University of Wales, Bangor, UK.

Thapa, B., Sinclair, F.L. and Walker, D.H. (1995). Incorporation of indigenous knowledge and perspectives in agroforestry development. Part Two: Case-study on the impact of explicit representation of farmers' knowledge. *Agroforestry Systems* 30: 249 - 261.

Thapa, B., Walker, D.H. and Sinclair, F.L. (1997). Indigenous knowledge of the feeding value of tree fodder. *Animal Feed Science and Technology* 67: 97-114.

Thorne, P.J., Subba, D.B., Walker, D.H., Thapa, B., Wood, C.D. and Sinclair, F.L. (1999). The basis of indigenous knowledge of tree fodder quality and its implications for improving the use of tree fodder in developing countries. *Animal Feed Science and Technology* 81: 119-131.

Thorne, P.J., Sinclair, F.L. and Walker, D.H. (2000). The interactive role of fodder trees in hillside landscapes: using fuzzy sets to combine farmers' knowledge with science. In: *Forests and society: the role of research. Proceedings of the XXI IUFRO World Congress, 7-12 August 2000, Kuala Lumpur* Volume 1 (eds. Krishnapillay, B., Soepadmo, E., Arshad, N.L., A.Wong, H.H., Appanah, S., Chik, S.W., Manokaran, N., Tong , H.L. and Choon, K.K.). IUFRO, pp. 743-751.

Tomich, T.P., Thomas, D.E. and van Noordwijk, M. (eds.) (1999). *Research abstracts and key policy questions – methodology workshop on env.ironmental services and land use change: bridging the gap between policy and research in South East Asia.* Workshop held on 31st May-2nd June, 1999, Chiang Mai, Thailand. ASB-Indonesia Report No. 10, ICRAF, Bogor.

Vayda, A.P. (1996.). *Methods and explanations in the study of human actions and their environmental effects*. CIFOR/WWF Special Publication, CIFOR, Bogor.

Walker, D.H. and Sinclair, F.L. (1998). Qualitative knowledge about complex agroecosystems. Part 2: formal representation. *Agricultural Systems* 56: 365-386.

Walker, D.H., Sinclair, F.L. and Kendon, G. (1995). A knowledge based systems approach to agroforestry research and extension. *AI Applications* 9 (3): 61-72.Walker, D.H., Sinclair, F.L., Joshi, L. and Ambrose, B. (1997). Prospects for the use of corporate knowledge bases in the generation, management and communication of knowledge at a frontline agricultural research centre. *Agricultural Systems* 54: 291-312.

Walker, D.H., Thorne, P.J., Sinclair, F.L., Thapa, B., Wood, C.D. and Subba, D.B. (1999). A systems approach to comparing indigenous and scientific knowledge: consistency and discriminatory power of indigenous and laboratory assessment of the nutritive value of tree fodder. *Agricultural Systems* 62: 87-103.

Westoby, J.C. (1987). *The purpose of forests: follies of development.* Blackwell, Oxford.

4 RESEARCH AND PARTICIPATORY FOREST MANAGEMENT: COMPARING THE PRIORITIES OF RESOURCE USERS AND DEVELOPMENT PROFESSIONALS

Anna Lawrence and Kate Green

4.1 INTRODUCTION

Participatory Forest Management (PFM) is used as an umbrella term to include shared forest management, joint forest management, collaborative forest management and community forestry. PFM attempts to secure and improve the livelihoods of local people dependent on forest resources (Hobley, 1996), by involving all key stakeholders in the process of forest management, understanding their needs and situations, allowing them to influence decisions and receive benefits, and increasing transparency.

A wide range of institutions now participate in forest management coalitions with the aim of reducing poverty, including government forest services, local and international NGOs, international donor agencies, and local users associations. The vast majority of participatory forestry management has been described and documented from South Asia, with the remainder being largely based in other parts of Asia. There is also much more documentation of the social and institutional aspects of PFM, than of the technical aspects.

From the professional researcher's point of view, it is difficult to identify from these documented sources ways in which their activities can usefully contribute to participatory forest management. This chapter outlines a study which addressed these gaps in our understanding of PFM, by surveying the opinions of a wide range of stakeholders from six contrasting tropical countries, about their priorities for *what* should be researched, by *whom* and *how.* The emphasis here is on the consequences of including resource users in priority-setting for research; specific recommendations for research topics by professional researchers will be discussed in a later paper.

4.2 METHODOLOGY

A study of this type presents challenges because it seeks to identify issues perceived by people from widely varying backgrounds and in a wide range of socio-political and ecological contexts. We adopted an iterative methodology, beginning with a pilot email questionnaire sent to key informants (KIs) to ask for their views on the relative importance for research, of issues identified in the literature. We deliberately avoided defining the term 'research' in order to explore respondents' own perceptions. KIs were selected on the basis of their experience in natural resource management and participatory approaches. The questionnaire was modified and improved through feedback from the KIs, and then used with local stakeholders (project staff including foresters, and local resource users) in each of the six countries.

The countries which participated in the survey were Nepal, India, Brazil, Bolivia, the Philippines and Tanzania, chosen to incorporate a range of ecological, social and policy contexts. Within these countries, local consultants selected projects covering a wide range of institutional partnerships and forest types (including protected areas and buffer zones), where they conducted semi-structured interviews with both project staff and forest users.

The interview started with open questions, asking respondents to identify the key areas needing research in PFM. It then asked respondents to comment on all constraints, using a semi-structured format based on a list of pre-selected issues. Finally respondents were asked to score the identified issues on a scale of 1 (not important for research) to 5 (highly important for research), thereby allowing us to quantify results.

The results were analysed both quantitatively and qualitatively, based on data grouped according to stakeholder group (KI, project staff or forest user), and country. Quantitative analysis, using SPSS, was applied to the scores that respondents attributed to different research priorities and to the frequency with which respondents mentioned issues. Qualitative analysis was applied to the open and semi-structured parts of the interview; in particular we identified constraints that cut across issues, were mentioned frequently by respondents but not prioritised, were not considered researchable by respondents but may in fact be addressed by improved knowledge management, and those prioritised by a particular sub-group of respondents which may warrant further attention.

The complementary qualitative and quantitative approaches allow issues to be identified, and patterns identified, despite the distance and number of respondents involved.

Table 4.1: Research priorities of the different stakeholder groups in relation to the top six overall priorities; (1 is top priority; 2= indicates the priority was second in equal place with another)

Issue	***Overall rank***	**Rank among KIs**	**Rank among project staff**	**Rank among forest users**
Communication and extension	*1*	1	1	1
Organisation and decision-making	*2*	2	2=	3
Silviculture	*3*	7	2=	2
Sustainability	*4=*	4=	4	8=
Policy	*4=*	4=	12	5
Conflict	*4=*	6	11	4

4.3 RESULTS

4.3.1 Quantitative analysis: the issues ranked by respondents

The top four issues prioritised by respondents are

1. communication and extension,
2. organisation and partnerships,
3. silviculture, and
4. sustainability.

However there were marked differences between different groups of stakeholders (table 4.1). Communication was rated the top priority by all stakeholders (KIs, project staff and forest users), but silviculture was a higher priority at local level (project staff and forest users) than at international level. The high priority accorded to benefit distribution by KIs was not echoed by local respondents, while sustainability was not considered important by forest users among whom conflict management was instead given a high priority.

While there is relative consensus within stakeholder groups, there is considerable variation between countries (table 4.2), which to some extent can be linked with the different ecological and policy contexts. Notably in Bolivia and Brazil a high priority was given to market research reflecting a preoccupation with management for commercial timber production; in Tanzania a high priority for conflict management and tenure contrasts with the low priority given to silviculture, reflecting the fact that most of the projects surveyed were in protected areas; and in India and Nepal, which have had community forest legislation for more than ten years, communication and extension is rated more important.

Table 4.2: Research priorities of respondents in the six countries.

Brazil	Bolivia	Nepal	India	Philippines	Tanzania
1. Market	1= Market + Organisation and decision-making + Sustainability	1.Communic-ation and extension	1.Communic-ation and extension	1. Ecology	1= Tenure + Conflict
2= Ecology + Silviculture		2. Silviculture	2. M&E	2. Sustainability	
		3. Organisation and decision-making	3. Sustainability	3. Communic-ation and extension	3. Communic-ation and extension
4. Policy	4. Policy	4. Policy	4. Silviculture	4. Silviculture	4. Organisation and decision-making

4.3.2 Cross-cutting constraints

In PFM many of the constraints, whether social or technical, are interconnected, and consequently some of the issues raised by survey respondents do not fall neatly into one category or the other. Furthermore, themes arise which cut across several categories. We analysed these qualitatively using our own understanding of the background of respondents, and their interpretation of the meaning of 'research'. This qualitative analysis indicated that the principle cross-cutting constraints are:

1. *communication:* a large group of issues would benefit from enhanced sharing of experience, many of them methodological, including: the effects of policy and policy-making processes; means of sharing information and experience; learning strategies; appropriate information and dissemination pathways, and improved data collection methods responding to technical information needs;
2. *pluralistic monitoring and evaluation systems* which recognise the heterogeneity of community stakeholders or forest user groups, and the interests of outside stakeholders. Research is needed to use PM&E to strengthen organisational capacity to manage forests, improve policy implementation and transparency of decision-making, and enhance equity of benefit distribution.

We consider these cross-cutting constraints to be of particularly high priority, because they reflect the concern of respondents from a wide range of backgrounds, with the issues access to and use of information.

4.4 DISCUSSION

4.4.1 The contribution of research in PFM

Respondents differed in their conceptions of research, its purpose and capabilities, according to their background and discipline. Among most respondents, the value of research is undermined by a widespread perception that it is conducted and analysed at a distance, with little evidence that results have been disseminated to those who would find them most useful. Consequently some project staff and forest users rejected a need for 'research' but instead wanted methods for learning from experience in an iterative and locally relevant manner, while others held the view that the latter is also 'research', albeit participatory action research. Other responses balanced this with the view that multiple stakeholders should be involved in research to ensure joint learning, based on recognition particularly among the KIs that many PFM issues also have meaning at a wider level.

Some pointed out that donor funding can distort the value of research: rigid funding patterns requiring explicit goals to be fulfilled can result in project inflexibility which may lead to incompatibility with the goals of local people. Part of the problem is the widespread perception of research as a long term enterprise. Primary stakeholders often need to perceive short term and tangible benefits, and long term funding and support are seldom ensured.

Clearly the question of *who* conducts research will affect the methodologies that are considered to be appropriate. Although participatory research techniques were most commonly considered appropriate by project staff and KIs in all sample countries, case

studies and surveys were seen to be complementary to these methods. Many respondents emphasised the need to integrate these approaches with more traditional scientific methods, especially in areas such as silviculture, ecology, sustainability and technology development, although only one respondent equated research with the testing of hypotheses.

4.4.2 Communication and extension issues

The most significant finding of the survey was the agreement between all stakeholder groups in prioritising communication and extension issues. Despite being a survey looking at priorities for *research*, each stakeholder group identified communication and extension issues as the top priority. This is an issue which links in with others, notably policy (low awareness at field level, lack of consultation at policy-making level); silviculture (poor dissemination and implementation of research results); and benefit distribution (related to monitoring and evaluation of participation and benefits).

Within the wealth of comments made by respondents, we can identify three main areas of perceived weakness in research. Firstly, a lack of information was commonly reported as hindering the development of sound forest management practices. In particular, local forest users and project staff often stated that they were unaware of national forest policies and regulations affecting local forest management, the processes and partnerships required for PFM, and locally appropriate silvicultural methods and techniques.

Secondly, there seems to be a lack of learning opportunities between projects. Many of the issues which preoccupy practitioners in countries where PFM is new (e.g. Tanzania and Bolivia) are the same as those that have been discussed in Nepal and India for several decades. This point highlights the scope for learning by sharing experience between countries.

Finally, there is a lack of communication and extension tools and methods for PFM, such as those needed for disseminating information (often of a technical nature) to field level staff and users and for sharing information among a wide range of stakeholders.

4.4.3 Organisational issues

Overall this category of issues was the second priority for research, although there were some important differences of opinion between stakeholder groups. For example, several scientific key informants felt that organisation is not a forestry issue, whilst social researchers recognised the significant influence that organisational aspects can have on local resource management.

Many comments referred to the structural and organisational weaknesses of government forestry departments (i.e. they tend to be top-down, budget-driven and control-oriented), as well as the lack of real commitment these departments can show to the devolution of power and responsibility. Other points related to the abilities of local organisations to manage and protect forest resources; to generate and manage financial resources; to ensure appropriate levels of representation and participation by community members (particularly women and the poor); and to be flexible and innovative. PFM projects often create completely new organisations for the purpose of forest management, the

other option being to build on existing local organisations and develop their capacities for PFM. In many cases respondents were unclear about this process of establishing and developing local PFM organisations (such as Forest Users Groups in Nepal and India), and forest users in particular stated a need for guidelines to assist in identifying appropriate organisations for community forest management, and for forming user groups.

Some of these constraints are not obviously researchable, for example where they consist of rigid policies and institutions. However innovative approaches to research can help even with such complex issues. It is clear from the survey responses that much more needs to be known about the appropriateness of different institutional partnerships for effective PFM. Obviously the specific nature of any partnership will depend on the particular local context, but there is a role for exploring the range of different partnerships involved in PFM and for identifying some generic lessons from their experience to date, through analytical cases studies, and participatory monitoring and evaluation of organisational experience.

4.4.4 Silviculture

There was an interesting difference of opinion between stakeholders over the importance of silvicultural research. Local people (forest users and project staff) rated it within the top two priorities for research, but KIs (academics and international researchers) ranked it only eighth, apparently because they feel that a lot of research has already been undertaken, and that new research is not needed in this area. Clearly local people disagree, because the results of existing research are not being communicated properly to users, or are not appropriate to local level situations. This block in information access or relevance should be a key priority for research.

Local respondents appear to put their finger on the problem when they emphasised that existing research results are not being utilised, and highlighted a desire not for more research but for improved information flow, and improved application of existing knowledge. It may be the case that appropriate silvicultural research results are lying idle, but our impression is that there is both an under-appreciation of the way in which silviculture needs to be adapted to local conditions and resources, and a misapprehension that research conducted on research stations is of relevance to PFM.

Silviculture is an area where local research is clearly required, and more so in some countries than others. It is evident from our respondents that participatory silvicultural research is more advanced in Nepal and India, where a focus on dissemination will be more appropriate, but that new experimental methods will be needed elsewhere (particularly in the timber-rich forests of the Philippines, Bolivia and Brazil). While experiments must be conducted locally and (if the results are to address livelihood constraints of the very poor) must be designed with poor forest users, there is a clear role for international contributions towards developing and disseminating the methodology.

Finally, this section of the survey drew comments indicating a high priority for research on the silviculture of native species, and linked the current priorities with poor use of local knowledge, particularly in forest inventory.

4.4.5 Other issues

Sustainability was rated fourth overall. However it was apparent that respondents held different *concepts* of sustainability and it is therefore difficult to treat this as a single high-priority issue. It is clear that international and project staff are anxious to establish ways of knowing whether forest management can continue. Qualitative analysis of their comments suggests that the main concern for research, is to explore ways of improving *institutional* sustainability rather than *biological* sustainability, a concern which adds weight to the high priorities given to organisational issues.

Policy as a research priority had a mixed reaction. Respondents from a range of SH groups mentioned policy problems in connection with PFM, but less commonly as a *researchable* constraint. Instead, the frequency with which local respondents and forest users in all six countries commented that they did not know or understand forest policy suggests a *communication* problem. International and project respondents added comments on the often considerable overlap and contradiction between forestry policies, and between policies of different sectors. There is a need therefore to expose these contradictions, to find ways to clarify and simplify policy at various institutional levels and to provide pragmatic interpretations appropriate for community management. This is an approach which was identified by ourselves in analysing the results, and is not necessarily seen as a priority among the respondents.

Conflict management was another theme mentioned frequently in the literature, and hence included on the list of issues to be scored for research importance. We anticipated that it would not necessarily be perceived as a *researchable* constraint, and indeed conflicts were mentioned in all six countries, but only rated highly for research in Tanzania. This was perhaps due to the relative newness of the PFM approach in the projects selected, and their focus on protected area management.

4.5 CONCLUSIONS

The study provides a framework for thinking about how research in PFM can be most useful. It is constructive to separate issues which are widely understood and hence not considered 'researchable' in the academic sense, from those which can be taken on by research professionals.

Many of the priorities identified fall into the former category. Conflict management, institutional development, silvicultural management and monitoring sustainability, are all areas which can be informed by existing procedures, but for which respondents have expressed a clear need to adapt to new local conditions and institutions. Action research approaches are relevant here, where it is above all important that the local stakeholders in forest management trust in the research results and apply them to their own decisions and activities.

On the other hand, there are areas where a broader vision may be needed, and where more conventional research can contribute. Such topics include the implications of policy; and an overview of institutional arrangements for PFM leading to a framework to help planning in different contexts. Furthermore, although the *results* of research under many topics may be context specific, the *methodologies* developed and used

may be of much wider applicability. Our own meta-analysis of the results suggests that there is still a scarcity of appropriate methodologies for participatory silvicultural research, for developing local market information systems and for using participatory monitoring and evaluation in conflict management and institution-building. This is where there appears to be the strongest role for professional researchers.

In order for any of the above research to have a useful impact, in terms of improved forest management (whether more participatory, more sustainable or with more benefits for local users), the overwhelming need indicated by this survey is for better communication. That is, communication between researchers; between practitioners; between researchers and practitioners; and between stakeholders in a given PFM context. Not only is communication prioritised directly and explicitly by all stakeholders, and in all countries, as a research topic; it is also implied through an analysis of the needs of different stakeholders. New approaches will be needed to address such research; for example stakeholders in a PFM project may decide to monitor the effect of involving forest users in silvicultural experiments, and the rate at which results are taken up by other forest users and managers. It is clear that opportunities are being missed for new actors in participatory forest management to learn from the experience of those where models are well-established, and that existing research results are not being put to good use because dissemination is poor. The challenge for researchers is to explore, document and share ways of enhancing this learning process.

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REFERENCES

Hobley, M. (1996). *Participatory forestry: the process of change in India and Nepal*. Rural Development Forestry Study Guide, 3. Overseas Development Institute, London.

SECTION 2: LEARNING FROM EXPERIENCE

5 ASSOCIATING PEOPLE AND INDUSTRIAL FORESTRY: JOINT FOREST MANAGEMENT IN LAO P.D.R.

Bérénice Muraille

5.1 INTRODUCTION

Compared with its neighbours, Laos retains a relatively high proportion of natural forest. A forest inventory conducted at the end of the 1980s (by the Department of Forestry (DoF) supported by the Lao-Swedish Forestry Programme (LSFP)) estimated a forest cover of 11 million hectares, which amounts to 47 % of the national territory. However, this situation should not mask the fact that Laos has lost over 6 million hectares of forests since 1940 due mainly to war, agricultural and infrastructure expansion, and unsustainable logging practices.

The government of Laos, aware of the economic, environmental, social, and cultural importance of forests for the country, has attempted to reverse the deforestation trend and even to expand the forest cover area through various policy adjustments and changes. These included exploring sustainable ways for managing productive forests, which differed from previous practices. A new concept of Joint Forest Management (JFM) was developed, based on scientific knowledge about sustainable forest management, and experience of community or social forestry activities in India, the Philippines and Thailand.

The concept of JFM consists of a partnership for *productive forest management* between the government and its representatives at local level, and village communities located in and around a State Production Forest (SPF). SPF are areas of forest and forest land that have been classified and delineated for timber production within the national forest management system. The SPFs are directly administered by the State through its forest administration at various levels (national, provincial and district).

Many conventional community forestry projects are implemented in degraded forest areas; in contrast, the Lao model of JFM is an innovative approach to community forestry which allows villagers to participate in and benefit from the management of rich, natural forest areas. The idea is that by involving local people and local administration directly in the management of the forest and its benefits, the forest will be better managed and protected than in a situation where decisions and benefits are taken out of the forest and its people's hands.

The government of Laos agreed that JFM could be tested on the ground for five years from 1994 to 1999, as an action research activity under the guidance of the Forestry Research Centre (FRC) of DoF and with the support of the LSFP. Deliberate efforts have been made to integrate JFM activities into the existing Lao legal and administrative framework.

Over the last five years the JFM test has been conducted as a continuous process of 'learning by doing', and this chapter reports on this learning process. The paper is divided into two parts. The first part describes the 'forester's approach' to JFM, corresponding to the implementation of the initial concept. The second part describes the 'integrated approach' that evolved through the lessons learnt from the implementation.

The SPF selected for testing JFM is a mixed deciduous dipterocarp natural forest known as Dong Kapho, located in Savannakhet province in Southern Laos. Covering an area of 9600 hectares it includes the territory of 15 villages (25 000 hectares) and over 6 000 people (population density: 20 people/km²). The main timber species are *Dipterocarpus alatus*, *Shorea* spp., *Hopea* spp., *Azelia xylocarpa*, *Xylia kerrii*, and *Irvingia malayana*. The collection of non-timber forest products and hunting within Dong Kapho is allowed according to the customary rights of the village within the framework of the law.

In Laos, forests and forest lands are the property of the national community represented by the State managing them through its forestry administration. The forestry law (1996) recognises five categories of forests and forest lands: Conservation, Protection, Production, Regeneration, and Degraded Forests. Production forests are incorporated into SPF and Village Forests. The former are directly administered by the state forestry organisation at all levels (Ministry of Agriculture and Forestry, Department of Forestry (DoF), Provincial Agriculture and Forestry Office (PAFO), District Agriculture and Forestry Office (DAFO) while the responsibility for the management of the Village Forest lies with the village itself. In any forest and forest land in Laos, logging rights and the rights to sell timber belong to the State and its representatives, except for a 5 m/year quota allocated to families in villages with productive Village Forests. Logging rights are allocated as quotas on an annual basis to various forestry operators, mainly sawmills.

From the mid-1980s to 1992, the rights for logging in Dong Kapho SPF were granted to two State Forest Enterprises, which logged heavily at unsustainable rates, literally mining the forest of its two or three most valuable market species. No forest management plans existed at this stage, and although limited efforts were undertaken for replanting after logging, this was done with exotic species like *Eucalyptus* spp. and *Tectona grandis*. Villagers were hardly involved in any of these operations although some money was given on an ad hoc basis to village headmen, and school building was supported in some villages.

5.2 THE FORESTER'S APPROACH

The initial set-up of JFM was conceptualised and developed by experienced local and expatriate foresters. The process leading to its conceptualisation and initial implementation is presented schematically in Figure 5.1.

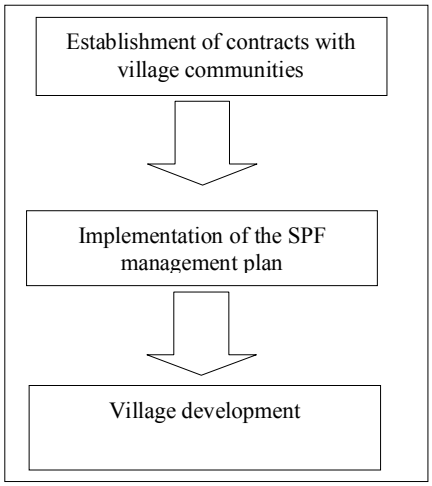

Figure 5.1: Initial JFM Conceptual Framework (assuming a forest management plan has been developed for a production forest).

5.2.1 Forest Management Plan

The Dong Kapho SPF management plan was developed by the DoF and subsequently approved by the Department in 1993. Its implementation started in 1994.

The three objectives of the Dong Kapho SPF management plan were defined as:

- Sustained yield production of valuable timber and non-timber forest products;
- Maintenance of the ecological, conservation, and protective capacity of the forest; and
- Involvement of the local people in the management.

The management plan was elaborated according to a 50 year sustainable felling cycle, based on growth and yield models developed from the inventory**.**

It covers an area of 9 581 ha (hectares) of which 5 925 ha have been classified for production (where stocking levels are higher than 75 m^3/ha). The area is divided into three management areas (Figure 5.2). Every year, one cutting area (ACA) is surveyed for harvesting in each management area. Each ACA falls within the customary territory of one of the villages surrounding the SPF, therefore three villages are involved in harvesting operations each year.

The annual activities to be carried out according to the management plan include pre-logging surveys, elaboration of the cutting regime (based on the result of the pre-logging survey, calculation of what species can be cut and at what diameter, and elaboration of guidelines for tree marking), tree marking surveys, harvesting, enrichment planting, non timber forest product collection, fire prevention and protection, hunting control, and operational and long term planning.

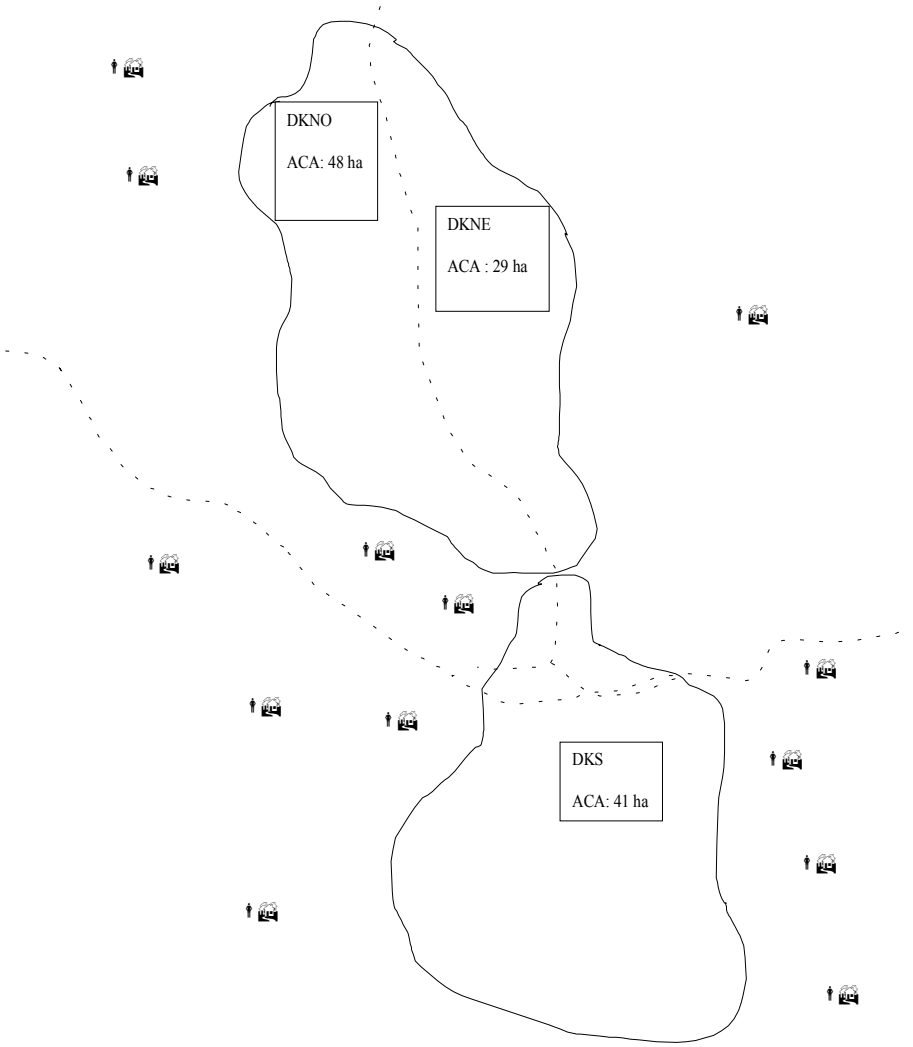

Figure 5.2: The forester's approach: schematic representation of Dong Kapho.

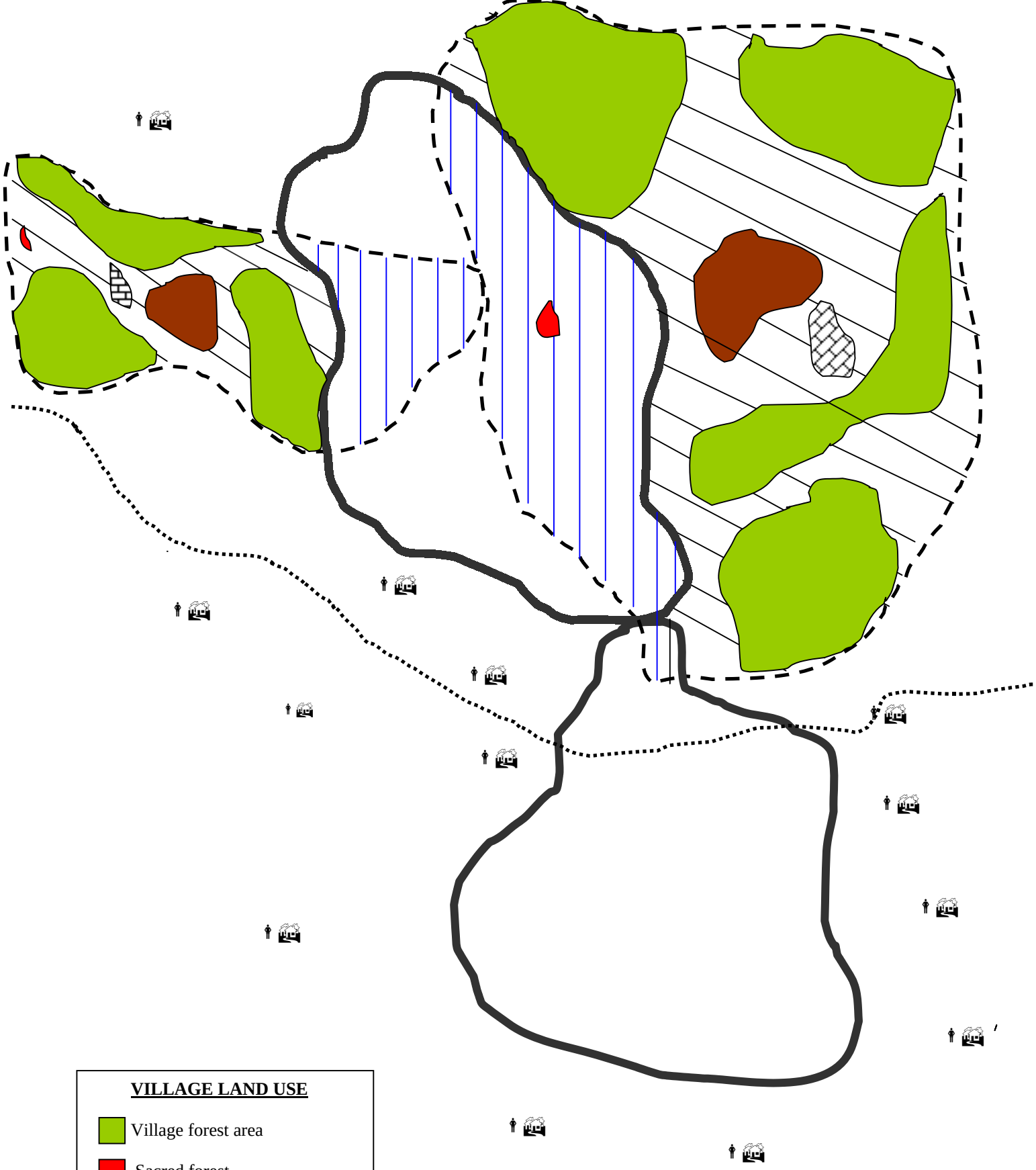

Figure 5.3: The integrated approach: Schematic example for 2 villages

The volume of timber to be harvested every year depends on what is available in each ACA. The pre-logging survey allows quantification of the stock of an area and its quality. Guidelines for marking trees to be cut are then elaborated (elaboration of the cutting regime), by applying technical criteria to the data collected during the pre-logging survey to ensure the sustainability of the 50 year cycle. Each year, a tree marking survey then occurs in the selected cutting area, which enables the forestry staff to calculate the volume of each species to be cut.

In order to maintain the ecological, conservation, and protective capacity of the forest, conservation and protection areas have been identified and delineated. Belts of protection forest (riparian reserves) are set aside along rivers and streams. Separate prescriptions are given for this purpose.

A rough indication of the boundaries of some villages is included in the management plan, based on questionnaires used in the villages while the plan was being prepared. These also provided socio-economic figures for rice, cattle, and poultry production, and the villagers' uses of timber.

5.2.2 Forest Protection Contracts

In order to implement the forest management plan, the PAFO had to establish contracts ("Forest Protection Contract") with the villages surrounding Dong Kapho. These were developed to entitle a particular village to participate in all forest operations (including pre-logging inventories, logging, enrichment planting and patrolling), and to be paid for their labour and get a share from the logging generated revenues. These revenues are to be managed by the village committee for community development.

JFM initiators wanted to contract the rights for logging and selling timber to villages, for the management of the SPF. However, two different models had to be developed for these village contracts in order to satisfy the Ministry of Agriculture and Forestry (MAF). MAF was initially a bit hesitant to allocate such far-reaching rights for managing SPFs (including selling timber) to villages, the concept being out of line with current policy. MAF, DoF, and PAFO decided on the villages and management areas that would be selected for the testing of each model for the contractual partnership (Box 1). Signed by three parties (the PAFO, the DAFO and a committee representing the village), the contracts describe the rights and responsibilities of each party in terms of the arrangements made for sharing the responsibilities and the benefits from log sales among the three parties.

Within a particular year, three villages out of a total of 15 will participate in all forest management operations, one village contracted according to Model 1, and two villages contracted according to Model 2. The intention was that at the end of the testing period, the Lao government would conduct an evaluation of both models in order to identify the most suitable model to the Lao context (legal, administrative, socio-economic, cultural, and ecological).

Box 1. The two models of village participation in forest management.

Model 1: the village gets the logging rights and the rights to sell logs. The village hires the services of government agencies to support the implementation of forestry operations as stated in the forest management plan. From the revenue of log sales, the village pays various government taxes, and also pays for the services of government agencies and for the labour of the villagers who have participated in the various forestry operations. Any remaining money is invested in village development projects. The village has to set up a JFM organisation (JFM Board) in order to manage its various contractual responsibilities.

Model 2: the government keeps its logging rights and the rights to sell logs. Villagers are hired as labourers and resource persons (persons with specific knowledge on the natural and forestry resource bases in the village) in all forestry operations. Villagers are paid for their labour and the village receives a protection fee (percentage from each log sold) for investment into village development projects The village has to set up a JFM organisation (Village natural resource management and development committee, VNRMDC) in order to manage its various contractual responsibilities.

5.2.3 Implementation of the management plan

During the two first years of JFM implementation, a lot of time was given to the establishment and organisation of the JFM set-up. The forestry operations as prescribed in the plan were conducted reasonably effectively, with the exception of the enrichment planting after harvesting, patrolling, and forest border delineation.

A considerable amount of time was spent training staff and villagers, and in developing the tools necessary for the JFM implementation. Activities included inventory and logging operations; contracting transport companies; bidding mechanisms for the sale of logs; designing staff and village recording forms; setting up village JFM offices and bank accounts; establishment of village JFM committees (JFM Board or VNRMDC according to the contractual model adopted); liaison between village and administrative offices; follow-up of activities, and general communication.

Time was also spent lobbying district and provincial authorities who were puzzled by the JFM mode of conducting forest management, compared with their traditional practices. They were also concerned with the issue of benefit-sharing between the village and the government, and controlling village use of the JFM development money. The project had to facilitate balanced agreements which attempted to accommodate both the authorities' tendency to control villagers, and the villages' own decisions. It was possible then to demonstrate that the government was not losing money in comparison with traditional government forestry operations by showing that all the taxes were paid as in the past. Additionally, the JFM sale system, which invited bids from several sawmills, made it possible to generate enough revenue for the villages to earn funds for village development.

JFM started to gain ground with villagers and local authorities when financial benefits started to flow, especially the funds for village development activities. Other villages from around Dong Kapho contacted the project about joining the JFM test when they heard about villagers being paid for their work during the dry season and when they saw that water pumps were established in the villages and that a road company had been contracted.

5.2.4 Lessons from initial implementation

Over the first two years of implementation, a number of practical and conceptual issues became clearer and needed to be addressed. These issues filtered through the foresters' regular consultations with the villages involved in JFM and from a mid-term evaluation undertaken by the DoF. Details of these issues are given below.

Forest management plan

- The village borders within Dong Kapho were not clearly defined and this could in the future cause a problem of a faulty allocation of a ACA to a village. Village border delineation was necessary for villages around Dong Kapho.
- In one particular ACA, villagers refused to log an area because it was a sacred forest which contained a ritual site for spirits. Each village must protect these sacred forests. To prevent them from being incorporated into production forest, sacred forest areas should be allocated as protection or conservation forest which is not to be logged.
- Only three villages out of 15 received benefits every year. A mechanism had to be found for redistribution of income to the other 12 villages so that they would be interested in forest protection in any given year.

Villages

- The villages have access to many different type of forests. Forest resources are not limited for the villagers. Their main livelihood constraint lies with agricultural production (rainfed paddies and shifting cultivation) in ensuring food security from one year to another, as they often experience two to three months of rice shortage. Forests are used as general resource reservoirs. The project had, in one way or another, to pay attention to agricultural production in order to ensure sustainable management of natural resources within village areas outside the Dong Kapho.
- Villagers do not take a 'forester's approach' towards Dong Kapho. They do not see the forest and farmland as two distinct areas. To them, Dong Kapho is part of a village territory that they manage as a global system. Knowledge of, and demands on, the various forested areas varies between individuals, and between men and women. Special surveys should be carried out with villagers to identify all the forest areas (including Dong Kapho), their use and management rules.
- Villagers have managed and used forests for various purposes. However, they do not manage it for industrial production. The foresters had to ask themselves: can we, or should, we integrate local knowledge within the forest management plan?
- The level of organisation and coherence varied from one village to another. Such situations have to be taken into consideration and accepted as pre-conditions of JFM tests.

- The JFM village organisation, imposed from outside, was not successful. It created conflict within the villages with the existing administrative and traditional committees. Furthermore, the villagers' own system of organising and sharing work for logging operations appeared to be efficient and equitable making imposition of a new approach unnecessary. JFM organisation should avoid imposing externally conceived processes of decision making on decisions belonging to the villages. It should only intervene in cases of long and unresolved conflict linked to JFM activities or in cases of evident prejudice against a particular group within the village.

Sale of logs

- One village working under the Model 2 agreement, frequently asked the question: "Since we get only part of the benefits from the sale of logs compared to the village under the Model 1 agreement, where do the rest of the benefits go?" This question took several months to resolve. It appeared that the sawmills were pocketing the difference as they do in the traditional logging system. The mode of selling logs in Models 1 and 2 should be the same. Benefits not directly redistributed to a village under Model 2 could be placed in a Dong Kapho Fund for redistribution to the 12 other villages that are not directly involved in the logging operations within that particular year.

5.3 THE INTEGRATED APPROACH

In view of the issues mentioned above, JFM needed to be oriented towards a more integrated approach to natural resources management and village development which would incorporate Dong Kapho, its management plan, and the revenue generated from logging. Consequently the JFM concept was transformed into an area-based natural resources management approach, with the following objectives:

Objective 1: *To develop and implement a partnership between the State and the villages located around the forest, for the management of Dong Kapho*

Objective 1 corresponds largely to the initial concept of JFM described above, but a few changes were made in its application:

- Sacred forests: when identified within Dong Kapho limits these areas were classified as conservation areas to ensure that they will never be logged.

- Log sales: the mechanism for log sales within Models 1 and 2 became more similar. Additional benefits from Model 2 were put in a fund to support development activities around Dong Kapho in those villages not benefiting from logging activities in any given year.

Objective 2: *To implement participatory village land-use planning and land and forest allocation in villages located around Dong Kapho.*

At the time of the JFM trial, the government of Laos was promoting agricultural land allocation throughout the country. JFM took advantage of this framework to introduce the idea of land-use planning and land and forest allocation in villages surrounding Dong Kapho.

Some important outputs of this process were:

- participatory border delineation between villages;
- participatory surveys of forest and agricultural land resulting in the allocation of forest land (different zones) to the community and agricultural land to families;
- a village forest and agricultural management agreement, which provided a framework for future forest and agricultural land management, signed by village, district and provincial representatives.

During the participatory surveys of forest and agricultural land, the various village forest categories are identified by, and with, the villagers as protection forest, conservation forest, regeneration forest, sacred/cemetery forest, village use forest, village reserved land for agricultural use, and SPF. Both vernacular names and official categories for forest and animal and vegetal species are used when mapping the forests with the villagers. Accordingly, the area of Dong Kapho that falls within the boundaries of a village becomes one of the forest zones of that village. Village forest and land management agreements resulting from the process will include the Dong Kapho zone and its specific rules, benefits and obligations.

During the forest and land use planning, an assessment of timber and non-timber forest product collection patterns and customary management rules are undertaken, so that they can also be specified in the village forest and land management agreement.

Objective 3: *To develop and implement participatory planning and management of village forests in villages located around Dong Kapho.*

Building upon the results of the forest and land use agreement, management objectives for each of the village forests zones identified should be developed by villagers in view of a village's own needs (forest products, land, tradition, environment) and a village's customary management rules. The management of village forest zones should not be oriented only towards timber production, as in Dong Kapho. Methods used when working with the villagers should rely on practical assessment and decision-making procedures that make sense to the villagers and empower them to take greater responsibility for managing their forests.

Objective 4: *To facilitate integrated village development in villages around Dong Kapho.*

Village land use and extension development plans (integrating land-use decisions with the general extension activities undertaken for the village development) are developed during the land allocation process, which can be completed simultaneously, or later depending on local circumstances. Such plans arise from the problems, needs and opportunities identified by villagers whilst also incorporating policy and macro-management objectives (forestry, land-use, agricultural laws and regulations). They contain three components: forestry, agriculture, and community/social development. Priority activities under each component are identified through a problem ranking and solving process with villagers, and are arranged in an annual work plan calendar over several years.

Forestry activities pertaining to Dong Kapho are included in the village extension activity plan with other activities to be undertaken by the village. Money generated from Dong

Kapho can be used to support some of the activities mentioned in the plan, which may include building a water pump, school, road, school furniture, road maintenance, micro credit to families, purchase of agricultural inputs, or a medicine box.

5.3.1 Lessons from implementing the integrated approach

To date, the 'integrated approach' (Figure 5.3) has been undertaken in seven villages. The major impact has been the integration of industrial forest operations into the general framework of village activities. This is in contrast to the traditional view that logging operations are different from village activities and that they have to be segregated in their follow-up by the local administration (Appendix I).

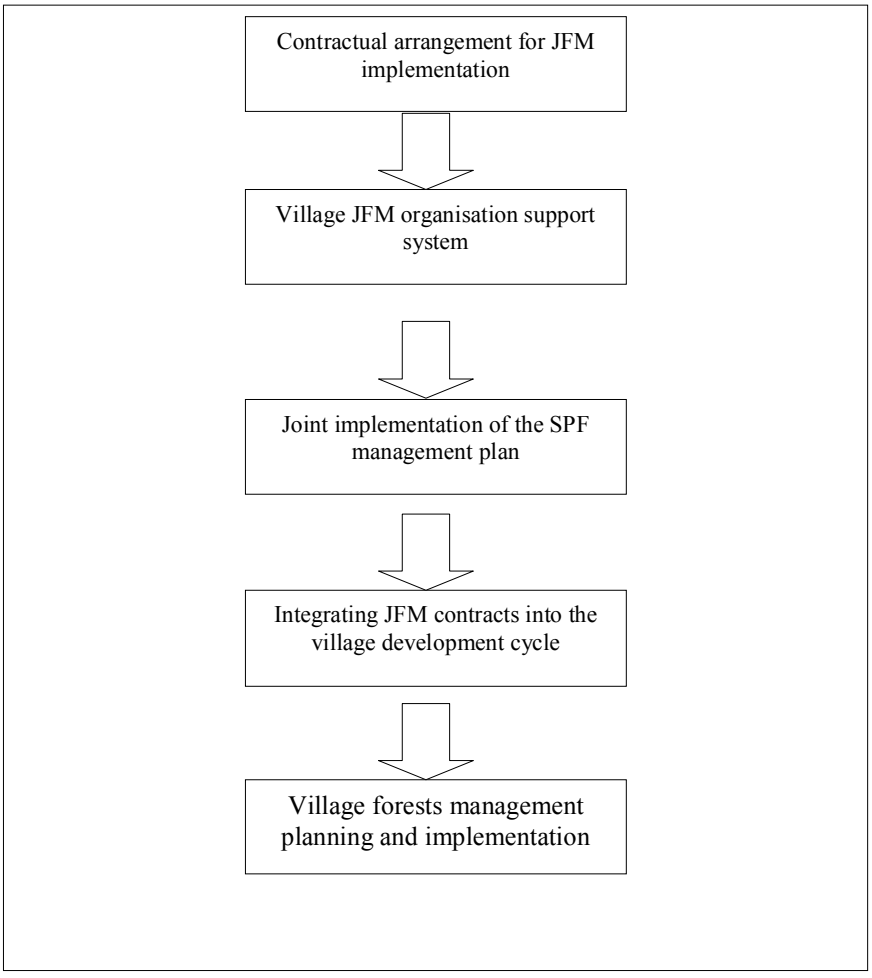

Figure 5.3: The Integrated Approach (assuming a forest management plan has been developed for a production forest).

The approach also creates new bases for interaction with the villages since the villages are considered in their entirety and not simply as a place where productive forest lies. The approach also offers the villagers and supporting staff a general view of the village and the various interactions that one activity might have with the other activities in the village. Time spent in the village allows villagers to share in the participatory methods and basic technical tools according to their own interest, thereby giving them a sense of ownership. Importantly, the process of involving province and district representatives at every step also gives the villagers and staff a much appreciated sense of legality. Again, this contrasts with data collection activities that do not lead to many changes within the villages.

JFM implementation gives new and challenging roles to villagers and forest officers. Forest officers are not only technical specialists but also community facilitators who promote and support village self-reliance, empowerment, and analytical decision-making. Villagers themselves are put in a new position, from being passive to active actors in the development of their villages and the management of their natural resources. This new role carries both responsibilities and benefits for the villages.

During its implementation, community foresters questioned the degree to which JFM was a participatory process which included local knowledge in forestry operations. It is correct to stress that the Dong Kapho forest management plan aims at the sustainable production of timber and that it is based on Western quantitative methods that make little sense to villagers. Timber production on an industrial basis has nothing in common with the traditional practices of villagers. The little that could be done was to accommodate local practices by forbidding logging in sacred forest areas, avoiding cutting trees that are used by villagers (e.g. for resin tapping), and respecting villagers' ownership of the timber in distributing the benefits issued from logging.

Objective 3 of the integrated approach was developed to take local forestry knowledge more specifically into account. Developing village forest management plans that would be agreeable both to the villages and to the administration has proven to be a complex and interesting process. Theoretically, the development of village forest management plans aims at putting local forestry knowledge at the fore. Therefore, the use of quantitative tools must be kept to a minimum in order to be able to share information with villagers on their own terms. Nevertheless, foresters (representing the government) can hardly conceive forest management plans without hardcore inventory methods, which are often requested from the administration.

The villagers' traditional interests and knowledge are mostly linked to NTFPs (Non Timber Forest Products). Methods for inventorying NTFPs exist but, again, these have been designed through Western quantitative methods making little sense to villagers. There are many NTFPs, and it is open to question which should be inventoried: those of interest to villagers or those with market value? Another issue relates to the fact that inventory of NTFPs allows quantification of resources thus making them more visible to outsiders. There is a risk that villagers lose their NTFP collection rights (as for timber) when products gain high market values.

Questions were also asked as to why villagers (at least those on the JFM committee) were not trained in quantitative methods for forest management so that, for example,

they could make their own ACA calculations, as was the case in another community forestry project in the province, funded by the World Bank and Finnida) In JFM, villagers are trained in practical harvesting operations and are provided regularly with the operational plans and maps for each activity. They do not draw the plans and maps themselves, and they do not calculate the allowed cut from pre-logging inventory results. Would the process be more or less participatory if villagers were trained in all aspects of forest management? If we expect villagers to become specialists in forestry, should they also become specialists in agriculture, health, and other aspects of their development? Instead, the JFM approach developed in Laos enables villagers to rely on, and pay for, support services (provided by the local administration and in the future, possibly, by the private sector) using some of the money the village would generate from log sales.

5.4 CONCLUSION

On the one hand, the process of implementing JFM partnerships proves complex and time consuming with results that are not always immediately financially rewarding or visible. On the other hand, it identifies and acknowledges land controls and users' rights, assuming that development will henceforth incorporate parameters other than those strictly governing production.

The implementation of JFM models in Dong Kapho has proven that both villagers and foresters (staff and administration) can find common ground leading to improved forest management and community development. Villagers are aware of the administrative, legal and economic frameworks within which they exist. They are able to make trade-offs and accept innovations if they see that they can have effective control over the process, that their use rights are respected and they can benefit from it. Local foresters have started to realise that forest management is not limited to timber extraction and that villagers are necessary partners, rather than a nuisance, in ensuring the sustainable management of forests.

A key to JFM successful development has been the learning-by-doing approach that has been adopted from the beginning of its development. The process of regular informal and formal consultations with the villagers and their representatives has gradually created a climate of openness between the field staff and the villagers so that issues, problems, and opportunities could be raised and listened to both ways. It has allowed change in some preconceived ideas for both villagers and the foresters and has led to an in-depth modification of the JFM approach. Nothing is definitive yet and the way forward is to keep a flexible and open attitude to the existing and changing circumstances in the villages and their larger environment.

The implementation of the JFM models has proven that it is possible to associate people in the management of productive forests and that the management of this type of forest (and not only degraded forest areas) could also be allocated to village communities. It is now down to the Lao government to decide if JFM models should be pursued and if they can, little by little, replace the regular government forest management operations all over the country.

ACKNOWLEDGEMENTS

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6 A CASE STUDY IN THE WOODCUTTING INDUSTRY OF TWO COMMUNITIES AROUND JOZANI CONSERVATION AREA, ZANZIBAR

A.U. Basha, Amour B. Omar, Adrian Ely, Said A. Fakih and Rob Wild

6.1 INTRODUCTION

6.1.1 Policy background

Prior to the 1990s, forestry activities in Zanzibar were centrally planned and local communities were seen as objects of forestry development. In June 1992, the UNCED Earth Summit in Rio de Janeiro recommended that countries reorient national forest policies to take into account the multiple uses and functions of forest policy in a holistic and balanced manner (CNR, 1995). Following the UNCED directive in 1996, Zanzibar enacted a new forest policy that strongly advocates active involvement and participation of local people in the planning, management and conservation of forest resources through various forestry programmes and research studies. Sharing of experience and knowledge between resources users and professional forestry researchers are focal concerns in the implementation of this new forest policy. Directives from the new policy indicate that learning can be accomplished through pilot research projects, development of micro plans and, where necessary, through organisational development. Zanzibar's long-term forestry plan includes strategies to ensure that forestry authorities undertake low-cost participatory research, especially in the identification of appropriate wood and non-wood forest products (ZFDP, 1997).

This chapter documents an attempt to implement the new national forestry policy goals. The first of its kind, the study aimed to understand the level of threat to forest resources around the Jozani conservation area, through participatory assessment of wood resources. The study emphasised local people's participation, trusteeship and ownership of the process and results. Informants were encouraged to act not merely as objects of study but as active participants in the research process. Local community members were involved in the collection and analysis of information and, through discussion in village meetings, were provided with feedback on the results and conclusions. Dialogue and joint assessment were repeatedly used to enhance people's awareness of forest resources and build confidence in the planning and management of these resources.

6.1.2 The Study Area

The study was carried out at Charawe and Ukongoroni villages, which are among eight villages surrounding the Conservation Area of Jozani forest and Chwaka Bay. The conservation area was established in 1995 to foster the long-term survival of the conservation area and its surrounding habitats by encouraging a new approach to conservation with an emphasis on community involvement. The main aim has been to encourage a decreasing dependence on the unlimited use of the forest reserve by promoting alternative ways to generate income.

The study area is located on the Southern edge of Chwaka Bay (Figure 6.1), the combined population of the two villages is about 6 000 people and has more than doubled in size in the last 40 years, with current population growth rate estimated at 4.1% per annum (Williams and Basha, 1996a; 1996b).

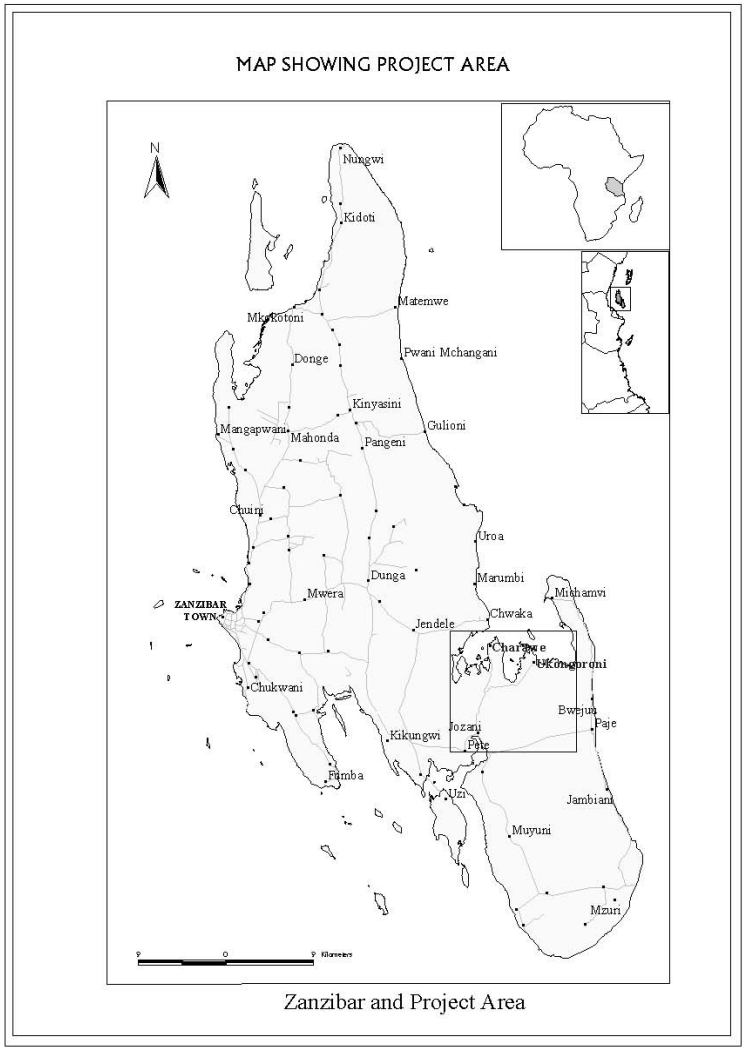

Figure 6.1: Map showing Zanzibar and project area.

Livelihood activities in the villages of Charawe and Ukongoroni are based almost solely on utilisation of forest and coastal marine resources with poorly developed secondary industries. Agriculture (mostly subsistence) is a major activity for men and women. In some cases, cash earning activities are undertaken in addition to fishing; these include woodcutting for men and seaweed farming for women. While the number of fishermen has risen drastically with the population increase, fish stocks have declined, and effective controlling measures have had to be used (Williams and Basha, 1996a; 1996b). The growth of commercial woodcutting can be at least partly attributed to those factors. In general, women collect wood for domestic use and men concentrate on commercial cutting. Men under 25 years of age are mostly involved in fuel-wood cutting but they move on to specialise in harvesting building poles as they grow older.

Since the Jozani-Chwaka Bay Conservation Area was initiated, intense and constant woodcutting has continued in villages surrounding the conservation area, including Charawe and Ukongoroni. The intensity of conflicts is magnified when communities feel that the degradation of their resources is neglected by outsiders. Forestry authorities in Zanzibar have attempted to resolve conflicts on a case-by-case basis but they are limited by the lack of a proper management process, and detailed participatory research is needed to fully understand the underlying causes of forest destruction by resources users and to gain the detailed information necessary to formulate optimal intervention in support of the conservation of Jozani-Chwaka Bay forest and adjacent community forests.

6.2 OBJECTIVES OF THE STUDY

This study attempted to integrate both indigenous 'know how' and scientific knowledge using simple methods and tools in two local communities around Jozani Area. Originally, the Commission for Natural Resources (CNR) as a government institution initiated the research, in response to complaints from the local communities that they were making little profit despite cutting more wood. The information collected enables government institutions, as policy implementers, to understand the levels and details of wood harvesting and to identify steps to improve the lives of woodcutters, as the major resource users, while also promoting sustainable forest management.

With these broad objectives in mind the study focused on the following specific objectives:

- to develop a complete understanding of the wood harvesting industry including all the actors in the two communities (Charawe and Ukongoroni), and their links to the wider market;
- to carry out a participatory survey and assessment of the natural forests of the two communities and determine sustainable annual extraction patterns and levels;
- to assess the impact on community forests of wood harvested for marine activities; and
- to develop acceptable long-term plans for the village forests, such that livelihoods and annual cut are sustained.

6.3 METHODS

6.3.1 Interviews: drawing on knowledge and community perception

In order to develop a complete understanding of the woodcutting process, semi-structured interviews with villagers were undertaken individually or in-groups. The research and underlying ideas were publicly discussed beforehand and accepted by the respective communities each of which had the opportunity to propose three participants for inclusion in the research team. The democratic approach employed was based on criteria identified by the communities themselves. Data collection in the villages was carried out over a period of three weeks in each village, while the team camped in the village. The researchers interviewed key informants selected by the village team members for their special knowledge of, or role in, natural forest management practices. These semi-structured interviews about knowledge and perception relating to the forest were complemented by a survey on the amount of wood extracted for household use and for commercial purposes. A total of 76 informants were consulted and classified as householders, woodcutters, wood agents, seaweed farmers, wood transporters and depot owners, small retail outlets or consumers.

Many dialogues were recorded on video and the footage edited into a short film for presentation to the villages. The resulting film (*Misitu Yetu*, *Zanzibar*, or 'Zanzibar – Our Forests') introduced key aspects of the project and helped to stimulate discussion of the research findings during the final workshop.

6.3.2 Joint forest evaluation

The participatory survey and inventory of the natural forests aimed to:

- determine the forest area by vegetation cover and to assess the actual condition of forest and trends in its change;
- obtain basic data for assessing the quantity and quality of forest resources and the current status of the growing stock;
- collect basic information necessary to facilitate the formulation of more effective forest management systems in accordance with the principles of sustainable yield management;
- obtain information on forest products, standing volumes and production capacity.

The forests of the two villages were studied separately during field operations. Each forest was subdivided into different sized compartments based on forest classes. For accurate sampling and data recording, the study area was further subdivided into smaller units (density classes), according to vegetation type, canopy cover and tree height. Community members provided information on plant use, vegetation classification, and cultural / spiritual aspects (such as the location of sacred places); defined boundaries of forest classes for which they are responsible; and informed the project of the conservation status of different tree species. The professional forestry researchers were responsible for establishing circular plots, measuring forest area, and taking measurements such as tree height and diameter at breast height.

6.3.3 Direct observation as a part of learning

Data on the uses of wood associated with marine activities were collected through direct observation of activities such as seaweed farming and construction of fencing fish traps (*nzio*). A total of 10 informants, mostly women, from each village and representatives from one seaweed company (ZANEA) were interviewed. All dialogues were filmed using a VHS video for the purposes of documentation and further clarification.

6.3.4 Analysis

Analysis of data was divided into two major parts. The first quantitative part was undertaken primarily by foresters using conventional methods. The inventory data was analysed using Microsoft Excel 5.0. The total volume per hectare of each plot was estimated using volume models developed by foresters.

The second qualitative part involved local community members, with a professional forestry researcher acting as facilitator. Information gathered from woodcutters, agents, and transporters, depot owners, small retail and consumers was analysed in large group discussions through workshops and meetings. Some of the information had to be analysed scientifically, but it was important for the community to understand the results without relying on written media as not all community members are literate. The role of the professional researcher was therefore to present simple statistics in visual ways. Groups and individuals engage in woodcutting in both villages and average figures were obtained for the annual harvest of individual woodcutters. Hence, it was possible to estimate the total annual wood harvest for each village and to predict the quantity of wood removal over the next ten years.

Building on this feedback and analysis, community meetings were held regularly to bring together representatives of interested parties in developing long-term plans for each village's forests. Methods which were used in the meetings to elaborate on facts and findings included video shows, flip charts, workshops and round table discussions. These methods helped to crosscheck information from different informants, which varied according to factors such as age and gender. The group had a role in verifying the information in the context of the community, and consensus proved to be an important instrument in decision-making.

6.4 FINDINGS

6.4.1 Labour categories involved in the woodcutting industry

Through the study, researchers gained a thorough understanding of the woodcutting industry in the two communities of Charawe and Ukongoroni, and its links with the wider market. They found that members of communities involved in all aspects of the woodcutting industry do not fall neatly into distinct trade groups, but may be classified in one or more of the following groups. *Woodcutters* form the primary group in the sub sector, harvesting building poles and firewood (and sometimes, in other areas, making charcoal for use in lime burning) and sell this either to an agent in the village or directly to a transporter.

A total of ten *agents* in the two villages engage woodcutters to collect a specific order of products. Transport from town (most often hired) is then used to take the products to the urban depots. *Transporters* range from owners of passenger-carrying vehicles, which take extra loads of wood on an informal basis (for woodcutters), to purpose-run wood lorries, which are more often hired by agents. Once they have reached town, wood products are sold to *owners of wood depots* in Zanzibar Town, who receive wood either from their own vehicles or from transporters who deliver to them. The two large depots in town that deal mainly in wood from Charawe and Ukongoroni concentrate on building poles. The main *customers* of the large depots are building firms / developers. In contrast, firewood is sold directly from the transporters to households or via small roadside shops. Distinctions between the owners of small retail outlets and depots are not clear, although in general depots concentrate more on sale of building poles. Finally, the *consumers of firewood* comprise domestic users (cooking fuel), institutions (e.g. schools) and industries (especially the bakeries in Zanzibar Town). The building industry and households are the primary consumers of building poles.

6.4.2 Forest inventory

The participatory survey and assessment of the natural forests of the two communities aimed to determine sustainable levels of annual cut. No systematic forest inventory had been conducted previously in either village. Based on aerial photo interpretation, GIS analysis and field observation, this survey estimated a total area of 3 085 hectares for Charawe forests and 4 924 ha for Ukongoroni forests.

Nevertheless, the number of tree species identified in the coral rag forests of Charawe is 30 while in Ukongoroni 52 species were recorded. The existing wood volume by species was calculated, and analysis showed that the species most at risk of local extinction within the forests of Charawe and Ukongoroni were *Suregada zanzibarensis* (Mdimu msitu), *Rapanea melanosphores* (Mkangara Shamba) and *Macphersoni spp.* (Mjoma). If replanting or silvicultural work focusing on indigenous species is initiated, it is advised that these species should be among the first to be tested.

All four mangrove species recorded in the study area (*Rhizophora mucronata*, *Bruguera gymnorhiza*, *Ceriops tagal* and *Avicennia marina*) were mentioned as preferred species for building poles, and two of them (*Bruguera gymnorhiza* and *Ceriops tagal*) for firewood. Mangroves were found to be under great pressure from cutting, as indicated by local criteria including number of cutting events, and amount of wood removed; it is clear that effective management systems are much needed. The survey suggested a total annual increment of the coral rag forest of 1.6 m^3/ha/yr, totalling 3 290 m^3 for Charawe forest, and 1.4 m^3/ha/yr, totalling 5 369 m^3 for Ukongoroni forest. The annual cut is 25 527 m^3 and 6 663 m^3 of all types of wood products from Charawe and Ukongoroni, respectively. This harvesting rate is expected to rise in line with increasing demand for wood in Zanzibar Town (Williams *et al.*, 1997). However, despite the lower annual increment per hectare, Ukongoroni has a greater total annual increment compared with Charawe because of its larger forest area. This means that wood cutters of Ukongoroni can be allowed to cut more than those of Charawe without further destroying the forest resources.

This kind of information proved useful to both community and foresters as it enabled them to compare the amount of wood being cut with the existing growing stock, and hence determine the reasonable allowable cut per capita. For many in the community it was the first time that they had considered that the resource might not be available for ever.

6.4.3 Village livelihoods

In collaboration with the foresters, the communities prepared long-term plans for the village forests so that livelihoods could be maintained and annual cuts sustained. The villagers of Charawe and Ukongoroni are smallholder producers who derive their livelihood from subsistence agriculture, wood trading, fishing, handicrafts and livestock keeping. Both mangrove and coral rag forests in these villages have been used as an economic resource providing wood in the form of fuel, building materials, timber and many non-wood products for household use and for commercial purposes. It was observed that approximately 15% of the mangrove poles and 75% of the upland forest poles sold in Zanzibar Town are from Charawe and Ukongoroni villages.

Wood used for marine activities falls into two categories: sticks used for seaweed farms, and fish fences (*nzio*). The number of seaweed farmers in Charawe and Ukongoroni is 101 (1453 farms) and 92 (460 farms) respectively. *Nzio* are usually built by a group of family members or friends from the same village (3-5 people). Although a single individual owns each fence, the fish catch is shared between all those in the group. Tides allow the *nzio* to be checked every day for seven days of each lunar cycle, with daily catches sometimes reaching a value of up to Tsh 50 000. This value is substantially higher than achieved in conventional fishing and the returns, in relation to labour input, are greatly increased by use of the *nzio* method. There are a total of 8 *nzio* fences in Chwaka Bay, owned informally by the family of the first person to claim them for *nzio* use.

The survey found that the total annual volume removed from both forests for *nzio* is a significant volume of sticks that would otherwise be suitable for building poles. However, it represents less than 1% of the annual wood cut from the two villages and therefore does not warrant introduction of new legislation or other interventions. It was a significant result of the study, that the threat from marine activities was less than had been anticipated.

6.5 REFLECTIONS ON THE RESEARCH PROCESS

Through a process which was new to both government foresters and villagers, this study explored ways in which collaborative research can empower local people. Before we began, no one believed it would be possible for the community to work together with scientist researchers, and no community in Zanzibar had been involved in forest research. The chapter has shown what kinds of data can be collected from and by local people, and how this information can feed into a local planning process. In this section we discuss the extent to which empowerment took place and lessons which will help us to enhance the research process in the future.

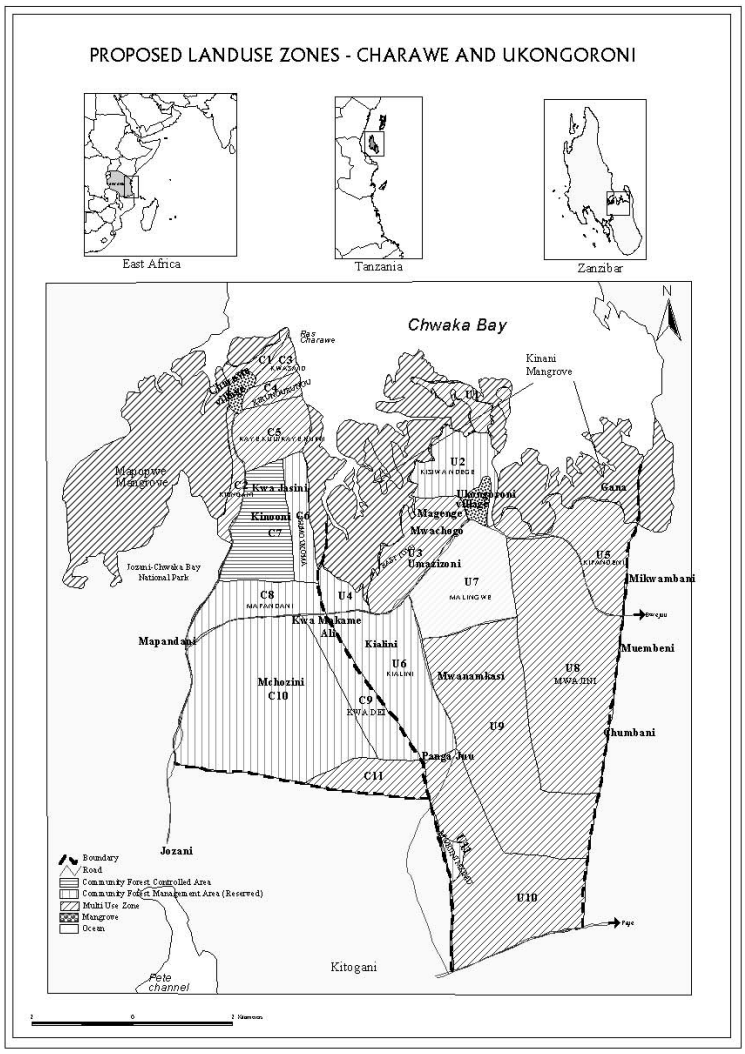

Figure 6.2: Proposed land use plan produced by local community. The plan drawn by the community team was submitted to the meetings and workshop for approval, and was then digitised for presentation by computer.

6.5.1 Empowerment and learning

Zanzibar's new forest policy stipulates that if local communities are willing and able to participate in community forestry programmes, then they should be involved. As a part of the empowerment process, the forestry authority should define the rights and responsibilities with respect to the natural resources they manage and protect. In this study, communities made substantial contributions to the definition of boundary areas and other natural resources for which they are responsible. Before this study the villages had no plan in place, but through the collaboration with professional researchers, community members suggested areas which should be closed for any use, and certain wood species which should not be harvested because they are declining rapidly. To do this, researchers encouraged the development of by-laws and land use plans (see Figure 6.2). By-laws is a way of giving local communities legal recognition and empowers local communities to manage their resources in the longer term, and people were eager to control access to the forest in this way, as quickly as possible.

Local communities, as resources users, made great contributions to this study particularly by supplying information about local classification of vegetation, and the economic botany of certain species. Communities were found to be very familiar with their forests, claiming to remember approximate years when forest areas were most recently clear-cut for agriculture. Using this knowledge, it was possible for surveyors to estimate ages of plots in different density classes, and derive approximate increment figures. During the course of the forest inventory the village team members also pointed out plant species of medicinal, cultural or other value. Professional forestry researchers were thereby given the opportunity to learn directly from resources users. In addition, the local researchers were more motivated to learn by being engaged in the study; the outside researchers on the team concluded that the six community members of the team were more likely to carry out activities such as monitoring of the forest resources, than those who were merely instructed to do so.

The study provided opportunities for participants (resources users) to view themselves as part of a broader cultural group moving towards change. Film-making was an extremely useful technique in stimulating discussion among village groups. Community members responded positively to seeing their peers being interviewed, and they commented openly on points raised in the film. It is recommended that future participatory filmmaking strive to produce higher quality products that will be suitable for national, as well as local, broadcast, to help in disseminating the experience to other communities.

6.5.2 Limitations and difficulties

The project was a positive learning experience for both community and researchers, as it was the first time that such research had been attempted. Inevitably some difficulties were also experienced as researchers experimented with the participatory approach. As is often the case, the interaction was started by the professional forest researchers who initially had more control over all processes. As time progressed it became easier to encourage community members to lead discussions, but analysis of the final results, particularly of data gained through survey and inventory, was undertaken and influenced primarily by professional forest researchers.

Researchers also found it difficult to believe all the quantitative information given to them by villagers, who do not keep formal records of their activities. For example, woodcutters could not always recall the exact number of a certain type of building pole that they cut in a year. Furthermore, since harvesting is seasonal, monthly, or weekly, estimates extrapolated to annual figures are subject to some error. This problem is difficult to avoid unless villagers become sufficiently motivated to keep their own records.

Members of governmental institutions who participated in the research have learnt that intense involvement of local people in studies like this tends to generate much enthusiasm about, and ownership of, the actions that the community members have identified.

Although this should be seen in a positive light, it is important to appreciate that problems can arise if promises and commitments are not met or fulfilled. This was vividly discussed in the open workshops and meetings.

6.6 DISCUSSION AND CONCLUSION

It is evident that participation of local communities, as the major resources users, in research work such as this study has helped to enumerate the few remaining available wood resources. Although the initiative came from government staff, and analysis was led by scientists, the participation of the community team and the attention paid to feedback enabled the community to obtain a realistic idea of their forest resources, and to see for the first time that these were rapidly depleting.

At the beginning of this study it was quite difficult to decide on appropriate procedures to analyse the information, because it was the first time the CNR had facilitated this kind of study. The planning process was lengthy and involved a multidisciplinary team from CNR, but the study still encountered some problems when it came to analysing the final results, especially with data gained through semi-structured interviews. It was easier for the professional researchers to analyse the quantitative data, but this used conventional methods that were unfamiliar to the communities and therefore their participation in this aspect of the analysis was considerably lower than in the qualitative analysis. Forestry studies should consider further the analysis methods employed so as to increase the level of participation of local communities, and to include detailed planning of data analysis before questionnaires are formulated, followed by pilot data collection over a set period of time. This would allow for appropriate changes to be made to questionnaires before they are used.

Most significantly, this study indicates that participatory research on woodcutting can stimulate significant contributions from resources users in an attempt to affect the goals of forest policy. A major achievement of this study was the establishment of an initiation process for land use plans and by-laws. Previously, this would have been difficult because the major resources users believed that the forest authority (CNR) was solely responsible for such decisions. While the study led villagers to change their views, CNR staff also felt that it was a privilege and opportunity as members of a government institution, to work with and learn from the resources users.

The donor community and its senior researchers must encourage participatory studies involving resource users, as a way of ensuring sustainability of forest resource management. This study has contributed to the creation of a learning methodology that can rebuild the level of trust between the community and government organisations.

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REFERENCES

Byers, B.A. (1996). *Understanding and Influencing Behaviors in Conservation and Natural Resources Management.* African Biodiversity Series no. 4. Washington DC biodiversity support program.

CNR (1995). *The National Forest Policy*. Commission for Natural Resources, Zanzibar.

Masoud, R.S. and Williams, P.J. (1991). *Fuel wood uses in Zanzibar town*. Forestry Development Project Technical Paper No. 3.

Williams, A.J., and Basha, A.U. (1996a). *A PRA carried out in Charawe Village*. Zanzibar Forestry Development Project Technical Paper No. 55.

Williams, A.J., and Basha, A.U. (1996b). *A PRA carried out in Ukongoroni Village.* Zanzibar Forestry Development Project Technical Paper No. 58.

Williams, A. J., Basha, A. U., Mtumwa, S. S. and Mussa, J. M. (1997). *Cheju Shehia Forest Management Pla*n. Zanzibar Forestry Development Project Technical Paper No. 95 (i).

ZFDP (1997). *The long term forestry plan 1997-2006.* Zanzibar Forestry Development Project Technical Paper no. 72.

7 LEARNING BY DOING: PARTICIPATORY RESEARCH WITH FOREST USER GROUPS IN NEPAL

P. Branney, Y.B. Malla and H.R. Neupane

7.1 INTRODUCTION

Participatory research in forestry is an interesting and sometimes controversial concept, which brings the participatory principles now being applied in many forest management projects into the sphere of forestry research. If it really works, then we have a possible means of addressing many of the location-specific problems that village-level institutions actually face in the management of their forest resources. These are exactly the type of problems which have proved difficult to tackle through conventional research since they combine a complex set of social and physical factors and do not easily lend themselves to experimental design nor to generating answers within limited time scales. What does participatory research really mean? How is it done, and does it really work? This paper tries to answer these questions using the authors' experience of working with forest user groups in the hills of Nepal.

The principle of learning by doing, or iterative learning, is fundamental to our concept of participatory research. This implies villagers taking some planned action to address a particular problem and subsequently modifying this action through a structured process of monitoring and evaluation. In the same way we as researchers with the Forest User Groups Forest Management Project (FFMP) have adopted a learning-by-doing approach to developing participatory forest research. There has been no standard procedure to follow and no set of guidelines for initiating the process. Our aim has been to develop and test a methodology based on monitoring and reflection on our own experiences and those of the participating forest user groups. In doing this we have gained considerable experience in developing a methodology. We now have some idea of what works, and where potential problems lie, and we have generated some research findings that are likely to be of wider interest.

The question of whether we and the participating forest user groups have actually been doing research or whether our activities can more accurately be considered a form of forestry extension has been discussed elsewhere (Branney and Hobley, 2000) and this point is not discussed further here. We have, however, been impressed by the ability of forest user group members to become active problem-solvers through a structured experimentation and learning process. How this can best be initiated and supported by outsiders (be they researchers or extensionists) is therefore likely to be of wider interest.

7.2 ISSUES IN COMMUNITY FOREST MANAGEMENT

Since the late 1980s the Government of Nepal has had a policy of transferring the management responsibility for areas of forest (community forests) from the Forestry Department to forest user groups (FUGs).

FUGs are local level institutions formed around identified forest areas specifically for the purpose of their protection and management. Especially in the Middle Hills of Nepal, the implementation of the community forestry programme has now become a major function of the District Forest Offices and their staff, often operating with the support of externally aided projects such as NUKCFP.

Community forestry in Nepal is widely considered to be a success when measured by the numbers of FUGs formed, the areas of forest transferred to local management and the effectiveness of the protection which FUGs have been able to impose on their community forests. However, concerns have also arisen regarding a number of issues in forest management. These concerns include the following:

- Highly effective protection resulting in under-utilisation by FUGs of their community forests that may lead to increased pressure (and degradation) on adjacent non-community forest areas. It has also led to reduced access to forest products by poorer households who are more dependent on common property resources (e.g. Branney and Yadev, 1998).
- Development of forest structures aimed at increasing the supply of commercial forest products (such as timber and poles) in the longer term rather than meeting the immediate needs of forest users for fodder, fuelwood or income.
- Non-equitable distribution of those products that are available from community forests (or even the deliberate exclusion of certain households from FUGs) (e.g. Graner, 1997).

Despite these problems the scale and the impact of community forestry in Nepal has been impressive. Around 9 000 FUGs have now been formed (January 2000) covering approximately 650 000 ha of forest and involving almost a million rural households.

7.3 WHAT IS PARTICIPATORY RESEARCH?

At the risk of sounding negative, it is probably easier to begin this section with a description of what participatory research is not. This is because the term has been much misused and to many is synonymous with PRA or with socio-economic studies of forest communities using a range of PRA 'tools'.

Firstly, participatory research is not PRA, although PRA may well be one of the 'tools' a researcher or facilitator uses to support participatory research by local people. Secondly, it is not research or study into what local forest users are doing with their forest. Therefore, the many studies of indigenous forest management systems although useful and informative in their own right are not, by our definition, participatory research. Participatory research aims to be non-extractive in the sense that information generated is 'owned' by the local participants and is interpreted and used by them to develop their own actions and to make their own decisions.

We have used the following working definition of participatory research. Participatory research is 'research identified, conducted, monitored and evaluated by local people not normally part of the conventional research community'.

The hypothesis that FFMP aims to test, is that participatory research by forest users is a means of achieving more sustainable forest management with consequent positive effects on supplies of forest products, their equitable distribution and the impacts of this on the livelihoods of the poorest members of FUGs.

7.4 PROCESS STEPS IN PARTICIPATORY RESEARCH

After an intensive selection process, participatory research was initiated with four FUGs in Parbat and Myagdi Districts in Western Nepal. Over the three-year project period a cyclical process, consisting of four main stages (as shown in Figure 7.1), was followed with these FUGs. Each of these stages consisted of a number of steps or activities, which are more fully described in FFMP (1999), but are given in brief below.

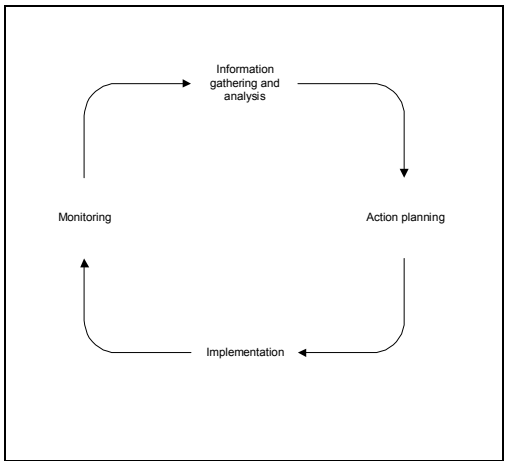

Figure 7.1: The learning cycle in participatory research.

- *Stage 1* involves FUG members using a series of techniques to gather information about physical resources (community forest and on-farm resources), and socio-economics (wealth, seasonal activities, roles of men and women, forest product requirements etc.).
- *Stage 2* involves using the gathered information to identify and agree on problems that need to be addressed and to prepare an annual action plan to tackle them. Where appropriate this includes an element of participatory research.
- *Stage 3* is the implementation of the action plan by the FUG with the support of the researchers or facilitators.
- *Stage 4* involves monitoring the impacts of the activities and their evaluation by the FUG with a view to further refining the actions or identifying future actions required.

Table 7.1: The four stages of the participatory forestry research process.

Stage 1 *Information gathering*	**Stage 2** *Action Planning*	**Stage 3** *Implementation*	**Stage 4** *Monitoring and review*
Household surveys	Compilation of an 'issues list' based on Stage 1	Awareness raising activities (e.g. meetings, distribution of legal information)	Collection of data from research 'plots'
Wealth ranking exercises	Committee and FUG meetings	Study visits to other FUGs	Feedback of information to FUG members at hamlet level
Interviews	Feedback of survey information to FUG members	Literacy programmes	FUG meetings and committee meetings
Hamlet-level PRAs	Issue prioritisation	Revisions of FUG operational plan	Modifications to FUG rules
Participatory inventory (in the forest)	Preparation of an annual action plan	Research 'plots' established in forest	Visits by other FUGs to participating FUGs
Committee meetings		Training in certain technical aspects (e.g. nursery)	Follow up surveys
FUG meetings		Implementation of forest product harvesting	
Collation of secondary information		Changes in committee structure	
		Requests for support sent to DFO (district forest officer)	

Some of the activities in each of these four stages are shown in table 7.1. The order in which activities are given does not necessarily reflect how they were carried out nor were all the activities carried out with each FUG since this depended on their own specific requirements. It is important to note that the action plans developed through Stages 1 and 2 led to a series of activities of which not all were developed into a more structured 'research' agenda. At this stage it is evident that forest management interventions to increase product supplies or improve the forest condition (e.g. thinning, coppicing, species selection for planting, etc.) are all activities which lend themselves readily to a participatory research agenda since they involve a series of 'options' that can be tested and monitored by the FUG. Other activities such as those relating to the need for greater awareness-raising about community forest rules or the need for literacy training amongst adults in the FUG are harder to envisage as a series of options which can be tested. A further set of 'issues' may be considered consisting of problems which cannot be tackled at all (e.g. the scarcity of land, or the frequency of hail damage to agricultural crops).

Despite the diversity of the issues arising from the first two stages of this process it is essential for researchers to give equal recognition to them all and to recognise that non-researchable issues may also need support in order to be resolved. Unless this happens, the agenda becomes a very selective one with FUG members participating in the researcher's area of interest and ignoring issues that may be of greater importance to them.

The researchers' credibility is reduced if FUGs feel that their real needs are not being addressed. In practice, the value placed by participating FUGs on the research process (involving an external researcher) is illustrated by the extensive interest shown by other non-participating FUGs, several of which requested that researchers also begin working in their own village. The practical implications of this process inevitably lead to a diffusing of the boundaries between research and extension – this being one of the important findings of the project.

7.5 EXAMPLES OF PARTICIPATORY RESEARCH FINDINGS AND ACTION FOR FUGS IN NEPAL

This section records three specific examples of problems and the identified actions, which have arisen from the participatory action research process, to tackle them.

7.5.1 Problem 1: Harvesting regimes

This example shows the use of participatory research in obtaining greater benefits from the community forest through improved forest management.

Information collection

As a result of household surveys, PRAs with groups of men and women at a hamlet level, and simple forest inventory the following findings were revealed:

- Community forests were found to contribute little to the supply of forest products for meeting FUG household requirements (because the FUG rules did not permit much harvesting).
- Considerable quantities of products were found to be available in the forest and could potentially be utilised.
- Neither the FUG committee, nor the FUG members, had any clear concept of how existing forest could be better utilised to increase output of products. The fear of 'opening' the forest relates to the possibilities of renewed destruction due to unsystematic cutting, or subsequent negative response from Forest Department staff.

Planning

The activity, identified in the action plan as a means to address these issues, focussed on the creation of a series of managed research 'plots' with different levels of harvesting, within the community forest. This activity was supported by visits by FUG members to other FUGs that were already more actively managing their forest.

Implementation

The actual number and type of cutting regimes adopted in the plots varied according to the FUG requirements and the forest type. Essentially, a number of treatments were adopted involving removal of different numbers of tree stems from a defined area. Quantity of products removed as well as before- and after-harvest stocking, was also recorded.

Monitoring and review

Data (unreplicated) from the plots were entered into simple software to generate pictorial charts for sharing with the FUG members. In addition, the forest plots provided a visual example of the impact of different harvesting regimes over a period of time.

Figure 7.2 illustrates the quantities of fuelwood (indicated by loads of firewood) and foliage (by a leaf picture) that were obtained by Bhirpani FUG (Myagdi District) from five plots (including a control plot) with different harvesting regimes.

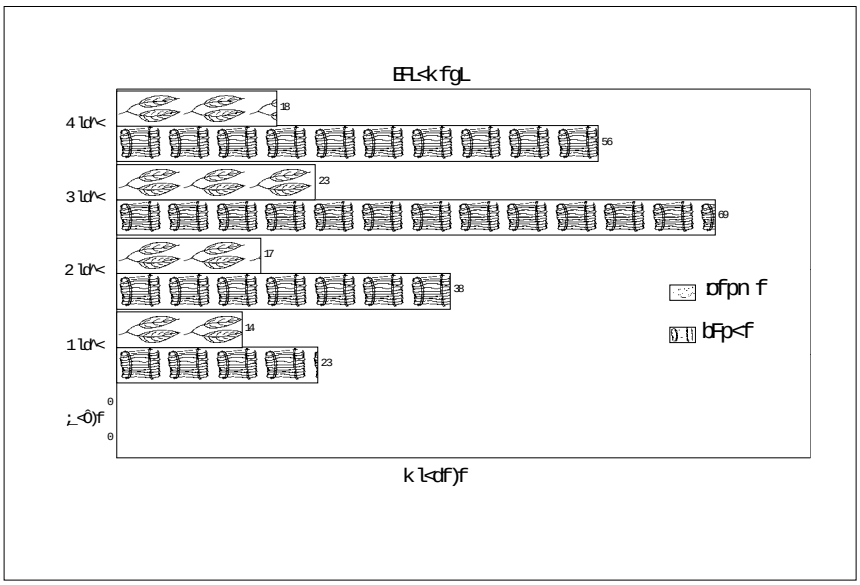

Figure 7.2: Yields of fuelwood and leaves from 5 research plots in community forest of Bhirpani FUG.

Harvest intensity was controlled by the spacing between remaining stems (between 1-4 m). Note that the widest spacing of 4 m did not give the highest yield due to site irregularities and the lack of replicates. Notwithstanding the difficulties with the simple experimental design (from the researchers' viewpoint), the pictorial illustration communicated to FUG members that there would be real benefits from more intensive harvesting in terms of product yields. Visits to the plots after a few months showed that response on the ground (in terms of number and size of coppice shoots) was also greater where a more widely spaced crop had been left. On the other hand, the estimated return period (harvesting cycle) would clearly be greater for the more widely spaced plots. This led the FUG to draw the conclusion that an intermediate residual spacing of about 2 m would be most suitable for similar parts of their community forest. Their conclusions then determined the subsequent year's harvesting programme (which increased the quantity of material being removed per ha) thus yielding an overall increase in fuelwood and leaves extracted from the forest. In fact, during an evaluation exercise one FUG member pointed out that '*We used to say that we must not cut the trees. Now we know that we must cut the trees*', indicating perhaps the shift of emphasis from forest protection to more productive forest management.

7.5.2 Problem 2: Awareness and empowerment for poorer households in the FUG

This example illustrates the use of participatory research to assist FUGs in becoming more aware of equity issues in the management of their forest and local institution.

Information collection.

Household survey questions, particularly those concerning FUG members' awareness of the rules and regulations governing community forestry, showed that there was a clear distinction between the wealthier, more aware households and the poorer, less aware ones. The wealth ranking exercise involving a series of discussions to develop and assign criteria attracted a lot of discussion within the FUG. By combining information from different questions, it was now possible to see exactly how household resources differed between the wealth ranks. Poorer households seemed to be more dependent on the community forest and were disadvantaged by decreased access to it. For example, Figure 7.3 shows how poorer households have considerably fewer on-farm trees than wealthier ones in Jamale Chisapani FUG (Parbat District) (the top row represents the poorest households).

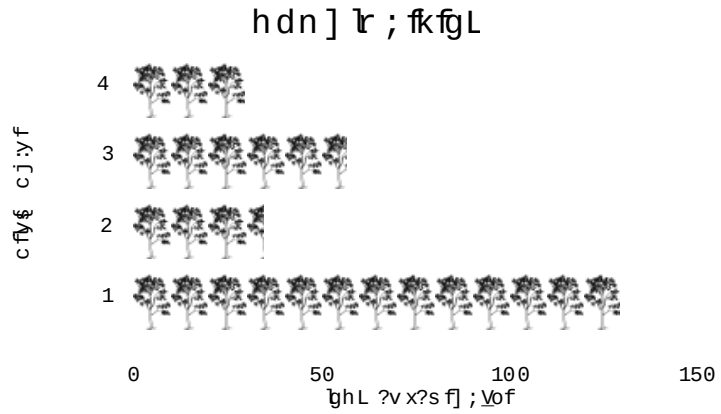

Figure 7.3: Tree ownership on private land by wealth rank of household for Jamale Chisapani FUG.

Similarly, a simple analysis of the FUG committee membership by wealth rank when compared with the whole FUG membership showed very clearly that wealthy households were over-represented on the committee. A simple diagram was used to illustrate this and proved to be readily understandable by both the FUG committee and the general body of FUG members. Figure 7.4 shows a comparison between the constitution of the committee and the overall membership by wealth rank for Jyamire Satbise FUG (FFMP, 2000b).

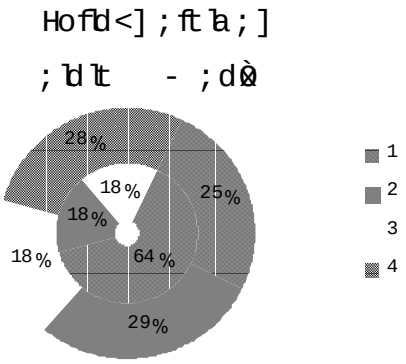

Figure 7.4: Membership by wealth rank of the FUG committee (centre circle) and the general body (outer circle) for Jyamire Satbise FUG.

Planning

This information highlighted the need to make better provision for poorer households in the FUG to benefit from forest management activities. In most FUGs, in the past, products have tended to be distributed equally regardless of need. In addition, there was also clearly a need to improve the overall awareness and participation of poorer households in FUG activities. Initially, activities to do this focused on improving levels of participation by poorer households in the FUG management process, including adult literacy programmes, disseminating FUG operational plans at hamlet level through public readings, and providing for alternative non-forest income generation activities for these poorer households. Later some FUGs developed plans to make the committee more representative of all wealth groups in the FUG.

Implementation

Implementation basically followed the planned activities. However, considerable additional support was needed to make some of these work (for example adult literacy) and the researchers role was very much one of extension and co-ordination of external inputs. Bhirpani FUG used the wealth ranking exercise to identify the poorest households as the recipients of loans from the FUG funds used for income generation activities such as improved livestock purchase.

Monitoring and review

Monitoring in this case has not been actively implemented. However, at a review of one FUG's annual action plan, the possibility of allocating more products to certain more forest dependent or poorer households was discussed. None of this would have been possible without the structured information gathering and analysis, action plan implementation, and most importantly the review and reflection – all of which have used the researcher as a catalyst and facilitator.

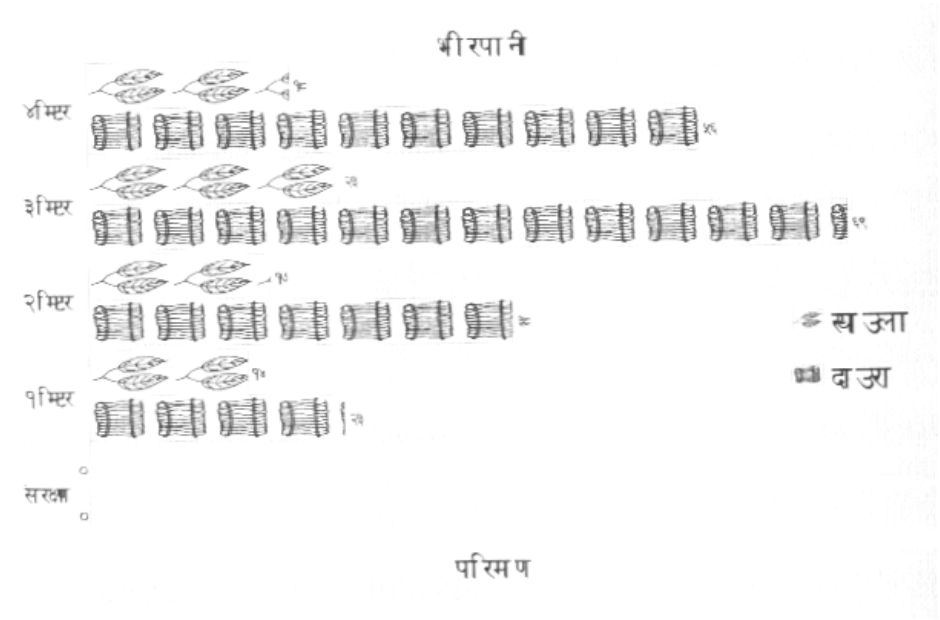

Figure 7.2

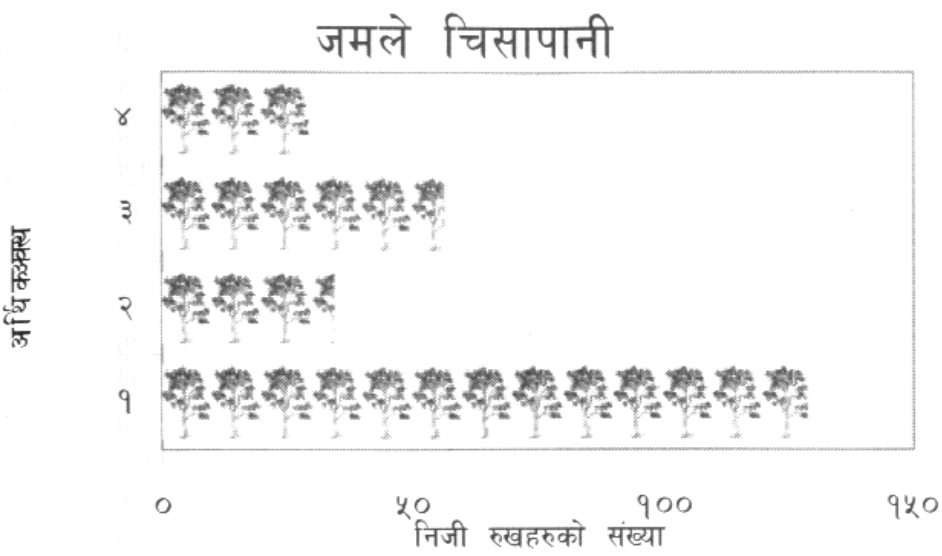

Figure 7.3

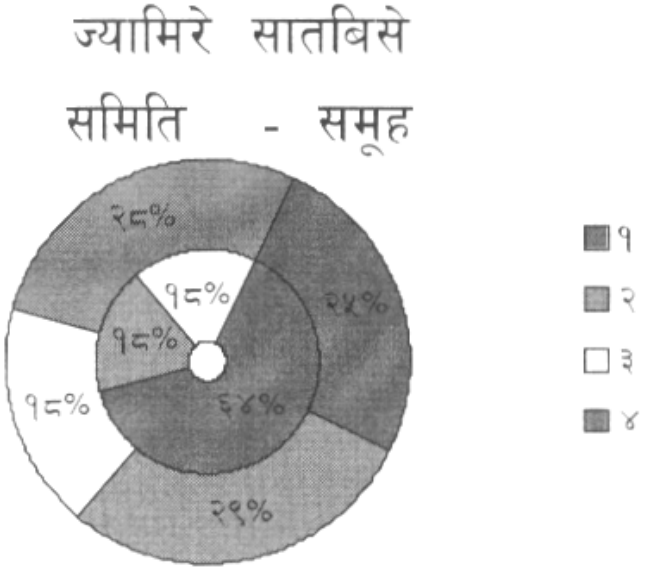

Figure 7.4

7.5.3 Problem 3: Relationships between demand and supply of forest products

This example illustrates the use of participatory research to better understand the dynamics of forest product supply and demand in community forestry, and in particular, to understand the extent to which the community forest is able to meet the forest product needs of the FUG members.

Information collection

The household surveys and PRA exercises provided information on the quantity and source of forest products required by different households. The research plots and forest inventory produced information on current stocking and potential yields under different management treatments. Although the information produced is clearly not especially accurate, for fuelwood needs it is sufficient to estimate total household requirements, and the amount likely to become available through more intensive management by the FUG. Table 7.2 shows the percentage of fuelwood needs of four FUGs currently being met by the community forest and the estimated proportions which could be met through more intensive management (FFMP, 2000a), based on inventory and research plot yields.

Table 7.2: Supply and demand for fuelwood from 4 community forests.

FUG name	***Proportion of current fuelwood needs met by CF (%)***	***Potential proportion of fuelwood needs which could be met through more intensive forest management (%)***
Bhirpani	11%	73%
Jamale Chisapani	32%	70%
Khotegairo Sattale	1%	89%
Jyamire Satbise	37%	n.a.

Planning

This information can be used in two ways. Firstly, it can be used by the FUG in planning how much area to harvest in coming years (harvesting is normally done on an area basis) and how intensively to harvest. Note that many FUGs could potentially meet a significant proportion of their fuelwood needs from their community forest if management was more intensive. Secondly, the information can be used at a more strategic level of planning to help determine which forests and how much forest land should become community forest. Clearly FUGs which only have access to a small community forest area will not be able to obtain much of their fuelwood needs from it, and hence alternative action would be needed to focus support on other areas.

Implementation

In practice all the participating FUGs improved the intensity of their harvest, but probably did not reach the theoretical potential. However, for many FUGs it is more important to produce a mixture of forest products than to maximise biomass production, hence the option providing the greatest overall social benefit would be more likely to be adopted. The information shown in the above table helped FUGs to understand the benefits of better utilisation of their forest and provided supporting projects and government agencies with information to help them to target their approach more towards active forest management than towards handover and protection of forest.

7.6 DISCUSSION

The essential aim of FFMP has been to test a methodology for participatory research. During the process, we have also been able to learn about community forestry itself, as an outcome of the research process.

The main strength of the participatory research process as we have developed it lies in our confidence as researchers, that the agenda of issues produced represents real problem areas as perceived by FUG members, even though they are not necessarily all 'researchable'. It incorporates the perceptions of all members of the group (not just those of traditional elites) and it is understood and 'owned' by the principal actors in the research namely the forest users. By contrast, much forestry research in Nepal has traditionally followed the agenda of outside researchers and has frequently failed to deliver results relevant to the majority of forest users.

We have to conclude that the participatory research process itself can be made to work. It can lead to simple actions being undertaken by FUGs that can deliver rapid and significant results. Leaving aside the wider issue of whether this is actually research or extension, the important point is that resources are channelled to activities with positive impacts. As partners in the research, we have been constantly surprised and encouraged by the willingness and capacity of local people to conduct research in a simple way (e.g. to take repeat measurements, to compare and discuss options) and more importantly to understand and analyse research findings – the critical factor here being the need for clear and simple presentation of information which can be understood by largely non-literate forest users.

The principle of sharing and reflection on information is clearly as important as the initial identification of the research agenda in participatory research. Time spent in providing information and participating in PRA is wasted time for local people unless they have the opportunity to see the information they have produced and to use it to their advantage. Again we have been surprised by the way in which very simple information can be used to the advantage of the FUG if presented in an appropriate format. The case given above where the constitution of the FUG committee by wealth rank is compared with that of the whole user group is such an example and has led to important changes in committee membership to ensure a better representation of the FUG as a whole. A further very positive feature of the participatory research process has been the interest it has engendered amongst neighbouring FUGs who now wish for a similar programme of support to be applied in their villages.

This links the research very closely to extension and wider dissemination – how this can be achieved in practice given the scarce human resources of government staff or projects needs to be carefully considered.

There are inevitably several disadvantages to the participatory research methodology as developed here. To be effective, the participatory process itself is invariably slow and extended. Meetings have to be planned and arranged to suit the seasons and schedules of a large number of busy local people who have many other demands on their time compared with that of the wholly research-focused researcher. The findings of the research process are site-specific – they relate to a particular forest and FUG at a particular time. This is not in itself a problem, but it does mean that the approach of participatory research needs to be initiated and applied as widely as possible, rather than simply transferring the findings from one place to another. This, however, strengthens the rationale for participatory research, since the processes implicit within it are of far greater importance than the actual findings. To make an analogy with agriculture, a farmer considering growing a new crop variety is far more likely to be convinced by a small local on-farm plot rather than published data from a distant trial on a research station. By promoting participatory research as a useful supporting mechanism for community forestry, we also recognise its limitations. It cannot be considered as a solution to all problems at the FUG level. Certain problems will only ever be tackled through conventional strategic research, and there clearly remains a strong role for this.

Participatory research approaches are not necessarily recognised or accepted by researchers. This is unfortunate, because we do feel that certain types of problem would benefit from the development of site-specific solutions using this methodology. Unless the concept is understood and treated seriously by researchers, it seems unlikely that they themselves will ever develop the skills required to make the methodology work. We hope that by testing the methodology and showing by example what it can achieve, we can create a greater interest and level of discussion about participatory research - particularly amongst the research community.

ACKNOWLEDGEMENTS

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REFERENCES

Branney, P. and Hobley, M. (2000). 'Participatory research' – is this research? In: Price, M.F. and Butt, N. (eds.). *Forests in sustainable mountain development – a state of knowledge report for 2000*. IUFRO Research Series 5, CABI Publishing, Oxford.

Branney, P. and Yadev, K.P. (1998). *Changes in community forest condition and management 1994-1998*. Nepal-UK Community Forestry Project Report G/NUKCFP/32, Kathmandu, Nepal.

FFMP (1999). *The participatory action research process*. FFMP Discussion Paper No. 1, March 1999. AERDD/NUKCFP.

FFMP (2000a). *Supply and demand relationships in community forests*. FFMP Discussion Paper No. 4, March 2000. AERDD/NUKCFP.

FFMP (2000b). *Sharing and reflection of quantitative information with community forest users.* FFMP Discussion Paper No. 5, March 2000. AERDD/NUKCFP.

Graner, E. (1997). *The political ecology of community forestry in Nepa*l. Verlag für Entwicklungspolitik, Breitenbach Publishers, Saarbrücken (Freiburger Studien zur Geographischen Entwicklungsforschung 14).

8 LEARNING TO LEARN: WORKING WITH LOCAL PEOPLE TO DEVELOP TIMBER AND NON-TIMBER FOREST PRODUCTS IN NEPAL

S. P. Dahal, H. Gibbon, G. Kafle and R. Subedi

8.1 INTRODUCTION

Forests and forestry are critical, in terms of day-to-day livelihoods, for millions of poor people, particularly in the developing world. Since the Rio Summit in 1992, forestry and forests in the tropics and sub-tropics have received considerable international attention with funding from both multilateral and bilateral bodies. While in gross terms funds in this area have been declining over the last two to three years, there is no doubt that forestry will remain a high profile contributor to global, regional and national debates about the environment and poverty elimination. The World Bank is currently reviewing its forest policy and, as a contribution to the discussion generated by this review, it has been argued that the Bank needs to: 'choose strategies, ways of managing, products bias and time frames to suit the poor [and] free up management goals so that people can manage the forest in their own way more.' (Shepherd, Arnold and Bass, 1999: 17). This chapter focuses on approaches to research which will help to achieve this.

During the 1990s there has been growing interest in the use of non-timber forest products (NTFPs), defined simply as all biological materials, except for timber, which may be derived from forests and associated lands such as pastures and shrub land (Nicholson, 1999). In Nepal, NTFPs are especially important for study since they have the potential to contribute to the local economy, local health needs of remote communities, and also to conservation of ecosystems and biodiversity (Subedi, 1998).

Observation and discussion shows there is a rich base of local knowledge, learning and practice regarding certain NTFP species and products, which goes back many generations. In many contexts local knowledge is being used, and may potentially be available to enhance development outcomes. However, until recently 'outside' researchers have made minimal use of local knowledge of NTFPs; where they *are* sensitive to local value systems, new knowledge appears to be shared more readily.

Those working as development facilitators at village and community levels need to be aware of significant local variations in local knowledge and to recognise that this is influenced by gender, caste, and generational dimensions (for example, in Nepal, Maharjan *et al.*, 1999; in Sri Lanka, Wickramasinghe, 1994; and in India, Mishra, 1994). Such variations in local knowledge are not surprising, but the situation does provide additional challenges for managers of forestry development and research projects. The design of more participatory research and development initiatives may be one way to improve the sharing of knowledge, and encourage transfer of learning, understanding of processes, tools and contexts, and self-confidence, that results in further testing of new knowledge boundaries.

8.1.1 Nepal, forestry and NTFPs

Since the Master Plan for the Forest Sector Nepal (1988) first gave recognition to community forestry, there has been an explosion in the number of officially-recognised forest user groups (FUGs). The Master Plan also highlighted scope for the development of both timber and NTFPs (for income and employment generation) in the national development of the country (MoFSC, 1988). The enactment of the revised Forest Act (1993) and the Forest Rules (1995) gave a further boost to the legal recognition of the FUGs and has also helped to encourage decentralisation of government to the village development committee (VDC) level throughout the country.

In development terms, NTFPs are often harvested by some of the poorest people in a community. Harvesting may involve walking several days from the harvester's village over difficult, and sometimes high altitude, land. Even where collection can take place within community forests, the work is often carried out by less educated women from disadvantaged castes. In stark contrast, usually all of the trade, from the level of the village trader to the Indian border, is controlled by (rich) men (CECI, 1999). Knowledge of plant ecology, harvesting and semi-processing techniques may be present among poorer members in a village due to their long historical association with certain tasks and roles in the community, yet market and price trend knowledge is often absent.

Estimates of the value of the forest sector in Nepal are difficult to make since the reliability of available data is doubtful. A conservative estimate probably puts forest contributions at around 15% of total gross domestic product to the economy. The monetary value of NTFPs exported annually from Nepal are subject to the same data limitations with figures ranging from US$ 8.6 million (Edwards, 1996) to US$ 18 million (Kanel, 1999), but there is no doubt that trade in these products is very significant.

Perhaps the most significant aspect of this trade lies in the fact that, for some districts in Nepal, sale of NTFPs can account for nearly 30% of the cash income of poorer families and is second only to those wages earned from seasonal labour outside the area (Nicholson, 1999). Unlike the prime timber trade areas of the *terai* (lowlands), which are more accessible and subject to more competitive market conditions, the NTFP trade is typically seasonal, remote, and site specific, and communities are highly dependent on a few products, with long market chains. NTFP trading tends to be monopolistic and in certain cases is shrouded in secrecy due to government restrictions on the harvesting, or processing of certain species (for example, *Dactylorhiza hatagirea* and *Cordyseps sinensis*).

8.1.2 This chapter

Using the experience of a major donor-funded forestry project in Nepal, two key themes are addressed and examined in this paper: the distribution and availability of local knowledge and, the manner in which 'insiders' and 'outsiders' need to interact in order to promote enhanced development outcomes. The work described identifies a number of critical issues:

(i) the importance of researchers recognising their own value systems, as well as those of others;
(ii) the relationships between learning and knowledge;

(iii) power relations and how these affect levels of participation and research agendas;

(iv) the policy implications of doing forest research *with* local managers and users rather than *for* them.

Pilot experiences with reference to timber and NTFPs (*Girardinia diversifolia*, *Edgeworthia gardneri*, and *Swertia chirayita*) are used to explore these themes and issues.

8.2 EXPERIENCE OF THE NEPAL UK COMMUNITY FORESTRY PROJECT

The Nepal UK Community Forestry Project (NUKCFP) is currently operating in seven districts in the middle hills of Nepal (shaded areas, figure 8.1). It has been funded by the UK's Department for International Development since July 1993 and builds on the work of an earlier project, the Koshi Hills Community Forestry Project, 1989-93. The main purpose of the project is to improve the living conditions of people in seven districts through increased effectiveness of FUGs in managing community forests on an equitable and sustainable basis. The project works with both government and non-government organisations (NGOs) to support over 2000 FUGs. More than 300 of these are involved in the management of NTFPs in addition to the more narrowly defined forest management activities such as thinning, pruning and logging activities for firewood and timber extraction. A second ten year phase of support is in the process of being developed and is due to start later this year.

The initial focus of the project, from 1993 to 1996, concentrated on supporting the government policy of forming and registering new FUGs throughout the seven districts of operation to manage forest patches, which may range from 1 ha up to several hundred hectares in size. During this time it became clear that there were differences between the value systems applied to these forest resources by the project staff and by Department of Forests staff. There were also differences in value systems both within and between different community groups. In order to explicitly address these differences and to negotiate more equitable management regimes the project began to adopt a participatory action research approach.

Towards the end of 1994 it became clear to a number of project staff that whilst the project was 'successful' in simple number terms (the increase in the number of registered FUGs had surpassed original estimates in the project design), this alone was not going to lead to sustainable and equitable forest management, because the agenda was being set by 'outsiders' with the operational plans written by forest department staff in many instances. As a result, project staff went through a process of deep reflection during 1995, which incorporated lesson learning, gender sensitisation, training of trainers and communication methods. New teams were established to concentrate particularly on issues of gender, equity, empowerment and communication. These began to pilot a new working approach. The explicit aim of this approach is to increase the participation of as many of the key stakeholders in a particular FUG, ward or village development committee so as to ensure that FUG developments were integrated into the local policy environment.

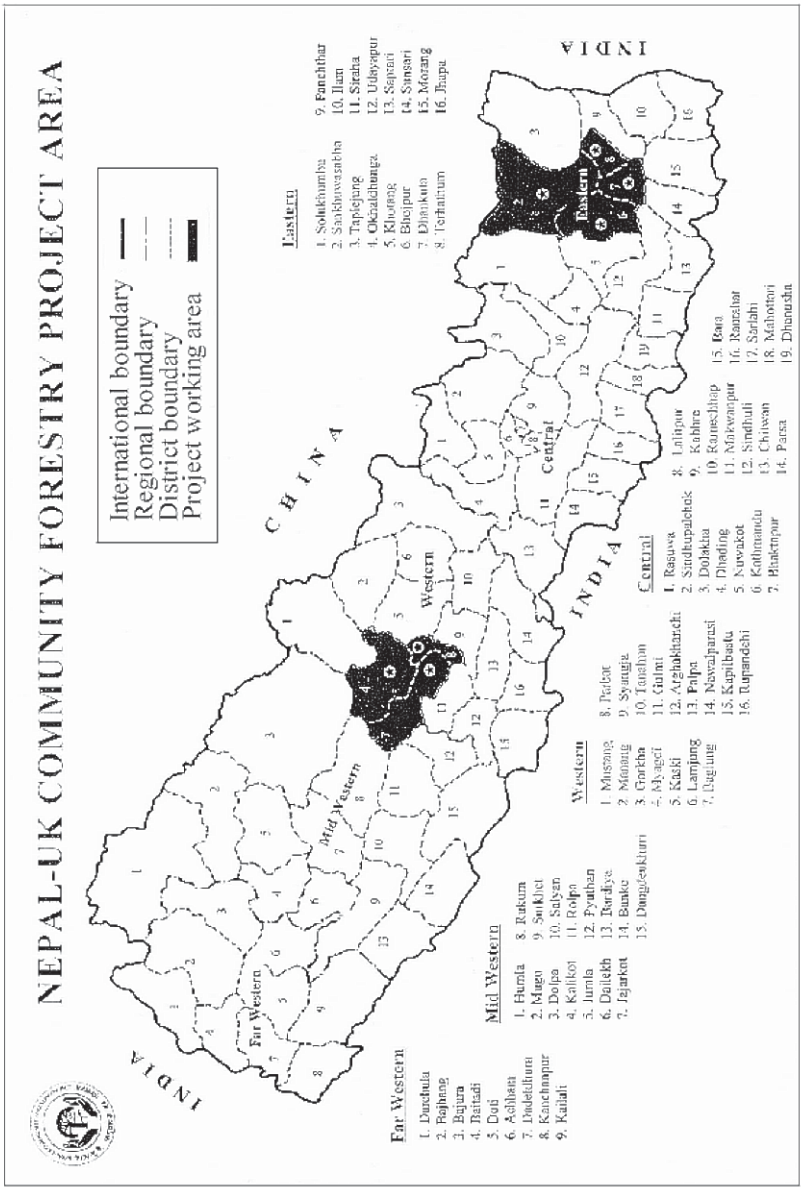

Figure 8.1: . Nepal-UK community forestry project area

The approach has now permeated to all levels in the project and is beginning to influence forestry practice at district, regional and national levels. Early positive results, from efforts encouraging local communities to explore and enhance their forest management and supporting group management practices, have been used to demonstrate the effectiveness of the action research methodology. Project, government, and NGO staff and community members are sharing knowledge more readily and are applying their learning through practical testing ('piloting'). The importance of transparency in negotiations between community and outsider agendas cannot be over-emphasised.

Practical testing occurs through a cycle of action, learning, reflection, analysis and further action. As far as is practically possible, these steps are undertaken together by all individuals involved in the action research team. The team should include representatives of all those likely to benefit, or lose out, from changes which may occur as a result of the intervention. Establishing strong 'ownership' of the process at the beginning of the research process takes time, but is essential if 'outsider' and 'insider' value systems and priorities are to be recognised and an action plan agreed. The approach is based on the principle that both local and scientific knowledge are critical in order to sustain rural livelihoods, biodiversity and social development.

8.2.1 Action research studies

Many of the principles of participatory rural appraisal (PRA) are consistent with the action research approach developed by the project. While project-employed staff take a lead in initiating and often (at the beginning) facilitating the research process, the topics for research are identified through careful observation, discussion with community members and key informants and with locally-based or active service providers.

Particular attention is paid to households which may be disadvantaged in some way, encouraging them to become part of the research process, or at the very least making them aware of the reasons for undertaking the research work, and its outcomes. This action research process requires sensitive facilitation by well-trained staff who understand the importance of role modelling and have internalised behaviour which supports an empowering working environment that is gender, caste, and age group sensitive. Team work is essential to success since this encourages a triangulation of perspectives as the work proceeds, and hence minimises the risk of individual bias. NUKCFP has been working with some thirty to forty FUGs in a more intensive manner to explore ways of improving sustainable management of community forests through the action-learning-reflection approach described above. Some examples of this work are discussed below.

8.2.2 Integrating 'insider' and 'outsider' values in forest management

During the 1990s NUKCFP began to experiment with participatory silvicultural approaches based on FUG forest operational plans (Branney and Dev, 1994). A number of lessons have resulted from this work which apply equally to the sustainable development of timber and of NTFPs. The 'demonstration effect' of action research sites, which are selected by FUG members in consultation with project or Forest Department staff, is critical for sharing learning between 'insiders'and 'outsiders'. Through such work it became clear that local people had a completely different set of values in relation to their forest areas from those of the project or forest department staff. Exchanging knowledge on species and products - both timber and non-timber

species - revealed that pre-conceptions on both sides were hampering the process. Once experimentation became based primarily on plants that were considered of high local value or interest, not necessarily those valued by 'outsiders', a new level of co-operation was developed. Table 8.1 summarises three cases where indigenous plant species are now being exploited by FUGs in new ways as a result of recognising that new knowledge and learning can provide a 'bridge' between the different value systems.

Through practical demonstration FUG members and field level technical staff are able to gain confidence in monitoring changes in the resource base. The visual effects that result provide a basis for more open discussion than would be possible based on written reporting and description, and the practical nature of the work lends itself to on-the-job training for both new FUG committee members and new government or project staff. The FUG committee is encouraged to keep annual records of the changes, to review them, and to use the results as a basis for planning the group's priorities for the following season(s). The visual changes which community members observe in their forest resource lead to greater debate and encourage more transparent decision-making. This is particularly important for the majority who are from non-literate households and for whom written reports are meaningless.

Another example of „added value" where 'insiders' and 'outsiders' respect and are able to value each other's knowledge has been the development of easy-to-use, community-level yield estimation tools ('thumb rules'). These allow villagers themselves to quickly estimate potential yield in a variety of forest types, after some initial training from the forest range post staff. Further details of this work are reported in Branney *et al.* (this volume).

Experimentation is a key ingredient of action research. In one situation, forest department staff in Terathum district (Basantapur range post) experimented with broadcasting the seeds of *chiraito*, *argeli* and *allo* in nearby community forest after discussing with the FUG committee members. The result was a failure, but has since led the neighbouring FUGs to support the idea of nursery propagation of *chiraito* seeds using the local range-post nursery as a demonstration plot for this purpose. A nearby FUG (Okhre, Sankhuwasabha district) has now initiated a *chiraito* nursery and vegetative propagation of *argeli* in their community forest.

8.2.3 The effects of learning and sharing knowledge

Working with FUGs in their community forests makes the researcher immediately aware of the depth of local knowledge and understanding of ecological and biophysical characteristics, the diversity of products exploited and their uses, and their linkage with local livelihoods.

In contrast areas where 'outsider' knowledge perhaps has an 'advantage' are in market development and linkages, the price and royalty environment, policy and regulation, written records and documentation, and tools and methods of resource analysis. For example, it is clear that for *chiraito* and a number of other NTFPs (for example, *Valeriana jatamansi* and *Rawolfia serpentina*) there is a long and complex chain involving collectors, village traders, road head traders, *tera*i wholesalers, processors, Indian wholesalers, and exporters (Edwards, 1996; Kanel, 1999).

Table 8.1. Three cases where indigenous plant species are now being exploited by FUGs in new ways.

Plant Species	***Description***	***Insider/Outsider Knowledge***
Chiraito (Swertia chirayita)	An annual plant occurring naturally in the middle hills of Nepal (mainly in the eastern part of the country) at altitudes between 1200 to 3000 metres.	Has been used by traditional healers (both men and women) for many generations to treat stomach pain, fevers, anaemia and bronchial asthma. Maharjan (1994) reports that it has also been used as a dye and as an ingredient in local liquor manufacture. With the development of Nepali and |ndian markets for dried *chiraito* stems, international pharmaceutical companies using 'outsider' scientific knowledge are now recognising the value of this species.
Argeli / Mitsumata (Edgeworthia gardneri)	A perennial shrub that grows up to three metres high. It occurs in the wild between the altitudes of 1500 and 3000 metres and thrives in slightly moist and shady areas. It responds well to coppicing. It requires about three years to reach maturity, but can then be coppiced three to four times before the shrubs have to be replanted.	Has been used by villagers for live fencing and gully control and for ropes for tethering livestock. It is poisonous to cattle and has therefore not been seen traditionally as a particularly important plant. Over the last 5-6 years, Japanese companies have shown a growing interest in the fibres of this plant for the manufacture of currency notes.
Allo / Bhangre sisnu (Girardinia diversifolia)	Commonly known as the Himalayan nettle, this plant is a perennial shade-loving shrub often found on stream banks and small gullies. It grows wild in many of the middle hill districts, but is particularly important as a NTFP in the eastern districts of Sankhuwasabha and Dhankuta between the altitudes of 1200 and 3000 metres and can be readily propagated by seed.	The outer bark and inner fibres are spun into yarn to produce various traditional cloth based products. Women are generally involved in all stages of the production cycle and because this plant has yet to be widely cultivated and is unpleasant to harvest (owing to its nettle fibres), *allo* collectors are often from the poorest households in a community. There is oral evidence that in remote hill areas the root of *allo* is used as a famine food. Over the last decade and a half 'outsider' and 'insider' knowledge integration has led to the development of new weave products for external as well as internal markets.

The linkages between these players, price differentials at different points in the chain, and the policy regulation environment are not well understood at the village level. Both 'insider' and 'outsider' knowledge therefore have unique content, and forest development benefits from sharing this knowledge.

Recent action research undertaken with four FUGs in Terathum district demonstrates some of the challenges and opportunities for 'insiders' and 'outsiders' learning and sharing knowledge together. The work was initiated to:

- assist FUG members to identify the income generating potential of a number of NTFPs (*Swertia chirayita*, *Thysanolaena maxima infloresens*, *Girardinia diversifolia*, *Edgeworthia gardneri*, *Arundinaria falcata* and *Amomum subulatum*);
- to encourage women and poorer members of the FUG to increase their participation at decision-making levels in their FUG and community;
- to encourage forest department field staff to spread action research learning into adjoining areas.

During a participatory monitoring exercise to assess progress on these points, a number of tools and methods were used in order to ensure that the lessons coming out of the action research were accessible to all members of the FUGs. Since literacy rates are very low in these communities (approximately 70% of men, and 80% of women are non-literate) it was critical that visual methods were used wherever possible (Maharjan *et al.*, 1999). Wealth ranking of FUG members (using their own criteria) helped 'outsiders' to distinguish between members of the community, to identify where constraints and opportunities existed, and to document important differences in perspectives, knowledge and needs amongst the expected beneficiaries as the work progressed. Subsequently a number of meetings and discussions have been facilitated by both project and forest department staff at which FUG members (both non-literate and literate) have been able to debate resource management options, the expected products to be harvested and the household-level benefits that may result from these.

In two FUGs (Kalika and Okhre, Sankhuwasabha), as a result of project support for a trial processing plant for *argeli* bark, a group of poor women and men collectors were able to exert pressure on their FUG committee to include them as wage labourers during the processing work. The bark is semi-processed to produce a product which is exported to Japan for the manufacture of currency notes. This has provided new employment and income generation opportunities for FUG members and a new market for collectors. A kilo of dried bark may now fetch up to 300 Nepali rupees (US$ 4.5) where previously there was no market for such products. The rates of pay for this work were negotiated locally within the FUG and were seen to be discriminatory in the eyes of the project staff. However, the opportunity to work an additional number of days was of immediate benefit to the poor households (see photo1 and 2, appendix II).

Thus, while the project staff may have wished to negotiate a 'just' wage for the work being undertaken by the FUG members ('outsider' value system), from the perspective of those with the work it was an opportunity not to be missed. Any delays in wage negotiation would be likely to lead to a different family benefiting. Because these poor households had been involved from an early stage in the negotiation process, they had gained the confidence to argue a case for some of the benefits to accrue to them.

8.2.4 Development of processes, tools and methods for Participatory Action Research (PAR)

Action research ensures that interventions are suited to the needs of community members and are adapted to local socio-cultural and marketing experiences as they arise. The focus is on the process rather than targets, and objectives are re-defined by the community (Nicholson, 1999). The approach is transparent and builds on what is already present in a community.

Another advantage of the PAR approach is that it focuses all those involved into a learning-action-reflection mode of working, where 'mistakes' are heralded as opportunities for learning, sharing and moving forward. Providing a learning environment, where 'mistakes' are viewed as essential for lesson learning, requires skilful and sensitive facilitation and deep respect and understanding of different people's perspectives. For example, in one FUG (Tinjure Baisakhe Thalo, Terathum district), during an early stage of the action research process, a group of women from some of the poorest households were not included in discussions, neither were they made aware of the FUG committee's decision to establish a trial plot of *chiraito* by broadcasting seed in the community forest. The plants grew up together with the natural grass but were all mistakenly cut by the women who had traditionally used the area for collecting livestock fodder.

In the above example, range-post forest department staff worked as moderators in negotiating a mutually acceptable plan between men and women members of the FUG. These 'outsiders' were able to foster a learning environment where local stakeholders regardless of whether they were from poor or rich households, were able to discuss, question, negotiate and decide on resource management issues in order to improve productivity and household income opportunities while maintaining biodiversity and sustainability. Importantly this episode has now resulted in the FUG earmarking a separate area of their forest for grass fodder production.

NUKCFP has been particularly concerned to ensure that participatory action research leads to individual and institutional capacity growth in the communities with which it works. The project has been very active in developing participative and self-monitoring and evaluation tools (PSM&E) based on visual media in order for villagers to assess their own progress towards desired outcomes. Whilst to date this work has tended to focus on the overall management of community forests based on the agreed forest operational plan, there is no reason why more specific applications of this tool could not be used for the development of NTFPs by such communities.

PSM&E is being adopted by the project and demonstrates that synergy or 'mutual learning' can result from a mixing of 'local' and 'external' knowledge. Through a process of establishing criteria and visual indicators for monitoring change, ownership of change is created at different levels. It is forward-looking, draws on local capacities and resources, responsibilities are agreed and learning is enhanced through improved communication. In the case of one FUG (Dhungedhara, Sankhuwasabha), different stages of the moon were chosen as an indicator to represent changes in product availability. Selection of this indicator allowed all those depending on these products, including children, the elderly, literate as well as non literate, to monitor availability.

In the Koshi hill districts, Rasaily *et al.* (1999) used drawings, based around a number of key themes derived from village level discussions, to document perceptions of change in the FUG and community. Four theme areas were identified: forest management; fund mobilisation and livelihood; gender, equity and empowerment (confidence level); and communication. Using a visual ranking tool, they were able to draw out a number of important differences in perception amongst forest users and FUG members which have helped to identify awareness levels and knowledge gaps. The tool also highlighted several sensitive socio-political issues, such as FUG committee members discrimination against low caste households. The identification of such issues and gaps raises important questions about the project, the forest department and donor's monitoring systems and the extent to which these are often biased in favour of 'external agendas' which may or may not address the perceptions and priorities of local people.

8.2.5 Power relationships and policy implications

In any development process there are likely to be both 'winners'and 'losers', but to what extent can external interventions protect the poorest families from becoming losers? NUKCFP is attempting to support a 'new' paradigm in forestry research and development which emphasises the interrelationship between 'internal' and 'external' knowledge and the importance of lifelong learning. The project is using action research and practical applications of ideas to identify best practices. This is proving to be neither a quick nor particularly easy route to take. The above examples have all required a period of negotiation and trust-building between different stakeholders. This is usually a slow process evolving over several months or even years which more often than not conflicts with project time-frames requiring the delivery of outputs within a three or five year period.

Since its inception, the project design has been modified in order to improve its responsiveness to FUG needs and to advocatie these needs at district, regional and national levels. This has involved a re-negotiation of power relationships with a number of key stakeholders including the government Forest Department and the donor agency. Linkages between international (donor), national, district and local FUG policy levels are a critical aspect of the current project. Three short examples are given here to demonstrate some of the challenges being faced by the project team.

Example 1:

Local knowledge and weaving skills among some of the Tamang, Rai and Bhote communities in Sankhuwasabha demonstrate successful knowledge dissemination over many generations of women (and to a lesser extent, men) concerning the *allo* plant and its uses. Chitre Dhodre FUG (Dhankuta district) reported that its members needed training in the management, production and marketing of this plant.

The training was organised by the Forest Department in association with the district Cottage Industry office. The training need may have been correctly identified (by the FUG committee), yet the selection of the trainees was made by district level organisations and was less than transparent involving the nomination of a number of individuals with local political connections.

Project staff work with both the FUG and Forest Department staff and found it difficult to intervene in the situation to suggest alternative trainees should be nominated, since either of the interested parties could have mis-interpreted such a suggestion. Their 'loss of face' might have led to damaging longer term working relationships. The training was less effective than it might have been had there been a clear interpretation of training policy between the different organisations involved.

Example 2:

Tinjure Ratpokhari FUG, in Terathum district requested the project to help provide technical support and training to establish a basic processing plant for *argeli*. The plant was set up under the operation of the FUG committee, who subcontracted the operation out to one of its most influential committee members. As a result whilst extra employment opportunities became available to some of the poorest households in the FUG, much of the profit from the operation benefited only one household. This clearly contradicts the national community forestry policy which states that forest-based resources should be used first to meet the basic needs of user group members. At the same time, however, FUGs are legally recognised as independent organisations in Nepal and FUG committees should therefore be able to make independent resource management decisions without outside interference from government or project staff. Interpretation and application of national community forestry policy guidelines is an area which requires further study.

Example 3:

'Outsiders' can sometimes play a crucial role in interpreting policy so that outcomes specifically benefit the poorer members in a community. A number of FUGs in the Basantapur area of the project have been wanting to domesticate *chiraito* within their community forests, and some individual members of these same FUGs have begun to experiment with cultivation of this species on their own private land. So far the project has explicitly supported only experimentation occurring within community forests, in an effort to encourage these FUGs to openly debate how any benefits should be distributed among members. The role of 'outsiders' in this process will continue to be critical especially where poor households, who have been traditionally excluded from decision making due to the historical socio-cultural context, need to gain self-confidence before they can contribute more openly to decisions in FUG management meetings.

8.3 DISCUSSION AND CONCLUSIONS

It could be argued that successful development workers and researchers need to be able to demonstrate two fundamental qualities in their work: empathy (but not necessarily agreement) with locally held values and perspectives, and a high level of self-awareness of their own personal value systems.

With these qualities we may be better placed to address two key questions: how we can continue to learn from local people while working to provide greater power balance between key local, district, and national stakeholders; and how we can encourage 'horizontal learning' within communities when we are always considered as 'outsiders' For learning to be encouraged, 'outsiders' need to be prepared first and foremost to listen to, and understand, those with local knowledge, to be aware of existing power

relationships which control access to such knowledge, and to be sensitive to their own power influences, i.e.- how the 'scientific' knowledge of 'outsiders' is perceived in the local context in which they are working. NUKCFP has found peer feedback and observations, which are now encouraged in teams throughout the project, to be one effective way to promote self-awareness of individual and corporate behaviour. The demonstration effect of providing 'role models' to challenge discriminatory practices where these exist has proved to be a powerful force for change. The demonstration effect of project staff, or forest department range post teams, that consist of both women and men from mixed caste backgrounds working and socially sharing together has been shown time and time again to stimulate debate within communities on their own value systems.

In the case of Nepal, one of the most important roles that 'outsiders' can play is in helping to establish a more supportive policy and regulatory environment. In NUKCFP's experience this requires a mid- to long-term staff presence to be maintained at a number of policy levels, not just at the centre or at the periphery of bureaucratic power structures. For a project to be able to support innovative community level empowerment and knowledge generation and to play an advocacy role, there needs to be a clear vision, leadership and team-based approach to provide the synergy to meet these challenges. Those with least power can be easily disenfranchised by bureaucratic hurdles. For example, government regulations currently tend to favour those trading in NTFPs at the expense of the collector households who remain poor (Kanel, 1999). Recent studies which have detailed the market chain and trade linkages in these products will help to make the costs and benefits of this trade more transparent (photo 2, appendix II), and potentially thereby reduce the information gap between producers and traders.

As researchers we need to encourage greater levels of participation in management decision-making, and thereby give new life to research priorities. This may well require radical re-thinking about the ways in which research is funded. Research agendas need to be set within the context of the countries concerned, not by aid agencies based many thousands of miles away from the life realities of forest dependent populations. The experience of the Nepal UK Community Forestry Project suggests that it is possible to develop effective synergy and understanding between 'outsider' researchers and practitioners of 'insider' knowledge. Realising this dynamic is, however, neither straightforward nor possible in the short term. This poses a serious challenge to researchers and to development practitioners who are likely to be assessed by criteria which are 'outsider'-driven and by people who are not familiar with 'insider' value systems. The challenge for researchers to convince donor agencies and research fund managers of the importance of developing local ownership of a research process will, we suspect in future, be as important as the manner in which research is carried out.

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REFERENCES

Branney, P. and Dev, O.P. (1994). *Forest Product Yields from Community Forests: Preliminary data from the Koshi hills.* NUKCFP, Kathmandu.

CECI (1999). *Subsector Analysis of High Altitude NTFPs in the Karnali Zone. Volume 1: Main report*. NARMSAP/DANIDA/HMGN, Kathmandu.

Edwards, D M. (1994). *Non-timber forest products from Nepal. Aspects of the trade in medicinal and aromatic plants*. Forest Research and Survey Centre, MoFSC, Kathmandu.

Kanel, K.R. (1999). *Analysis of Policy and Regulatory Constraints in the Development of Non Timber Forest Products in Nepal*. With special reference to EFEA project area. WWFUS, Kathmandu.

Maharjan, M R. (1994). Chiraito *cultivation in Community forestry*. NUKCFP, Kathmandu.

Maharjan, M R, Yadav, K P, Thapa, M. (1999). *Pilot process of IGAs through NTFPs: Opportunities and constraints. A follow-up study for sustainable rural livelihoods*. Nepal UK Community Forestry Project, Kathmandu.

Mishra, S. (1994). Women's indigenous knowledge of forest management in Orissa (India). *Indigenous Knowledge and Development Monitor* 2 (3), 3-5.

MoFSC (1988). *Main Report. The Master Plan for the Forest Sector. Nepal*. MoFSC, Kathmandu.

Nicholson, K. (1999). *SNV Nepal and Non-Timber Forest Product Enterprise Development.* Kathmandu: SNV.

Rasaily, L., Gibbon, H and Poudyal, U. B. (1999). *Animation and Empowerment Pilot Process.* Pilot analysis report series nos.1-8. NUKCFP, Kathmandu.

Shepherd, G., Arnold, M. and Bass, S. (1999). *Forests and Sustainable Livelihoods. Current understandings, emerging issues and their implications for World Bank Forest Policy and funding priorities.* ODI Issues Paper, London.

Subedi, B.P. (1998). *Participatory Utilisation and Conservation of Medicinal and Aromatic Plants: A case from western Nepal Himalaya*. ANSAB, Kathmandu.

Subedi, B.P., Ojha, H.R., Binayee, S.B. and Nicholson, K. (1999). *Identification of NTFP Based Micro-enterprises in Parbat: Opportunities, Constraints and Strategies for Development.* MEDEP/ANSAB, Kathmandu.

The University of Reading (2000). *Biomass tables in community forest management: Bringing together traditional and participatory research*. Forest User Groups Forest Management Project, Discussion Paper No 3, February 2000, Reading/NUKCFP publication.

Wickramasinghe, A. (1994). *Deforestation, women and forestry: The case of Sri Lanka*. Institute for Development Research, International Books, Amsterdam.

9 LEARNING TO RESPECT: CO-OPERATION WITH RESOURCE USERS

Gudrun Lettmayer

9.1 INTRODUCTION

Knowledge signifies power and 'learning from resource users' implies the transfer of knowledge and of power. Problems linked to questions of indigenous knowledge property rights and use of local resource knowledge for economic valorisation are well known. To avoid abuse of this power, the decision to learn from resource users requires external actors to give up the common and comfortable stance of merely observing from a distance and be willing to take the risk of interaction instead. He or she will then have to accept the views, the knowledge and intentions of the indigenous users.

Instead external actors (who may include the scientific community, international development co-operation, and those from within the same culture but who nevertheless represent a western approach) have more commonly decided to recognise the existence of indigenous knowledge because they expect to benefit from it by making available new information about natural resources, techniques of utilisation, management, organisation and distribution, as well as occasionally the ethical and cultural role of resources. It has become evident that approaches to natural resource management in tropical countries that are based exclusively on externally-generated knowledge are inadequate, and that ignorance of indigenous knowledge and perspectives has culminated in the failure of many well-intended projects.

When agreeing on the importance of learning from resource users, do all external actors have the same notion of it? Do external actors really want to learn from resource users or do they simply want to have access to additional information? To analyse this, I begin by considering aspects of the learning process. It is important to remember that learning from other people, especially from other cultures or spheres of knowledge, is a process. The way this process may evolve is strongly influenced by *attitudes* towards the foreign knowledge, *respect* for the other's perception and the definition of *roles* for interaction between external actors and local resource users.

9. 2 *ATTITUDES* TOWARDS FOREIGN KNOWLEDGE

By the 'attitude' of the external actor, I mean the approach or motivation for 'learning from resource users'. Three common examples and the problems linked to them are discussed here.

Extractive:

This attitude views the learning process as simply a way of gathering information. In this very common approach, external actors see the user's role as provider of information. This information can be acquired without consideration of the providers' intentions or background.

Figure 9.1: The “extractive way”.

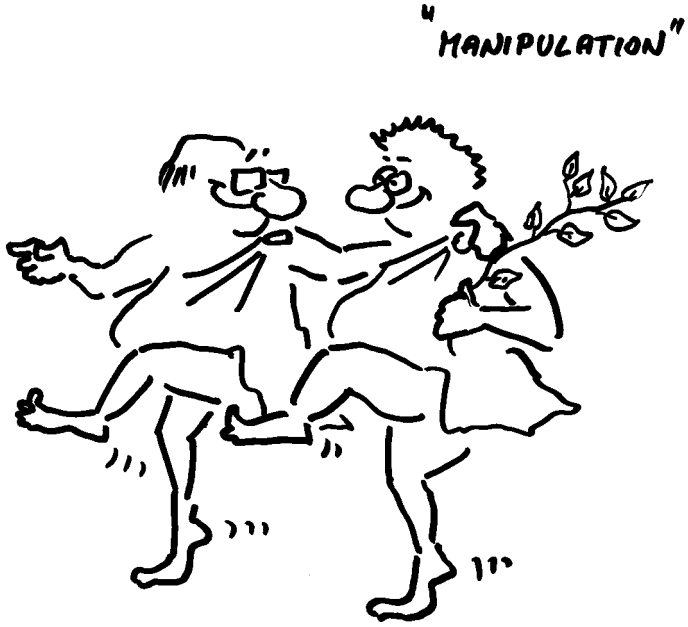

Figure 9.2: The “manipulative way”.

Figure 9.3: The “ethno-altruistic way”.

In these cases, interaction is not necessary, and the external actors and local users keep a 'safe distance' each other.

Manipulative:

Some external actors study user-specific attitudes and cultural, social and economic background information, in order to create a solid knowledge base, enabling them to manipulate local users, deliberately or not, towards the intentions of the external actors. Although referred to as 'learning', this approach contributes to the systematic misuse of external knowledge about local values and roles in an aim to achieve goals determined by considerations lying outside those local value systems.

It is difficult to define exactly from which point onwards we face this conscious manipulation of values and roles. It cannot be denied that a good part of practical co-operation between users and external actors is based on (mutual) knowledge of resources. There is no doubt that long-term change in values and attitudes happens in all cultures as a consequence of historic influences. "If they are to survive, traditional values must prove themselves useful to each new generation" (Goulet, 1995). Nevertheless, external actors have to be conscious of acting along a fine line that separates learning processes from manipulation.

Ethno-altruistic:

By contrast, we often see a phenomenon which I have termed 'ethno-altruistic', that is, the one-sided glorification and idealisation of indigenous knowledge over western science. As with extractive attitudes, learning becomes a one-way process. The ethno-altruistic attitude may emerge from certain modern philosophical trends such as ecocentrism and post-modernism, and is connected to the search (mainly by western scientists) for a more holistic, possibly also spiritual, notion of 'knowledge' than that provided by western academic tradition. Recent recognition of forms of science that differ from the classic western science schemes can lead to a generalised criticism of western scientific approaches and to the conviction of certain groups of scientists that indigenous knowledge, in its diverse and rich forms, could be the 'philosopher's stone'.

In many cases the resource users are themselves perfectly aware of these different attitudes and react consciously to these external influences by feigning ignorance or passivity. In the long term, they should not be seen as 'victims' of certain attitudes. Nevertheless, the common problem of all three attitudes is that external actors and resource users use divergent strategies towards divergent goals and miss the opportunity to benefit from the others' knowledge. There is no process of common learning.

9.3 *RESPECT* FOR THE PERCEPTIONS OF OTHERS

Frequently, we face an extremely complex perception of resource values when dealing with local resource users. Resource values and resource problems far exceed their economic significance and include what external actors call 'cultural' value. This holistic perception is based upon the understanding that resources and resource users are equitable parts of the whole, linked in all dimensions of being.

It contrasts with our 'western' dualistic perception, in which we consider ourselves 'observers' of the resource environment.

These differences are illustrated by an experience from the eastern Andes (box 1), where the existence of different perceptions indicates that if we want to enter into a process of co-operative learning, we must respect the users' knowledge and perceptions (even if we do not share them). Mutual respect for points of view creates a basis of trust, which makes both sides more willing to broaden their own knowledge of human-environment relations. And it is important to remember that ultimately decisions about the management of local resources are in the hands of local users, beyond the influence of external interests and knowledge.

Respecting the perspectives of others becomes most problematic in situations where the 'other' - in our case the resource user - adopts attitudes considered, in the western view, fatalistic towards situations or processes that are seen as threats by external actors. It is hard to respect the perspective of others when it does not correspond to the logical system of the external actors. This occurs in situations where, to the external actor, it appears that there has been no planning process, because there is no conviction that nature and resources can be shaped, nor conviction that processes have to be structured; or where there appears to be no thinking in terms of long term development, because of differing perceptions of time, feasibility, security and destiny.

9.4 INTERACTION *ROLES* BETWEEN EXTERNAL ACTORS AND LOCAL RESOURCE USERS

As already stated, interactions between researchers and resource users become questions of power concession and partnership, making great demands on the ways in which external actors interpret their roles. Usually, the external actor remains the more powerful one, at least in the short term, because of his or her access to financial resources, and ability to implement research. Therefore he or she is the one to decide the position conceded to local users in these kinds of relations. It is evident that this situation may open the door to selective and manipulative utilisation of local knowledge.

There are also external influences on the distribution of roles. Scientific and development projects have their own rules and framework conditions. Lack of time, and pressure to present results rapidly, tend to lead to work without a long process of mutual knowledge exchange. In such cases the role attributed to the users is to furnish complementary information and to be an object of research.

Box 1: Case study 1

At the beginning of the 1990s, I lived in an East Andean region, working on the issue of soil erosion and agriculture. From my western point of view, the problem could be described as follows. Historic and present land tenure, steep slopes, soil characteristics, types of crops, forms of exploitation and rain characteristics form an interdependent whole that aggravates soil erosion in many sites, especially on the scarce land of poor smallholders. Continuation of traditional fallow systems and the cultivation of untouched, non-eroded sites are heavily limited by population pressure and lend tenure. Soil loss is severe and threatens the user's existence in the long term.

By contrast, among the resource users in the Andes the traditional holistic perception of their territory still predominates. This perception is characterised by the principle of mutual, respectful nurturing (giving and taking) between all living elements of this sphere, which include animals, stones, soil, and human beings. The status of these elements in the territory is equitable. The kinship that exists between them is manifested by social reciprocity and, generally, in the cyclical regeneration of all beings.

The Andean resource user knows the soil very well. This profound knowledge is manifested by the many highly complex forms of cultivation historically developed by Andean users (including terraces and irrigation) and the many types of soils distinguished according to criteria such as colour, structure, texture, and suitability for certain crops. The constant communication or nurturing between all elements manifests itself in the user's 'conversations' with soils and plants, for example by observation of plant ripening or soil structure. 'Conversing' with, or observing, the stars and atmospheric signs provides information about what weather to expect. In reaction to this information, the user will choose the appropriate soils for cultivation and determine which soils should rest for a while (Apffel-Marglin, 1998).

The users' position on soil erosion, embedded in their holistic view, was quite different from my external diagnosis. In their view the harmony of elements was sometimes disturbed, because the permanent 'conversation' process had been interrupted. Although these disturbances had to be cured by ritual, in general the whole system is not perceived to show persistent change, because it is regenerating cyclically. In this world of equitable elements there is no concept of evolution or change of the system. Soil erosion is recognised as existing, and as a disturbance, but never as a problem or threat to the agricultural system that might require intervention and change of the resource user's behaviour.

Box 2: Case study 2 - Madagascar

A project designed to conduct research on two agro-ecological systems in Madagascar (the highland and east coast rainforests), was intended to provide sufficient information about the socio-cultural and ecological aspects of those systems to design, in a participatory way with resource users, sustainable scenarios for the future development of those two zones.

The establishment of a sound diagnostic methodology was also a principal goal of the project. Methodology had to be participatory, simple and transferable to the users. The testing and development of teaching tools, suited to facilitation of discussion with users about the agro-ecological systems, was also included in the objectives.

The concept as well as the implementation and interpretation of the research work were exclusively in the hands of the research team, composed of Malgach and European experts, and their respective institutions. In the two zones of research, measurements and observation, and analysis of soils and plants took place, in addition to interviews with local resource users.

The research staff obtained a large amount of information about the different areas of research, enabling a first diagnosis of the situation in the two zones, but the goal of participatory co-operation with resource users during the diagnostic stage and in the development of sustainable scenarios was not effectively realised. At the beginning of the project, presentation of goals and strategies of research to the users happened in a very systematic and complex, western dominated style that probably deterred more than it motivated or explained. Once or twice a year, users were given feedback about the results of experts' research. This feedback came in a one-way instructive way, using written media, although most users were illiterate.

When the project was two years old, and effective co-operation with users had not taken place, a number of user groups participated in teaching exercises conducted by a separate team of teachers contracted especially to elaborate and carry out the teaching.

Despite the intention of conducting participatory research, the research followed a classic approach of external dominated research and observation. Generally, users never knew exactly what the research team was doing and what they were working for. Insecurity and fear towards the presence of the external actors was manifested by rejection, theft and negative rumours about the research team. Resource users never had the impression that they could be an active part of a process of research and development nor that they could benefit from it. Instead of being their process, the project was the action of external scientists in their territory.

The Madagascar case study (box 2) illustrates problems with this approach. In the framework of the overall participatory methodology, it had been intended that the project would inform users about the externally defined goals, and then incorporate local users' knowledge of resources, development of teaching tools with and for users, collaboration with local informants and transfer of research results. However, despite the declared belief in participation, I would describe the research as a mostly extractive process of information gathering for the following reasons:

- on the whole, the role attributed to resource users was that of information source about users' perceptions and resource uses;
- the on-farm research on agroforestry was carried out with the co-operation of a few hired peasants;
- planning and interpretation was conducted by researchers alone;
- information flowed mainly from the user to the researcher and the user was never considered in the role of researcher

Reflecting on this experience, I see two main problem areas that negatively influenced the participatory aspect of the research. Firstly, there were some unfavourable *framework conditions***,** and secondly, there was a manifest lack of respect for the knowledge of the local resource users, resulting in a problematic *attribution of roles* to the external actors and to local users.

The dominant factor affected by the framework conditions was time. The project was expected to elaborate scientifically-sound studies of the natural sphere and the human sphere, within a time limit of three years and in two different eco-zones. At the same time, the project was expected to start up a dynamic participation process with resource users, leading to formulation of development scenarios. These goals were too ambitious and put the project team under time pressure. Participatory approaches in research and development need time, so when time is scarce, quickly realisable top-down research is given priority instead. Another unfavourable framework condition was the ethnic composition of the research team. None of the researchers came from the traditionally underprivileged ethnic groups of the rainforest zone, where part of the research was done. Researchers were either members of the two privileged Malgach highland ethnic groups, or Europeans.

Nevertheless, at the core of the project's problems lies the researchers' attitudes towards their own role and the role they attributed to the resource users. Basically, the scientific demands of the project determined the interpretation of roles by the scientific staff. They saw their role as the elaborators, in little time and under pressure, of scientifically sound results. They were responsible for providing those results, and furthermore such results could enhance their professional reputations. Their role was to plan, to act, to implement and to know. By contrast, the role attributed to the resource users was to be an *object* of research into specific resource-use strategies and practices, and the suppliers of complementary information.

In this project, participatory processes were a defined project goal that was never achieved. Indigenous knowledge *per se* was considered neither a rich potential source of information nor a guide to further development strategies. In principle, the position of researchers towards users was a distant and sometimes contemptuous one. Researchers and users were not working for the same objectives. It seems that participatory projects

need to include the long and sometimes difficult path of interaction with indigenous knowledge, explicitly formulated as a project goal.

9.5 CONCLUSIONS

This paper highlights ethical aspects of the learning process and behaviour between resource users and so-called external actors. The key points mentioned here (respect, fair and open attitudes, and clarification of roles) are not only intrinsic values but also indispensable preconditions needed to reach sustainable results in the process.

Knowledge and values are always products of their environment. Learning from local resource users therefore should be an attempt to recognise and to understand 'other's' knowledge and values emerging from their context; it implies learning about perceptions, attitudes, ways of thinking and socio-economic backgrounds.

Forestry and agriculture are directly and intensely linked with natural resources and therefore occupy key positions in the food production, energy, culture and religion of each society. This is especially true for the South, where these sectors have a decisive role in the economy. Forestry, as a science, should pay more attention to the multiple functionality of forests.

But in discussing natural resources, it is not only objective 'hard' facts which count. The relationships between human beings and their forests and certain forms of utilisation have emotional or religious roots, which should not be trivialised. This is one of the lessons learnt both from development projects in the South, and from environmental conflict in Europe. We have to respect the existence of different ways of understanding and forms of knowledge. None of these forms should be discriminated against *a priori*. This means that we need to go beyond learning facts about different 'ways of utilisation', and enhance our knowledge about different *perceptions* of natural resources, and respect for the points of view of others. To undertake this process we have to go far beyond pure knowledge accumulation; we need a long term communication process (about hard facts and about soft facts, or beliefs and cultural context) between different cultural perspectives. Real learning from resource users is also learning with resource users. As researchers, we need a new reciprocity in the transfer of technical and social knowledge during this interaction.

We face the fact that there is, for economic or political reasons, inequality of power between the different groups of resource users and many external actors. Even participatory methods (essential in today's interactions between resource users and external actors) may be nothing more than obligatory efforts and be used as tools of manipulation. On their own, they do not guarantee fair, respectful partnership in mutual behaviour. Instead, this respect requires an overall re-orientation of the roles of researchers and developers, who must move from 'making knowledge' to 'contributing to knowledge' and to be willing to take the risk of interaction that might lead to unexpected results. Do we have the courage and the time to try to develop a common acceptable way from these possibly diverging perspectives, for future development?

REFERENCES

Apffel-Marglin, F. (1998). *The spirit of regeneration. Andean culture confronting western notions of development*. Zed Books, London, New York.

Goulet, D. (1995). *Development Ethics: A guide to theory and practice*. Zed Books, London.

Lettmayer, G. (1993). *Bodenerosion in der Kulturlandschaft von Ayopaya (Cochabamba), Bolivien. Quantitative und qualitative Untersuchungen. - Soil erosion in the agricultural region of Ayopaya (Cochabamba), Bolivia. Quantitative and qualitative research.* Unpublished thesis. Post graduate studies. University of Göttingen, Germany.

10 A MODEL FOR INTEGRATING INDIGENOUS AND SCIENTIFIC FOREST MANAGEMENT: POTENTIALS AND LIMITATIONS FOR ADAPTIVE LEARNING

Rekha Singhal

10.1 INTRODUCTION

'Indigenous people and their communities represent a significant percentage of global population. They have developed over many generations, a holistic traditional scientific knowledge of their lands, natural resources and environment …In view of the inter-relationship between the natural environment and its sustainable development and the cultural, social, economic and physical well-being of indigenous people, national and international efforts to implement environmentally sound and sustainable development should recognise, accommodate, promote and strengthen the role of indigenous people and their communities'.

The above extract from Agenda 21 (UNCED, 1992), aptly captures the need for increased recognition of indigenous people and their knowledge of natural resource management and its use in sustainable development. Since the early 1980s new approaches to forest management, including active participation of local communities, have been attempted in many tropical countries. The role of indigenous forest management systems in sustainable forest management has received increased interest and attention during the last few years from researchers and also from policy makers, project designers, and implementers.

Forest management systems are referred to as indigenous, when they are primarily based on local experience of their 'local world' that is, perhaps, most important to them. Indigenous refers to knowledge and practices that have originated locally and are performed by a community or society in a specific place. This knowledge evolves and emerges continually over time according to people's perception and experience of their environment and is usually transmitted from generation to generation by word of mouth or by practice. In contrast, scientific forestry utilises specialised knowledge for managing forest resources not only for local populations but also for wider objectives and the global scientific forestry community. Scientific knowledge on forest management is generally shared in formal, written, and non-traditional ways.

Forest management has been defined as the process of making and implementing decisions about the use and maintenance of forest resources and organisation of related activities (Duerr *et al.*, 1979). The decision-making process involves integration and utilisation of several kinds of knowledge (box 1).

Box 1: Types of knowledge contributing to Forest Management (adapted from Munyanziza and Wiersum, 1999)

- **Botanical knowledge** on species characteristics and use properties.
- **Ecological knowledge** on growing conditions of trees.
- **Technical knowledge** on silvicultural management practices.
- **Institutional knowledge** on norms, rules and regulations for using and managing forest resources.
- **Behavioural knowledge** on community needs and use pattern.
- **Market related knowledge** on economic benefits and values of forest produce.
- **Legal knowledge** on national, international, regional and state levels laws and legislation for planting and harvesting.

10.2 THE ADAPTIVE LEARNING PERSPECTIVE

These different kinds of knowledge come from both scientific and indigenous sources, and can be combined through a process of adaptive learning, drawing on the principles of adaptive management. Adaptive management "deals with the unpredictable interactions between people and ecosystems as they evolve together" (Berkes and Folke, 1998) and is essentially a process of 'learning by doing' as described by Bos (1974). The guiding principles for adaptive management are provided by the interface between society and the biosphere: "The release of human opportunity requires flexible, diverse and redundant regulation, monitoring that leads to corrective action and experimental probing of the continually changing reality of the external world" (Holling, 1995). This suggests that continued monitoring of the environment and interpretations of unfolding events are essential for resource managers to adapt and respond with corrective actions. Social learning and institutional involvement are recognised as the key ingredients of adaptive management activities, which are generally considered to comprise group, community or organisational learning in the context of shared perceptions of problems (their causes and solutions), agreements on goals and desire to take action.

On the basis of principles of adaptive management (Holling, 1998), a model of adaptive learning is proposed. The principles of adaptive management are the key ingredients of adaptive learning. It is hypothesised that adaptive learning depends upon the appropriate integration of different types of knowledge and the verification of this knowledge. Based on the assumption that forest management is governed by the knowledge base, which is continuously verified, adapted and accepted by the community, a two dimensional model of adaptive learning is presented in Figure 10.1.

Two critical dimensions (knowledge and verification) lie at the heart of this adaptive learning framework (Figure 10.1).

- **Knowledge** is a critical dimension in determining adaptive learning. It includes information, values, beliefs and attitudes. Knowledge can be categorised as scientific (formal) and indigenous (traditional).
- **Verification** of knowledge can be carried out by the owner of knowledge or by others. This deals with action or action sequences that facilitate adaptation, acceptance and feedback.

Thus, forest management may be characterised as involving interactions between forest resources and their users. Figure 10.1 shows scientific knowledge as generally technique-based, sectoral, specialised and verified by others. Therefore feedback from users of this knowledge is necessary for adaptation, need assessment and acceptance. In contrast, indigenous forest management knowledge is verified as it evolves through the on-going trial and error practices of individuals and their community; this process results in a societal-based knowledge that is practical, dynamic, need-based, adaptable and integrated.

KNOWLEDGE

VERIFICATION	Scientific	Indigenous
ON OTHERS	1 Sectoral & Technical-Based	2
ON SELF	3	4 Holistic & Societal-Based

Figure 10.1: A model of Adaptive Learning.

The model provides a useful framework for understanding and selecting the processes related to adaptive learning. It is not conceptualised as a rigid model, rather it represents a perspective which is relevant for forest management. Because adaptive learning is holistic, societal-based and regularly verified by oneself, it is more suitable for designing and implementing people-oriented developmental programmes, such as Participatory Forest Management.

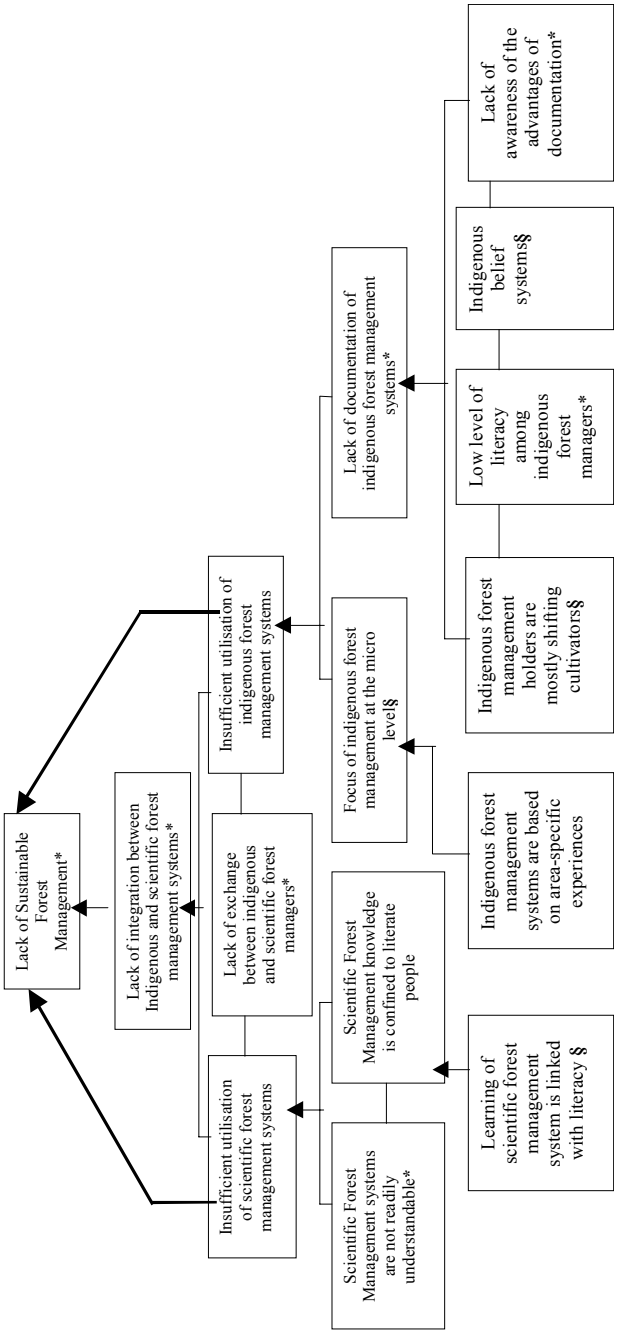

Figure 10.2: Opportunities and Problems in Integrating Indigenous and Scientific Forest Management; * Indicates opportunities for integration § Indicates limitations of a particular forest management system

10.2.1 Integration of indigenous and scientific forest management

Indigenous forest management activities may originate in specific areas in response to specific pressures, but this does not prevent them from adopting and transforming appropriate components of scientific forest management systems through interaction and shared experience. Indeed there is a need to promote equity of forest management systems between indigenous communities and formal forestry scientists around the world (Agarwal, 1995). This process of integrating two forest management systems is essential to achieving sustainable forest management.

Figure 10.2 shows a problem tree analysis in relation to integrated forest management systems, and indicates both opportunities for, and constraints to, the extent of integration. Figure 10.2 also suggests that exclusive management by either forest management system can achieve only limited objectives. It is increasingly recognised that forest managers from both forest management systems must work together to address the limitations and maximise the opportunities. However, integration of two forest management systems is not easy and the limitations of each system must first be addressed. There is no fixed method of addressing the bottlenecks in integration of indigenous and scientific knowledge, instead the methods chosen will vary according to what is appropriate and feasible within the institutional, ecological, and social environments in which they operate.

10.3 DISCUSSION AND CONCLUSIONS: THE MODEL IN THE INDIAN CONTEXT

The Indian Forest Policy of 1988 (MoEF, 1988) and the subsequent Government resolution on participatory forest management (MoEF, 1990) emphasise the need for people's participation in forest management. The policy document asserts that local people should be actively involved in protection, conservation and management of forests. Hence the policy envisages a process of joint management of forests by the state government (professional foresters) and the local people. So far, out of 25 state governments, 23 states have adopted Joint Forest Management (JFM). As on the 1st January 2000, 10.24 million ha of forestlands were managed under the JFM programme through 36 075 forest protection committees (MoEF, 2000).

Evidence of long standing local forest management practices can be found in various parts of India particularly in eastern and north-eastern regions. Despite increasing pressures with the increased population, regulations regarding resource use and harvest assist in managing forests in a sustainable way.

As the JFM programme has evolved, there are clear indications that the programme has had considerable impact on local ecology, economics, and the people (Yadav *et al.*, 1997). Initially the relationship between the local people and forest department was strained and lacked trust. Regular interaction and participatory learning and planning activities has facilitated an open dialogue and removed mutual distrust between officials of forest department and local people. Viewed in the light of the adaptive learning model, it was found that exchange and interaction of scientific and indigenous aspects of forest management within the context of JFM have resulted in ecological improvement and increase in average household income after four-five years of strong JFM activities.

Local people as well as foresters identify with the JFM programme. They take pride in being part of the programme and are recognising its benefits. Based on the successful experience of JFM, irrigation, health, and agriculture sectors are also now placing an emphasis on integration of indigenous and scientific knowledge through people's participation in resource management.

However real integration of scientific and indigenous management systems is still rarely achieved, and in presenting the model I aim to make more explicit the opportunities for doing so, and highlight ways forward for the continuous process of adaptive learning.

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REFERENCES

Agarwal, A . (1995). Dismantling the divide between indigenous and scientific knowledge. *Development and change* 26 :413-439.

Berkes, F., & Folke C. (1998). Linking Social and Ecological Systems for Resilience and Sustainability. In: Berkes, F. & Folke, C.(eds.) *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Great Britain: Cambridge University.

Bos, A.H. (1974). *Oordeelsvorming in Groepen: Willens en Wetens, Wikken en Wegen; Polariteit en Ritme als Sleutel tot Ontwikkeling Van Sociale Organismen.* (PhD. Dissertation: Wageningen Agricultural University, WAU Dissertation Abstract No.586. The Netherlands.

Duerr, W.A., Teeguarden., D.E., Christiansen, N.B. & Guttenberg, S. (eds.) (1979): *Forest Resource Management: Decision Making Principles and Cases.* W.B.Saunders, Philadelphia, USA.

Holling, C.S. (1995). What Barriers? What Bridges? Chapter 1. In: Gunderson, L.H., Holling, C.S. and Light, S.S. (eds.). *Barriers and Bridges to the Renewal of Ecosystems and Institutions*. Colombia Press, New York.

Holling, C.S. (1998). Science, Sustainability and Resource Management. In: Berkes, F. & Folke, C.(eds.) *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience.* Cambridge University. Great Britain.

MoEF (1988). *National Forest Policy, Resolution No.3-1/86-FP.* Department of Environment, Forests and Wildlife, Ministry of Environment and Forests, New Delhi, India.

MoEF (1990). *Joint Forest Management Resolution. Resolution No.6-21/89-FP.* Department of Environment, Forests and Wildlife, Ministry of Environment and Forests, New Delhi, India.

MoEF (2000). *Guidelines for Strengthening Joint Forests Management Programme . No.22-8/2000-JFM (FPD).* Forest Protection Division, Ministry of Environment and Forests, New Delhi, India.

Munyanziza, E., & Wiersum., K.F. (1999). Indigenous Knowledge of Mimbo Trees in Morogoro, Tanzania. *Indigenous Knowledge and Development Monitor* 7: 10-11.

UNCED (1992). *Agenda 21, Chapter 26 : Recognising and Strengthening the Role of Indigenous People and their Communities.* United Nations Conference on Environment and Development, June 3-14, 1992. Rio de Janerio, Brazil.

Yadav, G., Roy, S.B., & Chowdhury, S. (1997). Progress of Community Forestry in India. In: Victor, M., Lang, C. and Bornemeier, J. (eds.): *Community Forestry at a Crossroads : Reflections and Future Directions in the Development of Community Forestry.* Proceedings of an International Seminar held in Bangkok, Thailand, 17-19, July, 1997. RECOFTC Report No.16, Bangkok, Thailand.

SECTION 3: ACADEMIC RESEARCH

11 THE PRODUCTION OF SAWN HARDWOOD AND REGULATION OF TIMBER EXTRACTION FROM NATURAL FORESTS IN TANZANIA

David Wall and Jill Wells

11.1 INTRODUCTION

Rapidly growing urban centres generate a demand for wood for construction purposes, including hardwood, which is met by traders and processors of wood, who in turn have links to extractors in the rural areas. The research reported here focuses on the resource end of the hardwood system that supplies Mwanza and Dar es Salaam, in Tanzania, as part of a study to understand the complete wood system, i.e. wood markets, networks supplying wood to the towns, extraction methods and agents involved. The study aims to identify how the flow of affordable construction timber to urban areas might be maintained, and to use this emerging understanding as a basis for making recommendations to the policy community on how to balance conflicting objectives related to wood provision, environmental protection, management of natural resources, and poverty alleviation. In particular, this paper contributes to the development of methodologies useful to foresters and their collaborators for investigating ways in which timber is traded and sold.

The research and its methodology focus on the business aspects of timber production, in particular how timber gets from resource to final use and how it gets used. Interest in these issues by foresters is increasing as the importance of income generated from forest products increases in livelihoods. For the purposes of this paper construction wood is defined to include wood used in temporary support such as scaffolding; wood incorporated into buildings, typically in the structures of roofs and walls; wood in window frames, doors and door frames; and wood associated with buildings such as joinery and furniture.

11.2 RESEARCH METHODOLOGY AND METHODS

The broad strategy adopted for the research is what Blaikie (1993) terms 'abductive', meaning that it seeks "to produce social scientific accounts of social life drawing on the concepts and meanings used by social actors, and the activities in which they engage". More specifically, the approach is that of grounded theory - the idea that research involves both data collection and the development of theories (Flick, 1998). The objective is to formulate theory based on field data and to verify and develop that theory by accumulating empirical data throughout the research. The approach emphasises the relevance and interpretation of the data rather than their representativeness or how they are collected (Flick, 1998).

The grounded approach was adopted primarily because we were unable to identify a coherent body of knowledge about the connections between wood resource production, exploitation and use in African countries. This, and the dearth of relevant credible statistical data, meant research was heavily reliant on good quality data from people working within the wood systems. By allowing respondents to explain the world in the way they understand it, open-ended interviews seemed likely to produce information of greater accuracy than those methods prescribing the format of responses. Open-ended interviews also fit well within the abductive strategy. Other approaches, such as questionnaires or more structured interviews, have been shown to produce invalid responses (see Warwick, 1983), especially where many respondents are unused to dealing with impersonal questions on issues decided by 'outsiders'.

Fieldwork took place at various times between 1997 and 1999. Interviewing commenced in urban areas, with a stratified sample of wood traders (retailers) drawn from a 'population' roughly enumerated by visual observation from a vehicle and brief reconnaissance on foot. Urban traders occupy a pivotal position in the construction wood chains, with 'forward linkages' to customers who are the users of wood and 'backward linkages' to suppliers. From information provided by the traders, the main groups of customers (furniture makers, house-builders and building contractors) were identified and interviewed. The traders also explained the means by which they secure their products and the areas from which they are obtained. The sources of products were roughly defined in this way.

From the urban areas, the interview process moved to the source areas and to major staging posts within the source to urban chain. At these locations random selection of respondents was impractical because information about the identity, location and number of traders is unavailable without extensive primary research, so we sought interviews with those who were most likely to be able to provide an overview of the system (e.g. forest officials) and of their own business activity within the systems (e.g. pit-sawyers). Where trade was visible (e.g. sawmilling businesses or street traders) the size and nature of businesses involved in the trade were assessed by visual observation. This purposeful approach was complemented by discussions with people involved in 'interesting-looking' activities to do with construction wood. Several of the approaches to data collection mentioned above parallel techniques that are often used within the 'rapid appraisal' method (for example, see McCracken *et al.*, 1988).

It is worth reiterating at this point that the grounded theory approach does not insist on representativeness in order for data to be valid. Emphasis is not on ensuring the data collected is representative as much as on accumulating and interpreting relevant empirical data (preferably from a variety of sources) to construct a broad-based and relevant explanation. Verification of the initial explanation develops over a period of time by uncovering more data that corroborates the initial explanation. If new data suggests an alternative explanation then the explanation is adjusted until the data and explanation are in accord.

Interviews are central to this research. This in itself is not unusual, but when combined with the lack of secondary material and a grounded approach, the importance of interview data is enhanced. Explanations of the wood supply system and its workings provided

by respondents constitute, after careful analysis, cross-checking and synthesis, the research findings reported here. Thus, the output of this research - almost in its entirety - is what has been learnt from local people.

The methodology used is 'extractive'. Many people in the supply system provided information to the research team but the team has reported and debated its explanation of the system only with government officials, foresters, and interested academics in Dar es Salaam. An opportunity to debate research with respondents would have been advantageous and could have improved interpretation of results. The research method chosen was not participatory. Western researchers set research objectives in conjunction with Tanzanian researchers, and although it was planned that data analysis would involve Tanzanian researchers in the same way, a shortage of skilled personnel prevented this from happening. Despite these shortcomings, the method chosen remains broadly appropriate given the overall stated objective of the project, viz. to inform policy through provision of an overview explanation of the wood system. Changing the system or interacting with it and the people in it, which would necessarily require more participatory approaches, were not objectives of this research.

Unstructured interviews were eventually conducted with a total of 259 respondents drawn from the main groups of actors involved in the provision, extraction, production, marketing and use of construction wood in Dar es Salaam (the capital of Tanzania) and Mwanza (a large town on Lake Victoria). Occupations of those respondents providing information on the hardwood production system are given in Table 11.1.

Table 11.1: Interviewing sample for hardwood production system.

Urban respondents	**Dar es Salaam**	**Mwanza**	**Respondents in forest areas**	**Various**
Furniture makers	46	14	Transporter / dealers	14
Housebuilders	19	4	Sawmillers	7
Building contractors	4	4	Pit-sawyers	18
Retailers	101	17	Forest officers	11
Total	*170*	*39*	*Total*	*50*

Data analysis

The data collected in the interviews were analysed into comparable formats and the processes of developing concepts and theories continues to the present time. To date we have found two approaches particularly useful: sub-sector analysis (originally applied to the study of the production and marketing of agricultural commodities, see Boomgard *et al.*, 1986) and commodity chains that have been used and developed by Ribot (1998).

11.3 SELECTED FINDINGS ABOUT THE HARDWOOD SUPPLY SYSTEM

11.3.1 The sources of hardwood

In Tanzania, hardwood timber is synonymous with timber from natural forest. The main sources of hardwood timber marketed in Dar es Salaam are:

(i) The miombo woodland in Tabora and Rukwa regions, supplying mostly *mninga* (*Pterocarpus angolensis*).
(ii) The coastal forests to the south in Kilwa and Lindi regions.
(iii) Some pockets of forest in highland areas of Morogoro and Tanga regions.

Mwanza is served mainly from source (i). Timber is transported from the sources by road and along two railway lines, TRC (Tanzania Railway Corporation) and TAZARA (Tanzania - Zambia Railway) (see Figure 11.1).

Over the years, the centres of hardwood production have shifted progressively outwards along the main transport routes serving urban areas. In the 1970-80s the Kilombero Valley in Morogoro region was the source of much of the hardwood going to Dar es Salaam. By the 1990s production (notably for *mninga*) shifted to Tabora region. Today (1999) *mninga* comes mainly from Rukwa region around Mpanda and Inyonde. With the decreasing availability of *mninga* customers are turning to second preference species, notably *mtundu* (*Brachystegia spiciformis*) and *mkora* or *mkongo* (*Afzelia quanzensis*). Areas previously logged for *mninga* are now being logged for these species. There is also a trend towards cutting smaller trees and trees in less accessible forest areas and areas further from a road.

Most of the hardwood timber on the market in Dar es Salaam and Mwanza is now pit-sawn. Pit-sawing has increased because preferred species are widely dispersed, the larger trees can only be reached on foot, the cost of labour has decreased in relation to capital as a result of liberalisation and because Tanzanian businessmen with limited capital have entered the timber business. Stationary hardwood sawmills are now largely redundant due to lack of nearby trees.

11.3.2 The hardwood supply system

The analysis of the supply system for pit-sawn hardwood timber is based upon data gathered from 50 interviews from: Kilombero and Kilosa districts of Morogoro region, the miombo woodlands in Tabora, Kigoma and Rukwa regions, officials responsible for these areas and a few secondary sources. The focus of explanation here is on the resource end of the system.

Building an explanation of the wood system relied heavily on the approach of sub-sector analysis (see Boomgard *et al.*, 1986). It takes a systems approach to the study of economic activity, emphasising the interdependence of economic units (or businesses) involved in the production and distribution process. Figure 11.2 shows, in diagrammatic form, the hardwood system deduced from sub-sector analysis.

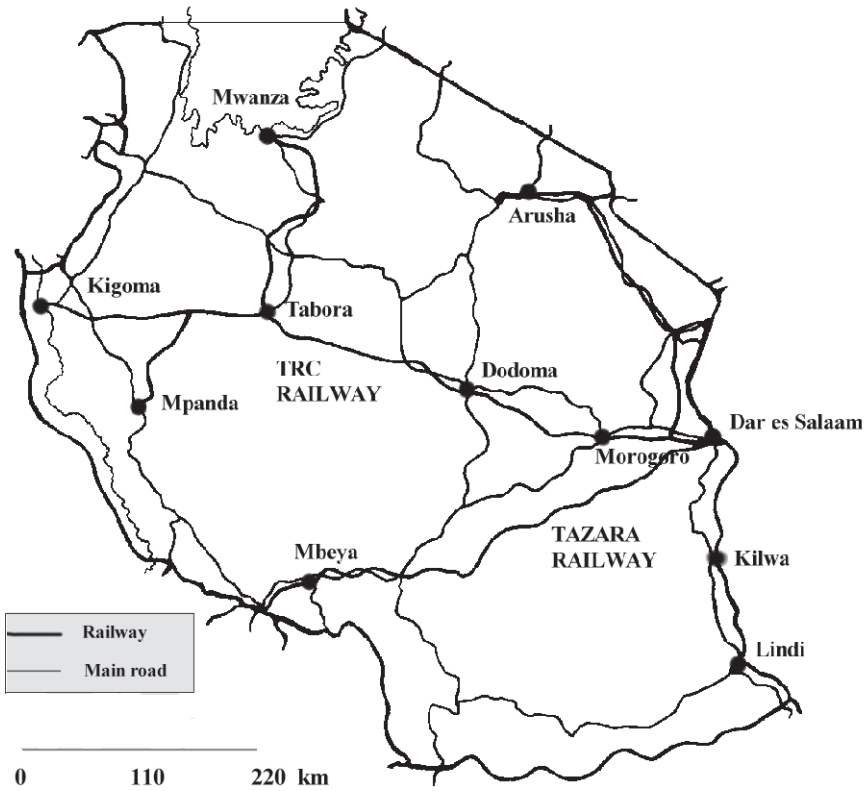

Figure 11.1: Map of Tanzania showing the places & transport routes mentioned.

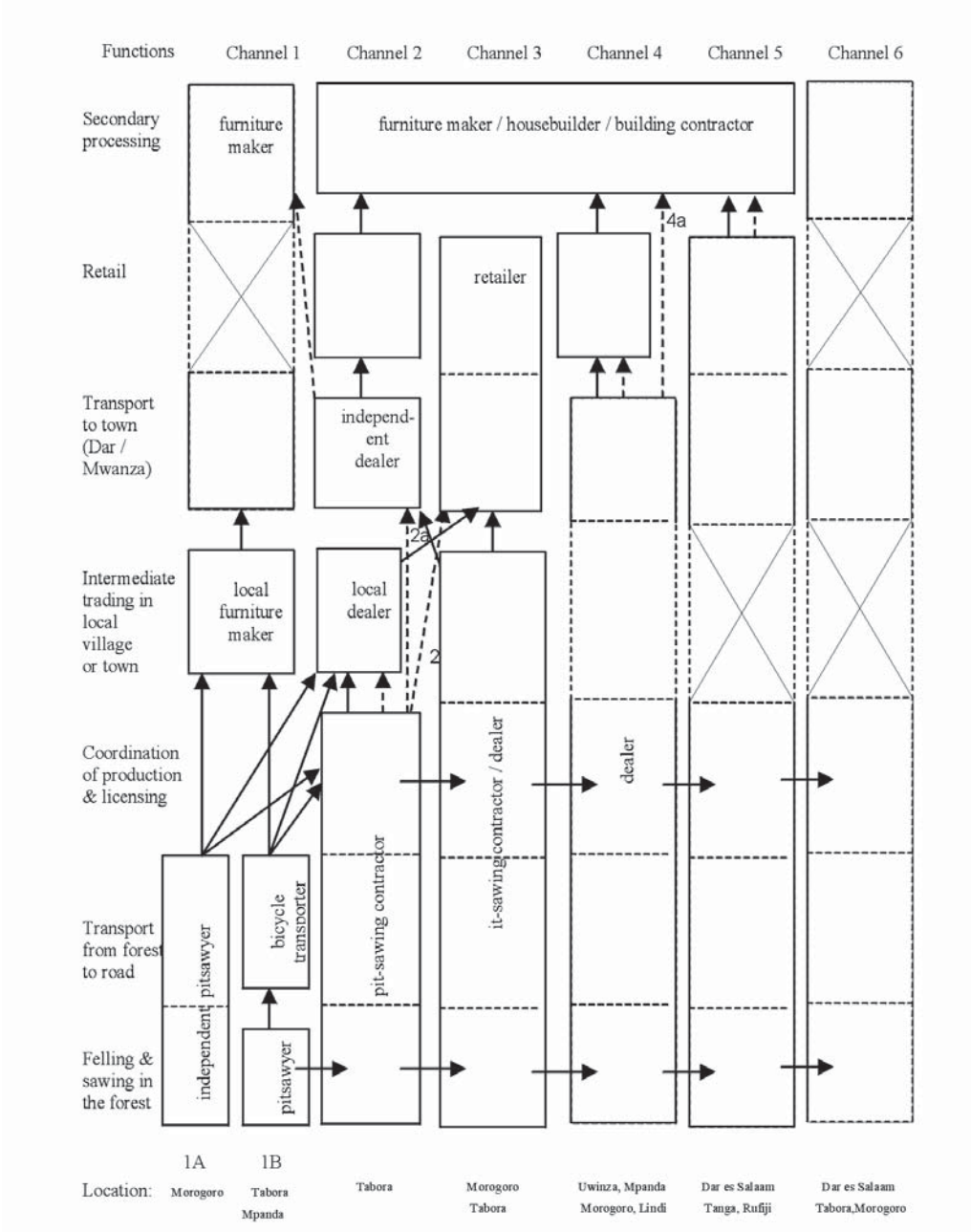

Figure 11.2: Sub-sector diagram for pit-sawn hardwood.

The hardwood system is complex. It comprises many different channels through which timber makes its way from resource areas to Dar es Salaam and Mwanza. Within the channels a variety of agents perform different functions in integrated and separate businesses.

The main functions at the resource end of the channels are pit-sawing, (which involves cutting logs length-wise by hand, using a long, two-handled saw worked vertically by two sawyers with one sawyer standing on the log which is lashed to a temporary platform and another standing beneath the log in a shallow pit dug into the earth underneath the platform); forest transporting (transporters carry the timber out of the forest often using bicycles); pit-sawing contracting (contractors link pit-sawyers, forest transporters and the customers who buy the wood); and dealing (the buying and selling of timber). Sometimes villagers provide 'safe houses' where timber is stored to avoid detection before onward shipment. Pit-sawing contractors may also be dealers, or they may supply wood to dealers. Transport from the forest to urban areas is usually organised by the pit-sawing contractors or dealers as an outsourced function. The main participants at the distribution end of the channels are timber dealers, urban retailers, furniture makers and builders. All these are usually based in urban areas.

The extent of integration of functions is the primary distinguishing feature of different channels. At one extreme each of the functions outlined above is undertaken by a single business that then trades with the next business in the channel. In these cases the value of each transaction is small, and usually in cash, but the volume of trade using this channel is large (evidence from Tabora suggest that there may be twice as many pit-sawyers working independently as there are working for pit-sawing contractors). At the other extreme is a channel that has all functions within one business, i.e. the business is completely integrated. This would usually be an urban-based furniture maker or builder who uses the timber that he himself has cut from a forest area.

A frequently-used partially integrated channel involves the hiring teams of pit-sawyers and labourers by pit-sawing contractors who provide them with saws and with food and medicines (which will be deducted from their wages) and send them to the forest to cut timber. Casual labour is often employed to carry the timber out of the forest. Most pit-sawing contractors cut timber to order, and work on contract for known buyers (usually dealers from town) who advance cash. Pit-sawing contractors may sometimes also cut timber and sell on a 'spot' basis to dealers, in which case they finance the operation themselves (although the pit-sawyers are not paid until the contractor has been paid).

When pit-sawing contractors become involved there is a jump in the scale of production. Contractors usually organise a number of pit-sawyer pairs (on average 6 pairs though there are reports of up to 200 being used) and also arrange activities so that casual labourers perform ancillary tasks (tree felling, pit digging and transporting the timber) in support of pit-sawyers. In this way contractors mobilise resources to meet big orders.

Channels do not necessarily stretch from forest to urban areas; there may be breaks at intermediate markets. A notable example of an intermediate market for sawn timber developed in Tabora in the 1990s. Dealers and contractors brought timber from resource areas to Tabora to sell to other dealers who come from both Dar es Salaam and Mwanza.

A notable feature of the wood system is the large amount of broadly distributed employment it creates. The breadth of its coverage also facilitates widespread furniture production. In this way the wood system, as currently configured, provides jobs and distributes income broadly to many rural, peri-urban and urban communities, and makes a positive contribution to poverty alleviation.

11.3.3 The social context at the resource end of the hardwood system

Some literature suggests that outsiders undertake large-scale extraction of natural resources against the wishes of forest communities. Other authors, for example Brigham *et al.* (1996), note that elite groups often control the extraction of valuable resources. Our findings support the latter although the situation varies by location.

In Kilombero and Kilosa districts of Morogoro many pit-sawyers were originally migrants from Iringa Region but have now settled and are integrated members of the community. Pit-sawing remains within the settler group and is a skill handed down through families. Original inhabitants are not excluded from pit-sawing, they are merely uninterested in learning the trade. Young men from non-sawyer groups were said by one pit-sawyer not to "*take pit-sawing seriously* ... (and hence were) ... *not prepared to learn*". However, they happily accept casual labouring jobs in support of sawyers.

These jobs and others involved in food provision and preparation provide off-farm employment and are an important source of income to the community. In their study of a village in Morogoro Region, Monela and Solberg (1998) found that around 20% of households received income directly from pit-sawing. When ancillary jobs are also included the importance of the trade becomes even clearer.

Most pit-sawing contractors in the area are former pit-sawyers but have been contractors for more than 10 years. One pit-sawing contractor, once a migrant labourer to the area, has grown to become an important businessman and is also the village chairperson.

Community leadership by those in the timber trade is also seen in the area around the Angai forest in the Liwale district of south eastern Tanzania. Several pit-sawing contractors or dealers are reasonably well-off prominent local people, for example, district councillors or people related to the village chairman (de Waal, 1998; Dondeyne, *et al.*, 1997). There is friction between ordinary villagers seeking to protect their interests in the forest and District officials but this seems independent of differences between original inhabitants and incomers.

The picture is rather different in Tabora and Mpanda where non-resident elites are much more involved in the timber business. Pit-sawing contractors and dealers in Tabora and Mpanda are mostly businessmen who came into pit-sawing in the 1990s. Dealers trading between Tabora and Mwanza are described by a trader in Mwanza as being "*people with money who diversify their business according to what is needed in the market: today they may be selling timber, tomorrow rice or fish*". Many have a good education and good connections, for example with a former Regional Forestry Officer, or with army officers who use army lorries (which are exempt from inspection at roadblocks) to transport the wood.

11.3.4 Difficulties in regulating the hardwood system

Before discussing difficulties in regulating the hardwood system, an outline of the regulatory requirements (largely as explained by respondents) is presented. Those harvesting trees have to be registered with central government as a particular type of business and pay a flat fee. Once registered, a felling license (also from central government) has to be obtained before felling can commence. The amount paid for the felling license varies according to the volume (measured over bark) and species of tree to be felled (in essence this is the royalty payment). Agreement has to be reached about the location of the felling. Once the trees have been felled a forestry official is required to hammer-mark the logs to certify felling is in terms of the license. Transporting logs requires a transit pass that is free on presentation of a valid felling license.

In fact, almost all hardwood is harvested illegally. A number of problems arise in administering the regulations. First, many pit-sawyers (particularly those working independently) are cash-constrained and cannot afford the prescribed registration fee. Thus, they do not register, obtain licenses, or pay royalties. Some pit-sawing contractors are registered and sometimes take a license, but always exceed their allocated volumes. Second, the regulatory requirements are cumbersome and time consuming. Forest officers cannot administer them because of poor resources and the travel distances involved. When regulation is tightened in one channel agents react rapidly to reduce its impact by, for example, producing false documentation, "*playing around*" (as one dealer put it) to find the weakest link in enforcement, paying bribes, or switching channels so bigger volumes move down other channels. In general, those apprehended for illegal activities either do not know how to work the system or cannot afford the required bribe (also see Monela and Solberg, 1998). Unlicensed (and hence illegal) activity is widespread, as recognised by all those involved in the system including forestry officials. Projects aimed at increasing revenue collection have had little success, collecting less than 10% of the estimated potential revenues (Danagro, 1997).

In addition to cheating and corruption, attitudes about forest regulation amongst the general public, dealers, public officials and politicians are ambivalent. In Mwanza, forest officers taking strong action to enforce regulations report that their action has been unpopular with the politicians in the town who say they are "*bringing chaos to their voters*". Forest officers in Morogoro report difficulties in obtaining evidence of illegal trading that will hold up in court because of lack of co-operation from the police and district council. A Dar es Salaam dealer/pit-sawing contractor who understands the environmental protection purpose of royalties seeks cheap timber knowing „*nothing at all is paid to get [harvest] the standing trees*" while at the same time complaining about over-exploitation and the ever-increasing distances he has to travel to obtain suitable trees for sawing.

11.4 DISCUSSION

The findings reported above are now analysed to consider whether current extraction of timber is sustainable and whether extraction can be sustainable in the future. We have followed the Brundtland definition of sustainability, i.e. that extraction to meet needs now should be at a level that does not compromise the next generation's ability to meet their needs (WCED, 1987). Towards the end of this section we discuss and reflect on the methodology used to conduct the research.

Consideration of sustainability is presented in two parts. The first starts from demand, noting that supply is demand-driven and that different agents in the supply system have differing abilities to affect its sustainability. Different agents also have differing abilities to conceptualise the wood system and convey its workings to researchers. We also discuss whether communities living close to forests in Tanzania can be expected to know how to manage forests sustainability. The second part of the discussion approaches sustainability from a regulation perspective; we explain an incompatibility between current forestry regulation and the nature of the wood system and suggest how compatibility might be achieved.

11.4.1 The effects of high demand for timber, communities and sustainability

The construction wood markets research shows clearly that the demand for prized hardwoods in urban centres is at a level sufficient to induce suppliers to source the bulk of their timber from more and more inaccessible (and generally more distant) locations as time goes on. The supply system stretches across the nation. Hardwoods sold in Dar es Salaam now come from the western borders of the country, from the south and the north-east. Supplies also come from remote places 50 km or more from the nearest point of access by vehicle. Interviews with suppliers and our analysis of the hardwood system suggest that suppliers behave rationally in the short term and seek out the lowest cost sources and channels to urban markets. Sources shift when the immediate costs of obtaining timber at a location near an urban area are higher than those of exploiting elsewhere. A major cause of increasing costs is increased travel time between trees suitable for felling, as they become scarcer. In summary, direct and indirect evidence shows urban demand for hardwood to be strong and its effect ubiquitous. There can be few forest communities in Tanzania who are unaware of the ready market for hardwood and the accompanying cash and job rewards available from trading in timber.

As the supplies come from dispersed natural forests, and communities live within and near forests, communities' livelihoods are affected by the extraction of timber. Amongst those that participate in the trade there are considerable differences in the benefits they receive and in their abilities to control and change the way the wood system works. The latter usually relates to their different roles and positions in the wood system, and their different knowledge domains. Forestry officials, some sawmillers and some of the pit-sawing contractors and timber dealers have post-school education, training in western business techniques and experience of working in formal sector occupations. These groups usually have access to a radio, the print media and in some cases television, and have devoted time to cultivating networks of friends and acquaintances in urban areas as sources of business information.

In comparison to many villagers, they live in an information-rich (defined using 'western' criteria) society. These groups usually have a conceptual understanding of the whole wood system and have extensive and detailed understanding of those activities within the system that affect their business. The knowledge that these respondents have enables them to capture a substantial portion of the benefits of the wood trade. Their characteristics also mean that once they appreciate the purpose of enquiries, it is usually relatively straightforward to elicit their knowledge because their understanding of the wood system involves use of western concepts.

Other groups, for example, pit-sawyers and bicycle transporters, do not usually live in 'information-rich' surroundings. News from outside their immediate community is limited and is usually hearsay. Visits to urban areas are infrequent because travel is expensive, not least because it represents a loss of time during which income might otherwise be earned. The separation of 'business life' and 'private life', common in western society, is alien and it is rare to find businesses that provide all year round, full-time activity. Life is about hand-to-mouth survival and diversifying income and entitlement sources (either at the individual or family level). Obviously, these groups know their daily lives and work better than anyone else but it is difficult for researchers with very different cognitive frameworks to find suitable ways of eliciting their understanding of their lives (see also discussion by Bulmer and Warwick, 1993). For example, concepts of turnover, profit, return on capital, and other important 'western' business research inputs seem inappropriate in discussions with a bicycle transporter, and the researcher resorts to inferring such measures during data analysis. Although people in this group readily discuss the state of their business the judgement criteria they use are not clear, and their diagnosis of business success or failure largely excludes exogenous causes.

The point that should be drawn from this is that people can only be strategic in the way they organise their business using the knowledge they have (i.e., they are boundedly rational). Where local people's knowledge is restricted to everyday tasks (which is the case with most of the pit-sawyers we interviewed) they can only influence trading patterns in a limited way. Other groups, e.g. dealers and pit-sawing contractors, with their broader conceptual understanding of their business, the trading system, regulation, etc. are the prime drivers in establishing trade patterns. Hence, if policy is to try and achieve sustainable exploitation of natural forests then it is the latter group that has to be influenced and/or regulated.

Another issue relevant to communities living alongside forests is their inability to affect forest management despite their direct and indirect interests (for example as a source of food or medicine) in the forest. The reason for this inability is that the state (via the Forest and Bee-keeping Division and Local Government) retains control of most forest uses for itself and is therefore responsible for devising a system of regulation for sustainable timber extraction. Residual rights that communities might rely upon to affect the extraction of timber, or rights that they claim for themselves, are unreliable as a basis for legal action owing to widespread legal difficulties over land-rights.

Even if the communities were able to secure some rights it is uncertain whether they would be able to increase the sustainability of forest exploitation. The theoretical construct of Ostrom (1990), which seeks to identify characteristics associated with

regimes of sustainable exploitation of natural resources, notes that such regimes are most likely where communities are stable, relatively homogenous and are committed to maintaining their existing way of life, amongst other things.

Our findings in the Morogoro, Tabora and Rukwa regions provide evidence of temporary and permanent inward and outward movements of people as well as heterogeneity within communities and the rural poor generally aspire to changes in their way of life. Thus, by rough application of Ostrom's criteria, communities are unlikely to have the capabilities or be pre-disposed to manage natural resources in a sustainable way. However, more research needs to be done in this area.

Besides deduction from theoretical constructs, direct evidence from our research suggests that extraction for timber might not be sustainable. While 'micro' evidence about the specifics of sustainability at a particular place may suggest that extraction is sustainable, such studies in Tanzania remain rare and recognition must be given to the problem of drawing broader or 'macro' conclusions from 'micro' studies. The 'macro' evidence from construction wood markets research relates to the rational (in the short-term) behaviour of timber suppliers producing a relentless shift in the primary source of hardwood timber from one area to another. Given that this shift occurs only when the resource is exhausted, and that *mninga* grows relatively slowly, the next generation of timber producers will not be able to exploit the resource in the manner of the current generation. Hence the shift from areas of exhaustion to the next area of exploitation should be understood, in the absence of more substantial evidence, as *prima facie* evidence of unsustainable extraction of timber. These findings accord with those of Munyanziza and Wiersum (1999) who suggest that commercial species in degraded miombo woodlands in Morogoro district are not managed sustainably.

11.4.2 State regulation and community involvement

With a few notable exceptions, this research found natural forest management and regulation by the state through the Forest and Beekeeping Division and Local Government to be ineffective. One important reason for this is lack of funding and investment in forest protection and personnel. Existing forestry regulation largely follows the old style of forest 'policing' by professional foresters. The current system of regulation of timber extraction is best suited to an industrialised timber production system in which relatively few large capacity stationary sawmills are the backbone of production, and trees are brought to the mill for processing. Regulation of this type of production system is relatively straightforward - the production units are easily traceable and production volumes are relatively easy to monitor.

The hardwood production system currently operating in Tanzania is very different. The bulk of production is dispersed. Some pit-sawyers are organised into mobile work-groups by pit-sawing contractors or timber dealers, but a large number of independent production units also exist. Prime production areas are dispersed and processors go to the trees rather than the trees being brought to the processing plant. Monitoring such diverse production is difficult in a regulatory system based on policing by professional foresters. Regulation might be attempted where timber flows experience bottlenecks through preferred transport routes, but this has been shown to cause proliferation of alternative routes. The wood system operating today is 'slippery' and difficult to grasp

for regulation purposes: potentially good 'intervention points' for regulation of the dispersed, multi-channel and complex system often slip away as regulation is applied.

The Tanzanian government has many demands on its limited financial resources and the forest sector should not expect an increase in funding to improve regulation. Given the shortage of funds it is unrealistic to expect an increase in the number of forest officers available for enforcing regulation by old-style policing. Indeed, this would not be recommended. Given the dispersed nature of the resource and the ambivalence of local people towards forest regulation, the policing objective of regulating tree-felling is bound not to be met.

An alternative system of regulation must be developed. It has to acknowledge the dispersed nature of the resource, the views of local people and the shortage of funds. These three requirements point to a solution involving some form of sharing the cost of regulation and management with communities resident in forest areas. Presumably communities would only be willing to share regulation costs if they receive benefits in return. In order to get the incentives right for communities, benefits must relate to the volume of regulated trade. Ideally (in incentive terms) communities would need to capture all the benefits of trade. In practical terms the latter would be achieved by the community being owner of the resource.

The new Tanzanian Forest Policy and Forest Act make wide provision for villages and Districts to own forests and to manage and regulate their use. Thus, it would seem that policy and legislation are moving in a direction that could produce viable regulation of tree-felling. However, it remains unclear whether the sustainability of hardwood production in Tanzania will be assured. For example (and this is bound to happen in some locations), unfettered ownership of forests by poverty stricken communities could result in rational decisions to set forest exploitation rules (which the community would regulate to ensure they receive maximum benefits) that result in the forest being exploited to extinction. Although such an outcome would be anathema to many, at least it has the merit of being an outcome of a considered decision. Other forest extinction events might happen as a result of neglect or carelessness. Alternatively, communities might use their unfettered ownership to maximise use of the resource over the long term and develop sustainable harvesting regimes. Risks must be taken. If the government takes fright, deciding that unfettered ownership might be unsatisfactory because of the possibility of non-sustainable extraction, and chooses to hold residual rights to prevent extinction then it dulls the community's incentives to regulate. This could result in a situation indistinguishable from the current position, which has already been shown to be unsatisfactory. There seems to be very little middle-ground in this matter; communities have to be entrusted with stewardship.

Communities, as noted earlier, are not homogenous and unlikely have the capacity to produce regulations themselves. The issue of ensuring that elite groups and those with timber interests manage the forest resource taking into account the broader community's interests is important and difficult to resolve. The membership, remit and authority given to community level natural resource committees would seem to be central in managing the problem. Also important would be the level of assistance given to the committees by professional foresters and others able to help in formulating, monitoring and enforcing regulation.

In this devolved and democratised system of forest regulation an important role for central authorities would be to develop and disseminate information so that all community members could inform themselves of rights and responsibilities. Central authorities also need to set in place accessible judicial procedures that would enable ordinary citizens to challenge wrong-doing by elites.

11.4.3 Lessons about the research process

The above discussion highlights the importance of forest communities in forest management and regulation. Research and development projects are already working on these matters and it seems appropriate for a greater proportion of available funding to be used in addressing these issues. In consequence, research methods that collect data from local communities and work with communities to develop new knowledge to improve forest management are likely to be of increased importance.

As outlined earlier, the grounded approach to research develops theory or understanding iteratively from fieldwork. Ideally those developing the understanding should do the fieldwork but resource constraints often make this impractical. Senior researchers with experience are perhaps better qualified to interpret and theorise but other duties often preclude them from lengthy visits to the field. This study dealt with the dilemma in a pragmatic way by seeking to establish good communication with those working in the field (this was partially successful) and by insisting that senior personnel visit the field frequently and for extended periods to actively participate in fieldwork. This approach is practical but finds itself at odds with the finance rules of many funding agencies. Agencies need to recognise that the time of experienced senior research personnel holding full-time posts at universities and other research organisations must be funded so that they can be released from other duties.

Another important issue arising from our experience with unstructured interviews, is that fieldworkers are required to have excellent inter-personal skills, high levels of curiosity about peoples' lives, great patience and high endurance. A half-hearted effort by an interviewer might produce a perfectly acceptable questionnaire response but it would not produce a satisfactory unstructured interview response. Finding the right fieldworkers should be seen as a task in itself and research should be delayed if suitable personnel cannot be found.

Reflecting on the type of information we found using the unstructured interview approach strengthens our suspicions of the quality of data generated by the questionnaires and survey approach to learning about the lives of people like pit-sawyers. Properly formulated questionnaires require hypotheses and hypotheses require conceptual frameworks. If the conceptual frameworks used to generate questionnaires are not understood and used by respondents it is likely that the questionnaires will provide false results. An obvious way for researchers to start understanding the lives of respondents is to use a grounded methodology to identify appropriate conceptual frameworks. This in itself is a difficult and time-consuming task and would consume the budget of most research projects.

The qualitative nature of research investigating peoples' lives and the lower reliance on 'hard' quantitative data poses problems for the verification of such research in the

eyes of some groups, for example, editors and reviewers of science-related 'scholarly' journals and some policy makers, who are not familiar with non-quantitative research methods, and expect proof of findings to be associated with high levels of statistical confidence. Advocates of qualitative methods need to raise the profile of their methods and findings in research, policy and public spheres, to make the point that research methods need to be appropriate for their context.

11.5 CONCLUSION

Although not proven beyond reasonable doubt, researchers should presume for the time being that the current extraction of hardwood from the natural forests in Tanzania is unsustainable across the country as a whole. The current system of regulation is ineffective in controlling extraction because it is unsuitable for monitoring and enforcing extraction rules given the widely dispersed resource, because people are ambivalent about extraction and regulation and because the regulatory system is under-funded. If sustainable hardwood production is the objective, and given the nature of the resource and the system that has developed to extract timber, affordable regulation has to involve forest communities. To provide appropriate incentives to communities they would need to have rights to forest produce and have to be involved in the design, monitoring, and enforcement of regulation. This approach provides an appropriate basis for developing regulation because it involves a relatively dispersed population of people in regulating the dispersed timber resource, it provides an incentive (the benefits of controlling rights to forest produce) to counter ambivalence and it reduces cost through reduced travel costs and by residents monitoring the extraction activities of others while engaged in other tasks.

The approach also has to overcome difficulties of heterogeneous communities (individual community members might have private interests in conflict with community interests) and by communities not having the capacity to develop regulation from their own resources. The association of control of the timber trade with community leadership produces an amalgamation of private interest and political power which might not readily concede control of extraction to achieve sustainable extraction. Democratic community government might, in some circumstances, enable the presumed social interest of sustainable extraction to peaceably constrain private interests, but in some other communities the social interest will align with the private interest (and extraction would probably be unsustainable), while in others violent conflict between interests could result. Managing the development of local solutions acceptable to a democratic central government and assisting communities to develop appropriate regulation requires resources probably best provided through the Forest and Bee-keeping Division. These latter issues need further research and analysis to produce a basis for advice. In the meanwhile, forest researchers should support and contribute to the development, strengthening and democratisation of community government, including forest management arrangements.

This research has identified the widespread sourcing of hardwood, the complex timber trading system, the probable unsustainability of extraction at the national level and the failure of current regulation. It contributes information on which to develop policy and

produces a rationale for keeping the current employment-rich timber production system while suggesting change towards a regulatory system that promotes sustainability by involving communities. From a methodological point of view the research has demonstrated the grounded methodology to be useful and appropriate where little is known about the system under study and where information must be obtained from local people.

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REFERENCES

Blaikie, N. (1993). *Approaches to Social Enquiry*. Polity Press, London.

Boomgard, J., Davies, S., Haggblade, S. and Mead, D. (1986). *Sub-sector Analysis: Its Nature, Conduct and Potential Contribution to Small Enterprise Development.* Working Paper 26, Michigan State University.

Brigham, T., Chihango, A. and Chidumayo, E. (1996). Trade in woodland products from the miombo region. In: Campbell, B. (ed.). *The Miombo in Transition: woodlands and welfare in Africa*. CIFOR, Bagor (Indonesia).

Bulmer, M. and Warwick, D.P. (eds.) (1993). *Social Research in Developing Countries: surveys and censuses in the Third World.* Wiley/UCL Press, London.

Danagro (1997). *Production and marketing of forest produce in Tabora Region.* Forest Resources Management Project, Forest and Beekeeping Division, Ministry of Natural Resources and Tourism, United Republic of Tanzania.

de Waal, D. (1998). *Draft paper from Rural Integrated Project Support programme, Mtwara* (copy available from author).

Dondeyne, S., Wijffels, A., Kinyero, O., de Waal, D. and Deckers, J. (1998). No short cuts to sound forest management: experiences from a participatory survey in Angai forest, Tanzania. *The Land* (International Land Use Society/FAO): 2(3): 181-91.

Flick, U. (1998). *An Introduction to Qualitative Research*. Sage Publications, London.

McCracken, J.A., Pretty, J.N. and Conway, G.R. (1988). *An Introduction to Rapid Appraisal for Agricultural Development.* IIED Sustainable Agriculture Programme, London.

Monela, G.C. and Solberg, B. (1998). *Cost-Benefit and Impact Assessment of Pit-sawing: Empirical Study from the Nguru Mountains, Tanzania.* Record no 67, Faculty of Forestry, Sokoine University of Agriculture, Morogoro, Tanzania.

Munyanziza, E. and Wiersum, K. F. (1999). Indigenous knowledge of miombo trees in Morogoro Tanzania. *Indigenous Knowledge and Development Monitor* 7(2): 10-13.

Ostrom, E. (1990). *Governing the commons - The Evolution of Institutions for Collective Action.* Cambridge University Press, Cambridge.

Ribot, J.C. (1998). Theorizing Access: Forest Profits along Senegal's Charcoal Commodity Chain, *Dev. & Change* 29, 307-341.

Warwick, D.P. (1983). The KAP survey: dictates of mission versus demands of science. In: Bulmer, M and Warwick, D.P. (eds.) (1993). *Social Research in Developing Countries: surveys and censuses in the Third World*. Wiley/UCL Press, London.

WCED (1987). *Our Common Future*. Oxford University Press.

12 LOCAL WAYS OF LIFE AND TIMBER MANAGEMENT

Søren Gram

12.1 INTRODUCTION

Among Amerindian forest dwellers traditional occupations are mostly based on a combination of slash-and-burn farming, fishing, hunting, and extraction of a variety of natural forest products. Trees are used for a variety of purposes, such as construction of huts and canoes, but commercial exploitation of timber resources does not have a traditional role.

The on-going destruction of tropical forests and the growing demand for economic development among local forest dwellers has resulted in a variety of international initiatives to deal with these challenges. National and international development agencies and environmental organisations have strongly promoted initiatives to protect tropical forests. Additionally, indigenous forest dwellers have claimed control of their forest resources and expressed their need for economic development.

One of the initiatives trying to combine these goals depends on the fact that local timber resources often represent a considerable economic value. Therefore it has been suggested that timber management systems should be developed among local communities. During the last decade both development and environment agencies have tried to develop strategies for managing natural forest in a way that allows local forest dwellers to take active roles in utilisation of timber resources. Timber management systems have been developed in accordance with ecological sustainability principles. The idea has been to combine the aims of tropical rainforest conservation with the aims of economic development of local communities.

However, such projects are often proposed without proper critical assessment. In reality, only a few of these projects have succeeded in achieving their objectives. The long list of projects engaged in commercial exploitation of forest resources in Latin American rainforests have not only failed to improve the welfare of indigenous peoples but have also failed to protect the natural forests against destruction (e.g. Smith, 1994; 1996). Similar conclusions have been drawn from comparable studies in other continents (e.g. World Bank, 1997).

In analysing such projects, we need to ask:

- what goes wrong?
- what are the barriers to success? and
- what possibilities exist to improve the outcome of projects involved in conservation and local development?

This chapter discusses commercial management of timber resources, and focuses on the difficulties for projects adjusting to local socio-cultural conditions, based on case studies among indigenous forest dwellers in Latin American rainforests. All the projects receive considerable donor support and have the common objective of increasing local income through a sustainable timber management system that will protect the forest

environment against destruction. To study the interactions between forestry and different livelihood strategies in natural rainforests, projects among non-indigenous forest dwellers have also been studied. Some of the projects have been followed for a number of years, thereby enabling an investigation of the long-term implications and development. While the focus of the study is on timber, the applicability to non-timber activities is also briefly discussed.

In thinking about the relevance of local knowledge for forestry, it is important to indicate what we include in the definition of knowledge. In this chapter, I include not only knowledge about forest technical issues, but also the socio-cultural context in which the local experience is formed, used, and developed. Among indigenous peoples the development and maintenance of knowledge about the forest environment is closely linked to the socio-cultural framework of their traditional occupations and activities in the forest.

12.2 CASE STUDY SITES AND METHODS

A case study approach was adopted to find out how socio-cultural characteristics affect commercial forestry, analysing relationships between community structure, local values and occupation. The methods were based on interviews and on long-term observation and participation in the forest projects. Interviews were held with local dwellers in the communities, with workers and members of project committees, with donor organisations, and with other institutions and people involved. It turned out that features such as family structure, economic networks, and local knowledge of the forest environment had an impact on the way the local dwellers approached commercial forestry projects.

Four projects were selected as case studies. One project is situated in the Palcazu Valley in the Peruvian Amazon: the Yanesha Forestry Cooperative; one in Beni, Bolivia: the Chimanes Forest Project; and two are situated in Quintana Roo of the Yucatan Peninsula, Mexico: the Organisation of Forest Production Ejidos of the Mayan Zone and the Association of Forest Producers and Ejidales of the South of Quintana Roo; this last is the only case study including non-indigenous forest dwellers.

12.2.1 Bolivia

The Chiman people in Beni, Bolivia, live separately in families near their slash-and-burn gardens in the lowland forests. Villages and communities are still a relatively new phenomenon among indigenous lowland people in Bolivia. The rainforest people of Beni were largely ignored until 1990, when they organised a march across the Andes Mountains to La Paz to protest against encroachment from timber companies. The protest led to a division of land recognising, among others, the Chiman people's right to forest land. Shortly afterwards, the Chimanes Forest Project was initiated by the Bolivian Government with support from the International Tropical Timber Organization, ITTO. The project was intended to support selective timber harvesting for the benefit of the Chiman people. The timber management is carried out by private companies according to principles agreed upon by the Steering Committee that was set up as the overall co-ordinator of the project. The committee consists of representatives of all

stakeholders, from government to indigenous community levels. However, the predominant loose settlement structure traditional among the Chiman makes mutual communication rather difficult with their representatives in the official Steering Committee. The Chiman are not organised to deal with so centralised an organisation, and this has resulted in a lack of real participation in, and influence on, project development. The indigenous representatives were not in reality able to represent the people who live in families widely scattered through the forest and consider themselves part of traditional relationship groups.

12.2.2 Peru

During the 1980s a large number of indigenous rainforest people in the Peruvian lowland formed communities to obtain land rights under the new law for Native Communities. After obtaining land rights a variety of efforts were made to increase local income from the forest resources that they now control. In the mid-1980s the Yanesha people started to participate in a natural resource management project initiated by the Peruvian Government and supported by USAID and the Peruvian Foundation for Nature and Conservation (FPCN), among others. The Yanesha Forestry Cooperative includes four Yanesha communities who all take part in the Committee running the project.

The Yanesha Forestry Cooperative is especially interesting because a strip clear-cut management system was developed to imitate both natural regeneration and traditional indigenous cutting systems. As an alternative to selective cutting methods, all trees are extracted in long narrow strips bordered by fully-grown forest, thereby securing natural regeneration in the strips. Technical data from the strips demonstrate good regeneration (Pariona, 1991), and from an ecological viewpoint, the management system seems promising. Furthermore, it is well adapted to local forest environmental knowledge. The indigenous forest dwellers know the trees, they know how to clear small areas, and they are familiar with this type of forest work. In traditional indigenous slash-and-burn farming, all trees are cut, and after a few years of farming the fields are left to regenerate naturally.

However, as this study found, the project failed for other reasons not foreseen by the development agencies. The significance of the close links between the Amerindians and their traditional family structure is discussed below.

12.2.3 Mexico

Government policy changes relating to land tenure were made in Mexico in the 1930s, much earlier than the comparable changes in Peru and Bolivia. The 'ejidos' are the official entity for jointly owning the land and in this case the ejidos constitute the organisational framework for the community members participating in a forest project. Not all members of the community are members of the ejido.

In Quintana Roo the study included forest projects among the indigenous Maya people who form the Organisation of Forest Production Ejidos of the Mayan Zone, and forest projects among non-indigenous people organised in the Association of Forest Producers and Ejidales of the South of Quintana Roo. These two organisations support the ejidos in establishing management plans and in developing silvicultural and marketing strategies.

The organisations also advise in training programmes and communal control of logging and play an active role in coordination between the individual ejidos.

To a much greater extent than generally seen in local forestry projects, the Forest Production Ejidos of the Mayan Zone is an indigenous initiative. This touches on the central issue of participation. During the whole process, the Maya people have been very aware of the need to keep control of project development. They feel that the forestry project is their own and, to a large extent, it has been their own responsibility. They have developed the necessary administration and technical knowledge, and now support other local initiatives in forest management.

Like the other cases the Mayan projects have received substantial outside funding. Even though the Mexican projects have had a much better start-up and a more successful participatory process than the Peruvian and Bolivian cases, they still have some way to go before they reach economic viability partly because the forest areas in Quintana Roo were already degraded due to previous logging.

A key difference between the Mexican cases (both Mayas and non-indigenous ejidos) and those in Peru and Bolivia, is that Mexican ejidos inherited a forest management system from an earlier forest concession period. The forest ejidos gained valuable experience in logging operations during the concession period. Further, the Maya learnt from the non-indigenous ejidos who began to organise selective felling systems years before the Mayas. The Maya ejidos have adapted this inherited forest management system over a long period and have absorbed it into their own knowledge of forest ecology and management. By contrast, in both the Yanesha Forestry Cooperative in Peru and in the Chimanes Forest Project in Bolivia, the initiative, the management systems and the project organisation were brought in from outside.

Among the Mayas, activities such as enrichment planting after logging are sometimes carried out by ejido families as part of a common effort and the surplus from forestry is distributed among the ejido members. This differs from the cases in Peru and Bolivia where the projects always employ workers to carry out such activities, thereby creating a feeling of the project as an employer rather than a common responsibility.

12.3 RESULTS

12.3.1 Community structure

Traditionally, the basic unit of production among rainforest people is the group that shares the hearth. These production units are linked together in larger, networks that act together as economic units responsible for the participating families (Smith, 1994). Economic responsibility, settlement patterns, and local power structures are based on these family networks and larger economic units and do not necessarily follow the introduced community structure.

During the 1980s and 1990s a community structure was formally adopted among many indigenous people in the lowland forest areas in Latin America for the specific purpose of meeting official requirements that would enable local dwellers to obtain land rights.

New communities comprising many families were given collective land rights to huge areas of forest land. This did not always happen without a struggle; for example, in Peru 6 000 Ashaninka people from 130 villages were given ownership of 2 million hectares of forest land in 1996, after a ten-year fight with authorities and timber companies.

But this new community structure does not reflect either traditional forms of social organisation or traditional settlement patterns among indigenous rainforest people. Throughout Latin America, the traditional family structure among such people is still a key factor beneath the imposed official community structure. In the case studies discussed here, the indigenous inhabitants were generally found to be unfamiliar with the idea of communities.

Nevertheless, most forestry projects have been organised on the basis of the established community structure. This is due to at least two circumstances: firstly, that the forest land is formally owned by the communities, and secondly, that most development agencies are more familiar with the official community structure. The official communities are visible to foreign agencies, whereas traditional socio-cultural structures are much more difficult for them to recognise and deal with.

With the benefit of hindsight, it seems obvious that forestry projects based on structures that are unfamiliar to the participants must create difficulties. In the case studies discussed here, there were several examples of obstacles raised by the official community structure. Leaders of the community-based projects found it hard to fulfil their responsibilities in relation to the communities that they were supposed to represent. The Project Committee in the Yanesha Forestry Cooperative was elected according to (Western) democratic procedures within the individual communities. But decisions made in the Committee with regard to equipment, economy and staff often favoured the interests of specific families or individuals at the expense of the project. And if the Project Committee took decisions to get the project back on track, these were not carried out because other local power structures were stronger than the Project Committee (Gram *et al.*, 1994).

The traditional indigenous economy in the region is essentially based on the deferred exchange of gifts within specific economic networks. This gift economy keeps the flow of goods moving back and forth between giver and receiver. The moral order obliges the receiver to repay any gift and thus a project manager is often put under pressure to redistribute the project's resources to his kinsfolk (Smith, 1994). In the Yanesha Forestry Cooperative project managers were also bound by certain traditional obligations to favour specific families and members of the cooperative. Since the project managers were not in a position to grow crops, they had only project equipment to give.

A forestry project that is based on a community structure and does not reflect social structures of power and competition between individual families in indigenous societies will clash with traditional units of production and exchange. The Yaneshas never really adopted the Forestry Cooperative as their own. Rather, it became a distant community institution for which they worked to make money but for which they did not feel any responsibility.

Despite their long-term economic interest in the project, the Project Committee hired people without necessary qualifications, equipment was not maintained, and project tools were given away.

How can these problems be solved? For smaller projects dealing with, for example, social forestry or agroforestry, it has been proposed that projects are organised within traditional families instead of communities (Cernea, 1991). But this is not an option in natural forest management projects concerning huge areas of natural rainforest, far beyond the bounds of ownership of traditional family units. Furthermore, the established communities in many areas of Latin America make the proposal of family-based projects difficult in natural forestry because the communities have become the owners of forest land. Forestry projects operating on community land have to return profit to the community. If a forestry project fails to give a reasonable profit to the community, those people not employed by the project, and thus not benefiting directly, will eventually put pressure on the project to change the land use. This was already the case in the Yanesha Forestry Cooperative, which was under constant pressure from individuals to allow cattle grazing in the strips left for regeneration. This view of the Yanesha Forestry Cooperative as an employer was reinforced by its structure and organisation and the fact that all its activities were carried out by paid employees.

Among international donor agencies, the word 'participation' has for years now figured as a trend in their official policies. Nevertheless, there was mistrust between the indigenous people and the donor agencies in the case studies described here, and the projects suffered from great difficulties in the participatory process because the influence of donor agencies over project initiative, organisational structure and decision-making resulted in inappropriate use of local experience. Traditional indigenous knowledge has for centuries been considered primitive by national governments. As a consequence the indigenous people do not consider their experience to be appropriate, and much traditional knowledge of forest management is being lost.

In the case studies, the Amerindians proved to be well qualified in forest management. The case studies show that they are familiar with the forest, the tree species, and plant use. Also strip clear-cutting has shown, in a unique way, that it is possible to combine Western ecological science with sophisticated traditional indigenous knowledge about the forest. Nevertheless, the experience and knowledge tend not to be used systematically in the design and organisation of forest management and these resources appear to be treated as incidental benefits to the projects. But in the Yanesha Forestry Cooperative and in the Chimanes Forest Project the initiatives and project ideas came from outside and, therefore, the local capacity and knowledge was never properly used in the projects.

An illustration of this tendency is given by the training programmes implemented by the donor agencies in both the Yanesha Forestry Cooperative and in the Chimanes Forest Project. The training programmes focused on forest management, especially regeneration and cutting techniques. But from their slash-and-burn farming the local dwellers already had a profound knowledge of this subject. What the projects urgently needed was training in administration and marketing since the participant Amerindians had only sparse knowledge about timber commerce and external markets. And as regards administration, the local indigenous dwellers had great difficulty in handling big projects at the formal community level.

Nevertheless, the majority of training programmes focused on specific forest technical issues, and training in administrative, economic, and marketing issues was neglected.

In the Yanesha Forestry Cooperative, which integrates production, processing and sales on a community level, it was evident that the indigenous people could not manage so large and complicated a project. The strip clear-cut management logging system resulted in a variety of tree species. Many of these species are not durable and a sophisticated press-cap preservation system was established. But the loose structure of indigenous rainforest societies proved to be incompatible with such comprehensive commercial forest projects that include sawmills, carpentry workshops, preservation and marketing units.

A solution can be seen in the way that some of the projects attached to the Forest Production Ejidos of the Mayan Zone are organised. For example, individual families or small groups of Maya people in the ejido can obtain the rights to log a certain area, in accordance with the local land-use and management plan developed in the ejido. These groups or families have to pay for the trees they fell, resulting in a surplus for the ejido but the initiative, the organisation of the logging and the economic responsibility for the activity lies with the promoters, not with the ejido forestry project. The Maya people are free to organise such initiatives in accordance with existing traditional structures. Furthermore, initiatives to downstream production often lie with Maya families and individuals who form small production units in accordance with traditional networks. For example, groups of Maya people have formed small companies, such as carpenter workshops, on a private basis. This situation has resulted in a thorough participatory process in these activities allowing local knowledge and experience to be used.

If downstream production is made a direct part of the forestry project, there exists the risk of centralising the project and causing people to migrate from their original habitats. This will undermine the traditional indigenous family-based settlement structure. For example, in the Yanesha Forestry Cooperative, people moved to the new 'social centre' around the project's processing centre to get work, and so left their fields in the more fertile zone in the river valley. Families were split, people could not maintain their slash-and-burn farming, and nutrition levels decreased strikingly (Gram, 1998). The relationships with other Yanesha villages also declined, and conflicts appeared because other Yaneshas disliked the new village development with its alcohol problems, indigenous women's relations with foreign men, and disregard of Yanesha traditions. Local knowledge and experience were lost in this process of making downstream production a direct part of the communal forestry projects.

12.3.2 Local values and occupation

An important issue with regard to socio-cultural characteristics interacting with forest management projects, is that of traditional occupations. Among Amerindian forest dwellers most occupations are based on a combination of slash-and-burn farming, fishing, hunting, and extraction of a variety of natural forest products. The ability of traditional slash-and-burn farming to restore soil fertility, preserve biodiversity, and protect watersheds has already been widely documented (e.g. Colchester and Lohmann, 1993).

But the field studies reported here highlight the fact that subsistence activities also form an integral part of the cultural relationship between the rainforest people and their environment. There are very strong ties between the indigenous forest dwellers and their traditional occupations. Local knowledge of tree species, plant use, and forest dynamics appears to be closely related to traditional occupation. These findings lead to the conclusion, in regard to forestry projects, that traditional subsistence activities must not only be respected for ecological reasons, but also because they comprise a stabilising cultural framework for indigenous societies. For example, work by Kronik (forthcoming) illustrates this interaction between traditional production, reproduction, cultural performance and distribution of knowledge about plant biodiversity among Amerindians in the Araracuara region in Columbia, who meet every year to participate in the 'dance of the fruits' through which they collect, pass on, and examine each other's plant knowledge.

Governments have regarded subsistence forest activities as standing in the way of development of a market economy. This has resulted in situations where local knowledge of forest management is not used properly in local forestry projects and sometimes this knowledge is 'lost' under massive project infrastructure. Furthermore, local forest management projects can threaten indigenous subsistence activities. For example, the busy periods of forestry and slash-and-burn farming coincide during the dry season, and conflict between the two can result in various social problems, including:

- local people often abandon forestry work in favour of farm work, fishing, or hunting activities;
- other people employ helpers to replace them in their slash-and-burn farming while they themselves work in the forestry project. This leads to an accelerated and hitherto unknown social differentiation among the rainforest people;
- in some families, the traditional gender relations are affected, because women take over men's farm work while the men work for the forestry project. Among Amerindians men and women have power in separate, but complementary domains of social life (Smith, 1994); projects can break these alliances, thereby affecting social stability.

In Quintana Roo, slash-and-burn farming was compared between indigenous Maya families and non-indigenous families who have been living in the area for more than 20 years. Maize is the main crop grown by both the Mayas and the non-indigenous dwellers. But besides maize, the Mayas also grow a variety of other crops in their gardens. They mix a combination of plants and have a far more thorough knowledge of cultivating different plants and how the plants interact with each other (Gram, 1998). While the non-indigenous families referred to their gardens as 'hard work', the Maya families were proud of their gardens and referred to them in positive terms. Mayan gardens hold great cultural value. In contrast, the non-indigenous forest dwellers in Quintana Roo soon gave up their subsistence activities in favour of working in a forestry project, their ties to slash-and-burn farming and other forest activities not being that strong. These differences, together with the particular informal social structures of rainforest Amerindians, imply that forestry projects successfully implemented among non-indigenous forest dwellers cannot necessarily be copied in forest areas inhabited by indigenous peoples.

12.4 DISCUSSION AND CONCLUSIONS

These case studies among Latin American rainforest dwellers show that donor organisations (i.e. NGOs and national and international agencies promoting development) have considerable difficulty in using local knowledge and incorporating cultural structures in the design of forestry projects. In the process of organising and implementing natural forest management projects, development agencies often ignore socio-cultural characteristics such as:

- local values and priorities;
- traditional occupations and their related customs;
- local knowledge;
- settlement patterns;
- family structure and local power structures;
- traditional economic networks.

If these characteristics are not incorporated into the planning and social organisation of the projects they can act as barriers, for example by blocking local responsibility for project organisation. Conversely, if development agencies recognise such characteristics, projects can benefit from the experience and capacity present in the local communities.

Sustainable forestry projects are normally associated with a tight organisational structure. Large integrated projects which include processing, in particular, need effective organisation. But this type of organisation has shown to be in contradiction with the traditional structure of many indigenous people in Latin American rainforests. Projects based on organisational structures, such as official communities, that are strange to the local participants will create difficulties. Although forestry among indigenous peoples in Latin America often has to be introduced within these official communities, because they are the formal owners of the forest land, the interests of the family and its traditional economic network have to be considered carefully.

Among Amerindians forest dwellers, slash-and-burn farming, fishing, hunting, and extraction are carried out through traditional economic relationships between families. They try to keep new development initiatives within these networks and, therefore, the organisation of forestry projects must somehow reflect those internal traditional structures related to subsistence activities.

To keep forestry projects on a relatively limited level that is easy for the local dwellers to handle, it is recommended that only forest management aspects of projects should be administered and controlled by communities. All activities that can be based on existing networks should remain the initiative of traditional production units in order to ensure that local knowledge and experience are utilised.

Once management plans have been approved by the community, the extraction can be carried out by smaller groups of indigenous dwellers that pay the communities for the trees they fell. In this way, the community gains a direct return for the area made available for the forestry project, and at the same time, the forest dwellers can form working groups in accordance with their traditional production units.

Likewise, wood processing should not be carried out directly as part of the project. It can be initiated privately, allowing people both to adjust their traditional occupations and project work and to influence the activities in a participatory process.

It appears that projects concerned with, for example, non-timber forest products or eco-tourism often suffer from similar problems to those of timber-based forestry: lack of participation, lack of appropriate use of local knowledge and, in general, an unwillingness on the part of donor agencies to cede decision-making authority to indigenous peoples and to respect traditional culture and knowledge (Cox and Elmqvist, 1997). Nevertheless, there are some obvious differences between forest management for timber production, and other projects integrating conservation and development. For example,

(i) timber management in natural rainforest requires areas that are too large to be based on indigenous forest dwellers' family lands;

(ii) timber management is a new occupation for indigenous dwellers, whereas the sale of non-timber products from forest and gardens is well-known; and

(iii) standing timber resources often represent a higher value than non-timber forest products and therefore suffer from a higher risk of illegal harvesting (Gram, 1998).

Difficulties arising from socio-cultural structures and traditional occupations reflect the extent to which donor agencies manage to understand and incorporate into projects, the indigenous peoples' way of life, their world-view, and local knowledge of the forest environment. To turn these difficulties into opportunities, foreign NGOs and development organisations need to empower indigenous forest dwellers with decision-making authority in relation to project development. This is a precondition for organising local forestry that is in accordance with traditional indigenous settlement structures and occupations, enabling incorporation and use of local capacity for the benefit of the projects.

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REFERENCES

Cernea, M. (ed.) (1991). *Putting People First*. World Bank, Washington, D.C.

Colchester, M., Lohmann, L. (1993). *The Struggle for Land and the Fate of the Forest.* World Rainforest Movement, Malaysia.

Cox, P.A., Elmqvist T. (1997). Ecocolonialism and Indigenous-Controlled Rainforest Preserves in Samoa. *Ambio* 26, 84-89.

Gram, S., Klint, J., Helles, F. (1994). *Forestry among Indigenous People in Natural Rain Forests - a case study from Peru.* Centre for Alternative Social Analysis, CASA Denmark.

Gram, S. (1998). *Natural Forest Management among Indigenous Peoples in Latin America*. The Research Series, 24, Danish Forest and Landscape Research Institute.

Kronik, J. (forthcoming). *Living Knowledge.* Ph.D. dissertation. Denmark: Centre for Development Research.

Pariona, M. (1991). *Microclimate and natural regeneration dynamics of rainforest after strip clearing*. Palcazu Valley, Peru. FPCN, Lima.

Smith, R.C. (1994). *The Gift that Wounds: Charity, the Gift Economy and Social Solidarity in Indigenous Amazonia.* Oxfam America, Lima.

Smith, R.C. (ed.) (1996). *Amazonía: Economía indigena y mercado*. COICA - OXFAM AMERICA, Quito.

World Bank. (1997). *Investing in Biodiversity - A Review of Indonesia's Integrated Conservation and Development Projects*. World Bank, Indonesia.

13 INDIGENOUS KNOWLEDGE AND THE USE OF FALLOW FORESTS IN NORTHERN THAILAND

Dietrich Schmidt-Vogt

ABSTRACT

Fallow forests, which have been generated by shifting cultivation, cover large parts of the highlands of Northern Thailand. This paper presents the case study of a village, in which a particularly sustainable form of shifting cultivation was practiced until the early 1990s. Secondary forests, which regenerate on the fallow swiddens of this village were found to be surprisingly rich in tree species and complex with respect to stand structure. Most of the species occurring in these forests are useful within the context of a traditional subsistence-oriented economy and there exists an extensive indigenous knowledge concerning the potential uses of these trees. Swidden cultivation is discouraged by authorities in Thailand and is increasingly being replaced by permanent farming. This change of land use causes a reduction in the area covered by fallow forests with negative consequences for the biodiversity and landscape ecology of the concerned region. In this paper, the argument will be put forward that fallow forests, which are ecologically more valuable than is usually supposed, could also play the role of an economic resource in the more commercially oriented economy that is currently developing in Northern Thailand. Indigenous management practices and indigenous knowledge of tree species could be the basis for devising land use systems for the utilisation of these fallow forests. Such a development has not been possible until recently within a political framework, which did not provide for the legal use of forests by village communities. The introduction of community forestry legislation, however, may provide a basis for the management of fallow forests with the aid of indigenous knowledge.

13.1 INTRODUCTION

The vegetation cover of Northern Thailand consists to a large extent of secondary vegetation formations, which have originated from swidden cultivation. These secondary formations are commonly regarded as degraded vegetation, i.e. poor in biodiversity and with almost no economic value. This view does not take into account that swidden cultivation is complex and that secondary vegetation formations can be significantly different from each other as a result of variations in site conditions and swiddening techniques.

Swidden cultivation in the northern highlands is practiced mainly by ethnic minorities, who have been migrating into Northern Thailand for centuries. Two main categories can be distinguished: primary forest swiddeners and secondary forest swiddeners (Grandstaff, 1980). Primary forest swiddeners have been migrating into Northern Thailand from the middle of the 19th century onwards, and are mainly found at elevations above 1 000 m, where they practice an intensive type of swidden cultivation with long cultivation periods of several years. This type of swidden cultivation has resulted in soil and vegetation degradation. Secondary forest swiddeners, on the other hand, have occupied an intermediate altitude between 600 and 1 000 m for several hundreds of years. Up until the present they have practiced an extensive and rotational type of swidden cultivation with short cultivation periods of only one to two years, and long fallow periods of up to 15 years.

Secondary forests or, more correctly, fallow forests regenerate rapidly on fallow swiddens and are again cleared for the establishment of new swiddens after the end of the fallow period. Research has provided evidence that these fallow forests are complex in terms of species composition and stand structure, and play an important role in the traditional economy of secondary forests swiddeners; furthermore that this complexity is related to indigenous management practices and knowledge about the properties of plant species in secondary vegetation formations (Kunstadter, 1978b; Kunstadter et al., 1978; Sabhasri, 1978; Schmidt-Vogt, 1999).

Highland development, which has been an agent of change in Northern Thailand since the early 1960s, causes the replacement of subsistence-oriented land use systems by commercial crop production and of swidden cultivation by permanent farming (Rerkasem and Rerkasem, 1994). Fallow forests are losing their economic function both as a reservoir of nutrients for the maintenance of swidden cultivation, and as a storehouse for materials used within the context of traditional economies. This kind of land use change is not considered to be entirely beneficial, mainly because of the ecological consequences of chemical input and loss of diversity, but also because of the economic uncertainties associated with the cultivation of cash crops (Sutthi, 1989).

This paper discusses an alternative option for land use change, which includes fallow forests as a resource within the context of a more commercially oriented economy, achieved by using indigenous knowledge and management systems. The Lawa, a small Mon-Khmer speaking ethnic group with a population of not more than 107 346 in 1995 (Schliesinger, 2000) has been living in the highlands of Northern Thailand for at least 600 years. They belong in the category of secondary forest swiddeners and have become famous for a particularly sustainable type of swidden cultivation (Kunstadter, 1974; 1978a; Schmidt-Vogt, 1995; 1997a; 1999).

13.2 CASE STUDY: FALLOW FORESTS IN THE SWIDDENING ECONOMY OF BAN TUN

13.2.1 Site and Methods

Ban Tun is located at an altitude of 1 100 m about 30 km to the NE of the town of Mae Sariang near the Thai-Myanmar border (Figure 13.1). In the early 1990s, when fieldwork began, Ban Tun was one of the last Lawa villages, where the traditional system of swidden cultivation was still in practice. It has been preserved because the half the population left after a fire in 1988, and the village therefore retained a favourable balance of population and available cultivable area. In 1992, 177 people in 27 households had access to 800 ha of cultivable land, including irrigated land and fallow land, which was sufficient to maintain the traditional swiddening system with a 15 - 17 year long fallow period.

The study of swidden farming techniques and the ecology and ethnobotany of secondary forests was carried out in close cooperation with the people of Ban Tun village. Living in the village and participating in the communal activities of villagers was an integral part of this research project. Fieldwork consisted in vegetation studies, observations of land use techniques, and inquiries concerning plant knowledge and plant use.

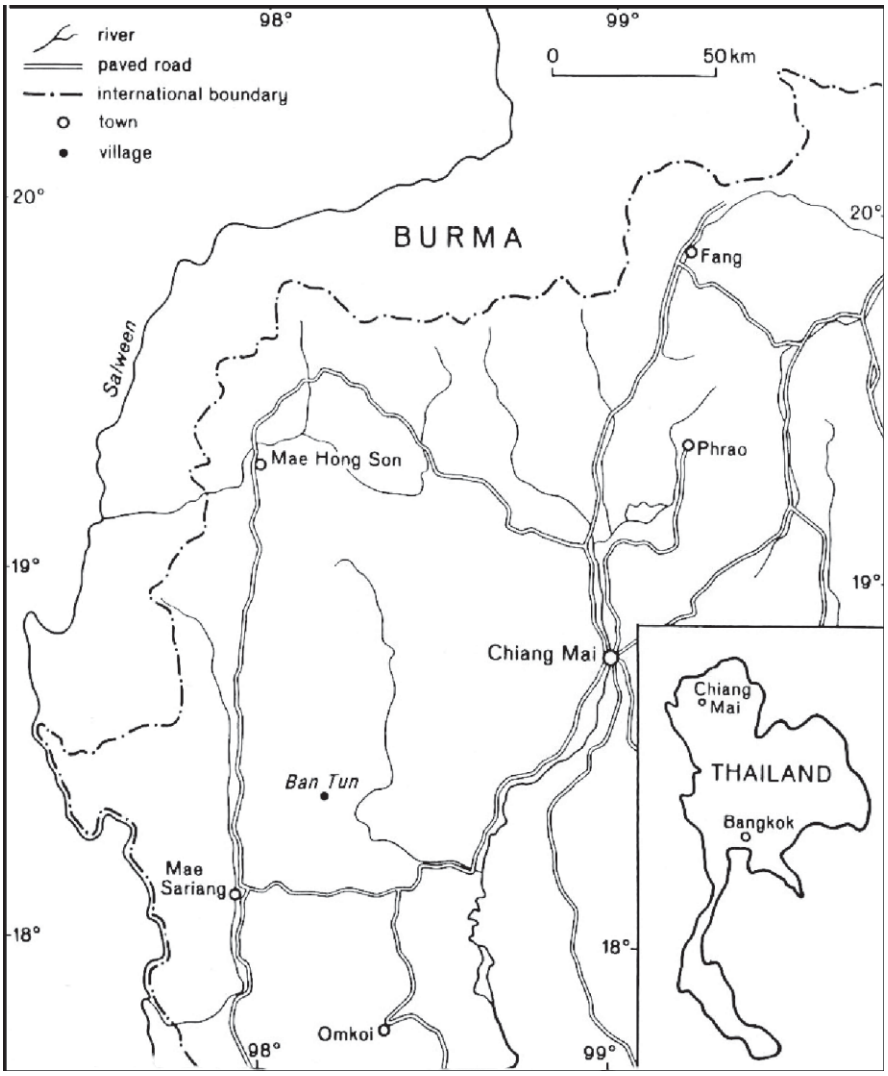


Figure 13.1: Location of Ban Tun.

Vegetation analysis was carried out by a combination of two methods. The early and intermediate stages of secondary succession, which are mainly composed of herbaceous plants, were studied by the releve sampling method of Braun-Blanquet (Mueller-Dombois and Ellenberg, 1974), secondary forests by the method of stand structure analysis - a quantitative method, which supplements floristic information with measurements of the position and dimensions of trees in a transect (Schmidt-Vogt, 1997b). Information on plants and plant use was provided by the villagers and especially by the study's main informant Khun Un-Khanyam, the former headman and village priest.

13.2.2 Swidden management

In Ban Tun, according to Lawa custom, one large swidden area of about 60 ha is prepared every year at around the beginning of February by the village community for the cultivation of dry rice. A unique feature of swiddening in the Lawa tradition is that new swiddens are prepared not by clearing the forest, but by a process, more correctly referred to as thinning. This entails a gender division of labour: the women cut the brush and small trees with a diameter of 8 - 12 cm (photo 3, appendix III), but leave the trees with a larger diameter standing, which are then pruned by the men to prevent shading of the future crop. Sometimes they remove the entire foliage, but more often a few branches are left at the top to ensure that the tree survives. These remnant trees or relict emergents are a conspicuous feature of the cultural landscape of secondary forests swiddeners and especially of the Lawa (photo 4, appendix III). The average number of relict emergents on the swiddens of Ban Tun is 244 per ha. When the cutting of trees is finished, the branches and foliage are left on the ground to dry until they are ready for burning.

Burning of the swiddens is carried out in two stages. The first burn consumes foliage and branches but leaves behind charred logs, which are collected into piles and burned separately about two weeks later. Rice planting starts with the onset of the first monsoon rains in April. At the same time, secondary succession is also setting in with the emergence of weeds and woody regrowth from the stumps that have been left on the fields. Weeds grow so plentifully that weeding must be carried out about three times each cropping season. At the time of rice harvesting, the ground is already covered with a dense carpet of weeds and resprouting woody plants.

One year later, the most successful weed species - mostly exotics such as Chromolaena odorata - have achieved dominance and form the upper layer of a two meter tall and almost impenetrable tangle of vegetation. This successional stage persists for about three to four years, and is then gradually replaced by a scrub stage, which develops out of the growth of coppice shoots and root suckers. During the fifth and sixth year, the scrub stage passes on to the secondary forest stage, and by 12-15 years is considered ready to be cut for a new round of swiddening.

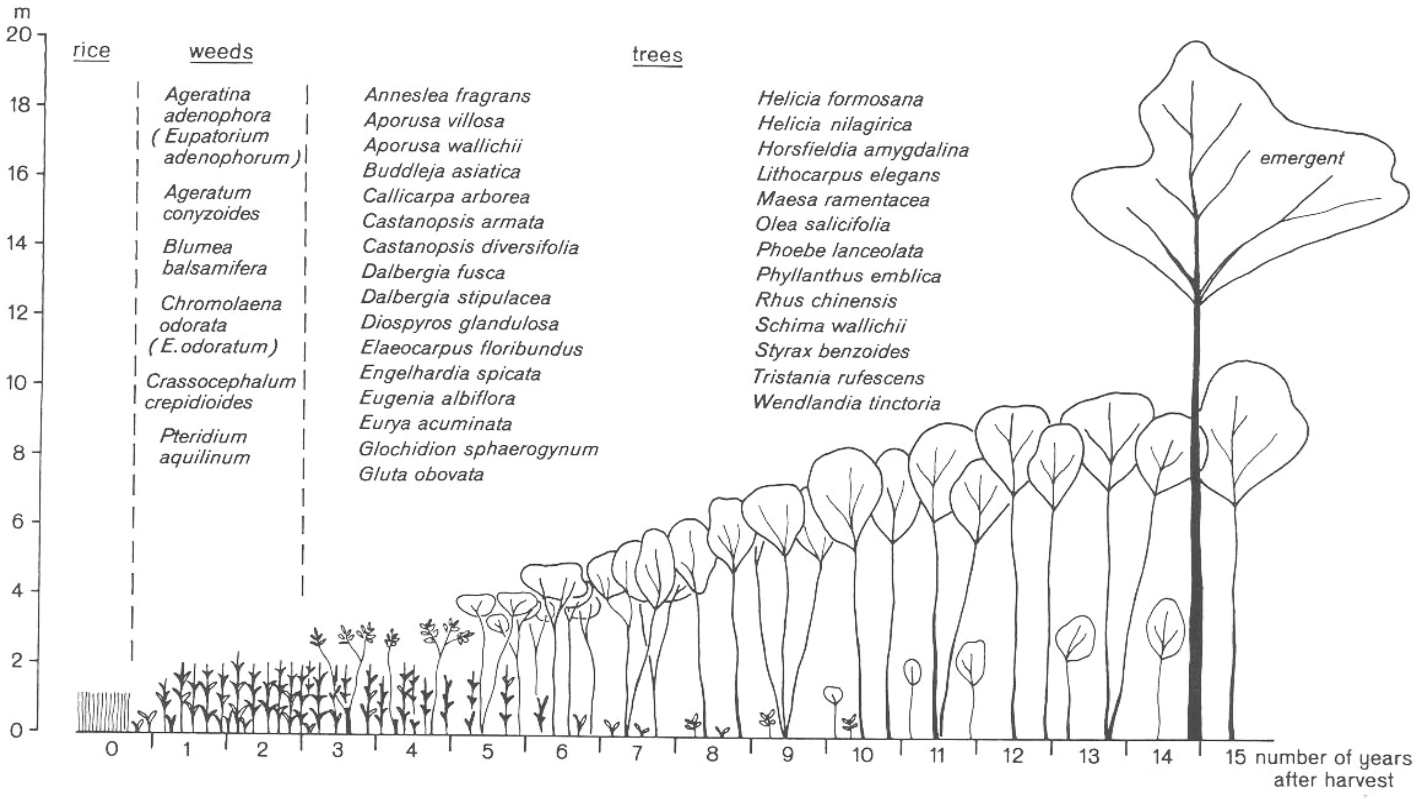
13.2.3 Characteristics of swidden forest

Stands at this stage are structurally complex (Figure 13.2). Three types of trees forming three distinct layers can be distinguished:

- relict emergents from the previous stand with a height of more than 10 m in the uppermost layer;
- coppices of trees felled in the last swiddening cycle with a height of 8-10 m in the main canopy;
- seedlings and saplings, which have developed under the canopy of the coppicing trees, with a height of 4 m or less.

The fallow forests of Ban Tun are extremely dense and contain 2 096 trees/ha on the average. Basal area is variable depending on the number of relict emergents; it averages 27.4 m^2/ha, but can be as high as 54.0 m^2/ha, similar to the value of old growth forests in the same area.

Figure 13.2: Successional sequence on fallows at Ban Tun with frequently occurring weed and tree species.



Such forests are also rich in tree species, not dominated by one or a small number of species as is often the case in tropical secondary forests (Brown and Lugo, 1990; Richards, 1996). The most species-rich stands contain more than 30 species / 500m^2 in the tree layer alone, and the total number of species in the tree layer is 78. The complex mixture of tree species in these forest stands can be explained by the location of the swidden fields in the transition zone (above 1000 m), where montane forests are penetrated by floristic elements from forest types of lower elevations.

Forest stands are characterised by a rapid increase in wood volume due to the growth of coppices. If these forests remain undisturbed, further forest development will consist mainly in the maturation of coppicing trees, and the filling in of gaps in the canopy by younger trees.

Species richness, structural complexity, and rapid increase in wood volume can be related to indigenous management practices in the following manner:

- the preservation of stumps and rootstocks as a source for coppices ensures the rapid development of a woody fallow;
- the preservation of relict emergents enhances the structural complexity of the emerging fallow forests;
- long fallow periods permit the development of trees from both coppices and seeds and therefore contribute to species richness.

13.2.4 Economic value of the fallow forests

In addition to serving as a source of nutrients for the regeneration of soil fertility, fallow forests are a source of timber and non-timber products useful in traditional subsistence-oriented society. Villagers described 49 of the 78 tree species as useful, most of them for two or three different purposes (see Figure 13.3). The wood of trees from fallow forests is mainly used as construction timber and firewood, and for the making of fences and tools. Fallow forests are also an important source of food, mainly of fruit. The land on which swiddening is practiced and on which fallow forests regenerate is regarded as common property and individual plots are allocated to households by the village priest only during the cultivation period. Fallow forests are not managed and there are no regulations concerning the use of these forests for grazing or for the extraction of wood or other forest products.

13.3 DISCUSSION

13.3.1 Dynamics of highland development in Northern Thailand

Despite the existence of sustainable types of swidden cultivation, such as the one practiced by the Lawa, government authorities in Thailand discourage this form of land use and promote the conversion of swidden land to permanently cultivated farmland or to (ecologically impoverished) pine plantations.

Until the 1970s, the main reason for suppressing swidden cultivation was the concern about opium production and drug trafficking. An emphasis on conservation and watershed protection has emerged in the 1980s.

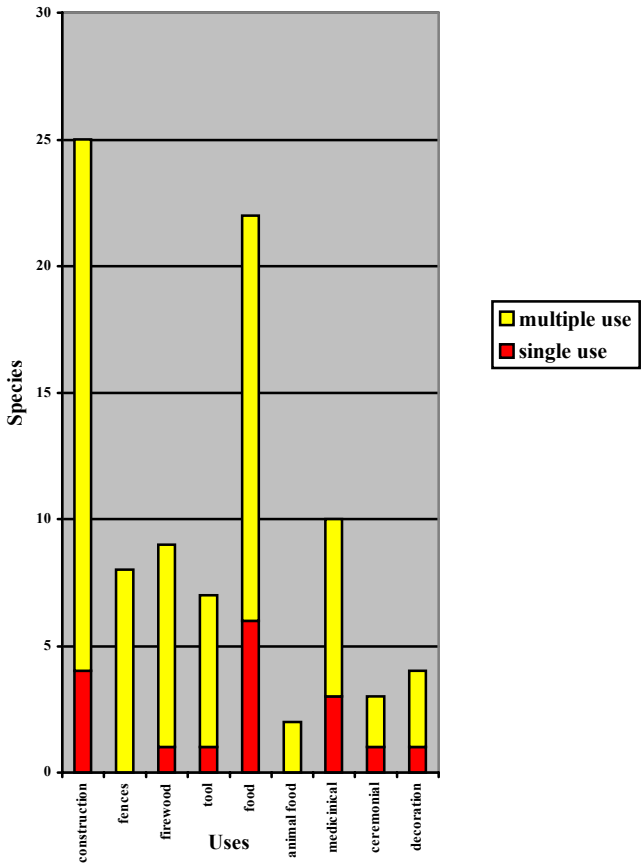


Figure 13.3: Uses of fallow forest trees.

The government is in a strong position to enforce its policies due to the Land Code of 1954, which stipulates that all mountain land and land within 40 m of the foot of a mountain must not be damaged, destroyed or taken possession of. The hill tribe population therefore has no legal right to the land in the mountains and even though their land use has to a large extent been tolerated, it is unlikely that they will be granted land tenure in the future (Rerkasem and Rerkasem, 1994).

The extension of permanent farming has been further enhanced by the construction of a road network, which was started in the 1960s and which provides access for highland farmers to markets in the lowlands. Many farmers have changed their land use from swidden farming for subsistence purposes to permanent farming for the production of temperate cash crops, for which there is a market in the lowlands. However farmers can experience economic problems due to market instabilities and price fluctuations. These changes are often accompanied by soil degradation, water pollution by herbicides and pesticides, and the overall reduction of forest cover due to the replacement of fallow forests by permanent farmland.

13.3.2 Fallow forest management: an alternative option

The course of development that is currently taking place in the highlands of Northern Thailand is aimed at intensifying the agricultural component of swidden agriculture. This development results in the loss of the close relationship between forests and agriculture, and of the need for indigenous knowledge of fallow forests. The most obviously negative consequence of this development, from an ecological point of view, is the reduction of the forest cover because there is no longer a subsistence need for fallow forests.

As an alternative option, these forests could be preserved and made useful at the same time by land use systems that are capable of utilising these forests within the context of a commercial economy. Indigenous knowledge of tree species and of management practices can be an important asset in the development of such management systems. Sabhasri, who in the 1970s carried out one of the first surveys of secondary vegetation on fallow swiddens of the Lawa, proposed that the swidden farming system of the Lawa be transformed into a forest management system for the production of firewood (Sabhasri, 1978). At that time the major obstacles in the way of such a development were the unresolved issue of landownership of the minorities and the lack of infrastructure for the transport of firewood. Landownership by minorities is still a contested issue, but the transport situation has improved significantly so that there are better opportunities today for marketing forest products than there were 20 years ago.

The sale of firewood is only one possibility among others for obtaining a cash income from forest products. The secondary forests of Ban Tun contain a number of tree species which are suitable for commercial utilisation. *Styrax benzoides*, for instance, which is a common fallow forest species, produces an aromatic resin that can be sold in markets. In Laos, a closely related tree species, *Styrax tonkinensis*, is cultivated for this purpose in agroforestry systems.

This leads to the question of which land use systems could be suitable for the commercial use of trees in secondary forests. There are several possibilities:

- the conversion of swidden farming systems to agroforestry systems, which could be similar in structure to the swidden fields with relict emergents of the Lawa;
- the supplementation of swidden farming with the management of fallow forests;
- the combination of swidden farming with forest management according to the taungya principle.

Fallow forests could be managed for the production of small timber, firewood, charcoal, and a wide variety of non-timber forest products. The ethnobotanical knowledge of swidden farmers is the basis for identifying the economic potential of these forests. It must be supplemented, however, by a study into the marketability of tree species in fallow forests. Forest management could be based on the principle of thinning with which the Lawa are already familiar and be supplemented by the practice of enrichment planting.

A severely limiting factor is the attitude of the Forest Service towards swidden farmers and towards the local use of forests in general. Most of the forests in Northern Thailand are government forests, which are administered directly by the Forest Service. This applies also to forests used by swidden farmers. Forest policy is generally aimed at a more effective control of forest land through the Forest Service and therefore at diminishing the control of local groups and local institutions. A law concerning the introduction of community forestry could change this situation, but is still pending. Once it has been passed, it could provide a basis for the establishment of fallow forest management through local communities. Administrative problems are therefore an important factor that must be kept in mind when discussing the possibilities of development with the aid of indigenous knowledge.

13.4 CONCLUSIONS

Secondary forests regenerating on fallows of rotational swiddening systems were found to be valuable because of their plant diversity and because of their vital role in the traditional subsistence economy. The replacement of these subsistence-oriented swiddening systems by more commercially oriented systems based on permanent fields means that fallow forests lose their economic significance and may also lose their proportional share in the vegetation cover of Northern Thailand. The emerging modern land use systems have been criticised for their substantial input requirements as well as for the income instabilities associated with the cultivation of cash crops in monocultures. Diversification of cropping systems therefore must be a key issue of highland development in Northern Thailand.

The argument of this paper is that both conservation of the ecologically valuable fallow forests and broadening of the resource base of village economies can be achieved by developing the economic potential of fallow forests or of fallow forest trees within the context of a commercial economy. Utilisation of these forests could be based on the extant indigenous knowledge concerning the properties of plant species occurring in secondary formations as well as on certain elements of the traditional management systems.

Important research requirements for such a development are inventories of traditional knowledge, which in some areas have already been carried out; studies into the marketability of fallow forest products, which are still missing; and research with farmers into developing their own priorities in a local context. The most important requirement is a legal framework for forest management by local communities; such community forestry legislation is under debate in Thailand.

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REFERENCES

Brown, S., Lugo, A.E. (1990). Tropical secondary forests. *J. of Trop. Ecol*. 6, 1-32.

Grandstaff, T.B. (1980). *Shifting cultivation in Northern Thailand: possibilities of development.* The United Nations University, Tokyo.

Kunstadter, P. (1974). Usage et tenure des terres chez les Lua' (Thailande). (Land use and land tenure among the Lua'). *Études Rurales (Rural Studies)* 53-54-55-56, 449-466.

Kunstadter, P. (1978a). Subsistence agricultural economies of Lua' and Karen hill farmers, Mae Sariang District, Northwestern Thailand. In: Kunstadter, P., Chapman, E.C., Sabhasri, S. (eds.): *Farmers in the forest*, 74-133. University of Hawaii Press. Honolulu.

Kunstadter, P. (1978b). Ecological modification and adaptation: an ethnobotanical view of Lua' swiddeners in Northwestern Thailand. In: Ford, R.I. (ed.): *The nature and status of ethnobotany. Anthrop. Papers* 67, 168-200. University of Michigan. Ann Arbor

Kunstadter, P., Sabhasri, S., Smitinand, T. (1978). Flora of a forest fallow farming environment in Northwestern Thailand. *Journal of the National Research Council of Thailand*. 10, 1-45.

Mueller-Dombois, D., Ellenberg, H. (1974). *Aims and methods of vegetation ecology.* John Wiley and Sons, New York.

Rerkasem, K., Rerkasem, B. (1994). *Shifting cultivation in Thailand: its current situation and dynamics in the context of highland development*. IIED Forestry and Land Use Series No. 4. London.

Richards, P.W. (1996). *The Tropical Rain Forest: an ecological study*. Cambridge University Press. Cambridge.

Sabhasri, S. (1978). Effects of forest fallow cultivation on forest production and soil. In: Kunstadter, P., Chapman, E.C., Sabhasri, S. (eds.): *Farmers in the forest,* 160-184. University of Hawaii Press. Honolulu.

Schliesinger, J. (2000). *Ethnic groups of Thailand: non-Tai-speaking peoples.* White Lotus Press, Bangkok.

Schmidt-Vogt, Dietrich (1999). *Swidden farming and fallow vegetation in Northern Thailand.* Geoecological Research. Vol. 8. Franz Steiner Verlag, Stuttgart.

Schmidt-Vogt, D. (1997a). Forests and trees in the cultural landscape of Lawa swidden farmers in Northern Thailand. In: Seeland, K. (ed.). *Nature is culture: indigenous knowledge and sociocultural aspects of trees and forests in non-European culture*s. pp. 44-50. Technical Publications. London.

Schmidt-Vogt, D. (1997b): Stand structure as an indicator of forest change due to human impact: a methodological contribution with examples from Nepal and Northern Thailand. In: Stellrecht, I., Winiger, M. (eds.). *Perspectives on history and change in Karakorum, Hindukush, and Himalaya*. 287-302. Ruediger Koeppe Verlag. Koeln.

SECTION 4: DISCUSSION

WORKSHOP DISCUSSION AND RECOMMENDATIONS

In this chapter we present the issues and recommendations which were discussed by the workshop participants. Our identity as a group was important here; the workshop was organised by the European Tropical Forestry Research Network, and in particular sought recommendations for the conduct of forestry *research* rather than *practice*. This stimulated a discussion about the nature and purpose of research, and the fact that many of the presentations were based on experience of forestry *practitioners*. The group recognised that a broad view of research as a learning process would help the discussion to move forward, and that in particular new research *methods* tend to emerge from field practice rather than from academic research. Furthermore, as the recommendations show, many participants felt that research activities are not easily separated from dissemination, institutional issues and policy.

Participants divided into groups to consider the following questions, which move from an assessment of the current situation through identified needs for change, to personal responsibilities for such change:

1. What is changing in forestry and forestry research?
2. What needs to change further?
3. What action should we take?
4. What should be the priority research topics?

Different groups considered the implications for forestry researchers ('internal' stakeholders), and for 'external' stakeholders such as donors, policy makers and forestry practitioners.

CHANGE

Our discussions about change in forestry are summarised in table 1, and perceptions of further need for change in table 2. The group discussing internal issues highlighted a profound change in the nature of 'forestry' which has become a diverse discipline within which foresters might now be considered as professionals working with people using forest resources, irrespective of which discipline they come from. Consequently, the isolation of the traditional forestry sector is no longer seen as valid. These changes have occurred among both practitioners and researchers, but less so among decision-makers and large (forestry) companies, indicating a need for institutional change.

Participants noted however that some countries are starting to devolve control over forest resources to local communities, as part of a global trend which encourages governments to 'hand over the stick'. This is accompanied by a change in control of knowledge and research, through more participatory approaches. Participants in the workshop had very distinct experiences, and pointed out that not all governments are following this trend. The degree to which governments are prepared to give up control depends very much on the resource status.

In countries with degraded forest areas, governments are more prepared to devolve forest management, whilst in those which still have rich forest resources governments prefer to control the benefits of those resources. And finally we should remember that the devolution of power to communities is not sufficient; we need to be aware that local power structures may also be inequitable.

Table 1: What is changing in forestry and forestry research?

Note: The groups were summarising their perceptions of change, and hence the distinction between 'internal' and 'external' issues is not rigid in this section.

Internal issues	External issues
The traditional forestry approach is challenged.	Multilateral donors are now supporting participatory forestry, and recognise the value of local knowledge.
We see change from a single-disciplinary (forestry) approach to a multidisciplinary (livelihoods) approach.	On the negative side, bilateral donors have reduced funding, and use short-term economic criteria to evaluate projects.
But forestry business and administration retain the traditional approach.	The objectives of tropical forestry have changed to include empowerment, in line with a more general trend towards decentralisation of decision-making powers.
The devolution of power represents a kind of revolution.	Donors expect research to be demand-led, and to involve beneficiaries.
The global conservation agenda has a strong influence, but is also questioned by some.	Relations between rural resource users and foresters have improved.
	Forest departments can no longer act unilaterally to enforce forest policy and must seek cooperation with forest users.
	More disciplines are involved in forestry research.

Table 2: What needs to change further?

Internal issues	**External issues**
Create opportunities for exchange of experience through networks and journals; and	Foresters and policy makers must recognise and accept local institutions, and enhance the scope for cooperation between local (formal and informal), national and international institutions.
build on local, existing structures/networks.	Networking channels need to be developed.
Ensure training / education of 'foresters' includes other disciplines dealing with natural resources.	Facilitate vertical and horizontal links between research, so that for example the World Bank can learn from local participatory research.
Include broad based, interdisciplinary education imparting 'conservation/forestry/environmentalist' values in non-forestry education from primary level onwards.	Funding for research should be less prescriptive and allow for a process approach which allows revision of goals during the research.
Researchers must develop a real interdisciplinary approach, by not only planning together but also conducting the research together.	Accept the equal status of local and scientific knowledge.
Foresters need to abandon arrogant attitudes.	Establish journal for relevant research.
Communication between researchers, resource users and practitioners needs to improve.	Institutions (government, donors, etc.) must move towards a more participatory and IK-inclusive* approach.
We need more research into the interface between IK* and professional knowledge.	Change attitudes to and roles for forestry research to enhance relevance for forest users.
	Involve resource users in defining research needs and include representatives on donors' decision-making boards.

* IK = indigenous knowledge

ACTION

Table 3: What action should we take?

Internal issues	External issues
Advocate amongst our own professions to change perceptions of forestry (i.e. to recognise that it is interdisciplinary, IK-inclusive*, and uses participatory approaches)	Improve coordination between researchers, e.g. by establishing a clearing house which tracks who is doing what, why, when and where; and what *methods* they are using to learn *with* resource users.
Establish dialogue between researchers, practitioners and resource users.	Influence institutions, networks and organisations to recognise the issues we have discussed here.
Communicate better with the general public to change perceptions of the forestry profession.	Introduce participatory learning in forestry education.
Ask ETFRN to survey existing networks (professional, academic, local) and identify the need for a specific network, journal, newsletter, etc. for topics related to 'learning with resource users'.	Change current forestry curricula to address the need for participatory forestry management.
Change our own way of working and accept that others have different ways of doing things.	Promote integrated interdisciplinary research.
Improve learning processes with resource users through participatory research.	Ensure that project and research reports are produced in English, the language of the donor and the language of the research area (local language), and make sure that 5 copies of research reports are disseminated to libraries in the country where research was conducted.
Formulate general hypotheses from site-specific studies (extrapolation of findings)	Communicate research findings to the users with short and practically oriented reports.
Build theories and concepts on how to learn with local resource users.	Re-evaluate failures to help improve learning processes in forestry.
Build local research / learning capacity	
Document dynamics of local knowledge instead of treating it as static.	
Advocate for change in criteria for accepting publications in journals (many participants experience difficulties in publishing 'process-orientated' research).	
Work with a range of policy-makers, not only forest departments.	

* IK = indigenous knowledge

Table 4: Preliminary list of research topics

Research topics	**Research approaches**
In what ways is local knowledge dynamic and what factors affect such change?	How can we improve cooperation between disciplines?
What areas does indigenous knowledge *not* include and how can these be addressed?	How can we develop a *general* understanding of methods for researching local systems / knowledge?
How can we generalise from context-specific local knowledge?	How can we integrate indigenous and scientific knowledge in forest management?
Are existing forest curricula addressing the need for participatory forest management?	
What is the relevance for forest management, of local / indigenous knowledge in Europe?	In summary, both
How can research improve livelihood security?	conceptual research to generalise findings and to develop a new set of integrated theories and methods, which will stimulate paradigm change; and
	location-specific research and development to improve local livelihoods, which will lead to further integration with information networks.

Recommendations for action which we can take as researchers or practitioners, are summarised in table 3, and preliminary suggestions for research topics are in table 4. The discussion groups considered how their recommendations related to research topics, and produced a short list of ideas. We refer the reader to the ETFRN website (www.etfrn.org/etfrn) for subsequent discussion of the research implications. More discussion took place around the research *processes* than around the topics themselves and its contribution to development; the key points are presented below.

Participation

Participation in research refers not only to the research activities themselves. The group also identified a need to improve the involvement of resource users in decisions about research, and in the use of research results in training and development projects. Research funders might limit the possibilities for this, but we felt an effort should be made to find donors who understand the need for integration of research and development.

Aspects of participation which need to be addressed include particularly the need to return research findings to the research sites and participants. It is not possible or appropriate for all research to be conducted and validated by local researchers, but

where outsiders conduct research based on local knowledge or practice, we have an obligation to make sure the results are communicated to those who contributed. Such communication can be enhanced if we seek funding for local language translations and use more non-verbal forms of communication.

Role of 'forestry' research

The range of disciplines represented at the workshop, and diversity of experience reported, provoked questions about what kind of research can be labelled 'forestry' research. Some participants felt the research we were discussing would be better described as 'livelihoods' research, but others felt this might reduce the social dimensions of forestry by separating the livelihood issues from it.

There was a strong sense of responsibility as researchers, and recognition that this responsibility is particularly complex in research involving local resource users. It was suggested that the professional researcher should think of him or herself as an intermediary, in a position to communicate research needs and results to those who can use them, or to those who can respond to them by facilitating or enabling change.

The recommendations of the 'internal' working group in particular reflect the sense among participants that foresters, and forestry researchers, must work hard to change perceptions of their profession, and advocate for a better understanding of the social and power issues involved in our work, as well as linking more directly with government departments other than forestry.

Generalisation

The discussion stimulated a debate about generalisation of research findings. We noted that some of the presentations had warned against assuming that research from one geographical region or culture, was relevant for others. This appears particularly to be the case with studies of indigenous knowledge, in contrast with scientific research which seeks to generalise from controlled experiments (an example relevant to forestry would be the generalisation of plant breeding results from site specific studies). This highlighted a difference in research approach which requires interdisciplinary approaches, and the need to develop generalisable concepts, theories and methods.

One way to approach this is through country-specific case studies, but we must recognise the possibility that results are not easily communicated between countries. Both approaches (regional exchange of experience, and attempts to generalise) are needed and can coexist.

Summarising the debate, it was suggested that research involving local or indigenous knowledge needs to take place at two inter-related levels:

a) conceptual research to generalise findings and to develop a new set of integrated theories and methods, which will stimulate paradigm change;
b) location-specific research and development to improve local livelihoods, which will lead to further integration with information networks.

Dissemination

The focus of the workshop on resource users led many participants to see dissemination as a particularly high priority for researchers. We considered the range of options for dissemination, and the pressures on researchers to publish results, and noted that we should make use of the range of outlets for these findings (journals, newsletters, leaflets) depending on the type of research being reported on.

While some participants saw a strong need to create a new journal, others argued that existing journals should be encouraged to include new research approaches of the kind discussed at this workshop. One result of this meeting could be to propose new guidelines for accepting such research in professional journals. The argument for a new journal is that there is no focused body of knowledge on this topic, and that instead it is dispersed in many different publications, which makes it difficult to keep track of other work. Such a journal would not necessarily be confined to forestry. However establishing a new journal would take up a lot of time and resources so the preference of the group is to work with existing outlets.

More specifically, it was noted that a journal is an academic communication tool; how can we communicate with practitioners and resource users? This question led into a discussion of the value of networks.

Networks

Linking researchers and practitioners through networks plays an important role in research of the kind discussed here, and an animated part of the discussion focused on the merits of establishing new networks. There was a strong general feeling that existing networks could be better used, and that there is scope for researchers to share information about these, perhaps through one of the networks itself – this could in fact be a key role for ETFRN.

Against this was the view that existing networks are not sufficiently open to the specific issues discussed here. However it was recognised that networks are expensive to establish and run, and that a new one was not practicable; instead we should focus on convincing network coordinators of the importance of issues relating to resource users. One way in which ETFRN could move forward would be through linking up with research institutes in the tropics:

Education

Finally, it is worth noting that many participants mentioned the need for foresters to change – and that this would only happen if forestry education changes. Curricula for forestry education are still largely based on the traditional approach to forestry as natural resources to be managed by professionals; as forestry researchers we agreed on the importance of communicating the need for new foresters to be more aware of the range of participatory methodologies, and approaches used by relevant social disciplines.

BIOGRAPHY

Ali U. Basha has a National Diploma in Forestry from the Forestry Training Institute, Tanzania, and an International Certificate in Environmental Education from Rhodes University, South Africa. He has fourteen years' work experience in community-based in natural resources projects and participatory rural appraisal. Currently, he works as Project Officer in the Jozani-Chwaka Bay Conservation Project, Zanzibar.

Peter Branney is a UK-based freelance consultant specialising in participatory forest management and silviculture with over twenty years' experience of working with rural communities and government departments in many countries including India and Nepal where he has been involved in participatory forestry research since 1996.

S. P. Dahal is a forester with over fifteen years of experience. He has a Masters in Rural Development from Reading University, UK. He is currently based in Dhankuta, in the eastern region of Nepal and works for the Nepal UK Community Forestry project.

Adrian Ely. A graduate of the University of Cambridge, Adrian Ely has three years of experience in the ICD sector in Tanzania. His primary areas of interest are the environment-livelihood interface, and the incorporation of participatory methodologies into quantitative scientific research and policy formulation. He is currently at the University of Sussex studying 'Plant Biotechnology for Emerging Economies'.

Said Abdallah Fakih has a National Certificate in Forestry and Ethnobotany from the Forestry Training Institute, Tanzania. He has sixteen years' work experience in taxonomy and botanical collection, as well as participatory rural appraisal. He currently works as Field Officer in the Jozani-Chwaka Bay Conservation Project, Zanzibar.

Hugh Gibbon is a land use planner with interests in forestry, agriculture and organisational development. He has worked for over fifteen years in Africa and Asia and has recently completed nearly five years as Area Leader for the Nepal UK Community Forestry Project in Dhankuta, eastern Nepal.

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Kate Green trained as an agricultural extensionist, and has practical experience working on agricultural research and development projects in Kenya, Botswana and Bolivia. For the last three years Kate has been employed as a Research Fellow at the Agricultural Extension and Rural Development Department, at the University of Reading, where she supports the department's wide range of research activities.

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Gudrun Lettmayer, born in 1961 in Austria, is a geographer and tropical agriculturalist. For ten years she has been working as a scientist and development worker in Austria, Bolivia, West Africa and Madagascar on soil erosion, natural resources management and rural development. At present, she works at Joanneum Research, Graz, Austria and is a lecturer at Salzburg University.

Yam Bahadur Malla has a PhD from the Australian National University, Australia and has been closely involved with community forestry projects in Nepal as a researcher and adviser for more than twenty years. He is a lecturer and course director at the Agricultural Extension and Rural Development Department, University of Reading, specialising in participatory forestry and extension. He has undertaken numerous consultancy and teaching assignments in Asia and Africa.

Genevieve Michon is an agronomist and ethnobotanist. She has been conducting research into local forest and agroforestry management practices in Congo and Indonesia for the last fifteen years. Based at IRD (Institut de Recherche pour le Developpement, formerly ORSTOM), she has recently returned from a secondment of five years at ICRAF (International Centre for Research in Agroforestry) in Southeast Asia, where she carried out project research with CIFOR (Centre for International Forest Research).

Bérénice Muraille is an Agriculture and Forestry Engineer from Belgium. She has worked for the past ten years in agroforestry and community forestry in Central Africa and in South East Asia. For three years she was with the Lao-Swedish Forestry Programme as Joint Forest Management (1996-1999) in Savannakhet and as short-term JFM adviser (1999-2000). She is currently based in Brussels as a free-lance consultant in community-based natural resource management.

Hari Raj Neupane is a forestry graduate with almost ten years of practical experience working with forest user groups in rural Nepal as part of the community forestry programme. He is currently studying for an MPhil at AERDD, University of Reading with his field work taking place in Parbat and Myagdi districts in Western Nepal.

Amour Bakar Omar has an M.Sc. Natural Resources Management from University of Edinburgh, and a B.Sc. Forestry, and Diploma in Wildlife Management. He is currently working as Head of the Research and Forest Management Section of the Commission for Natural Resources Zanzibar. Previously he was a rural afforestation programme officer, then wildlife conservation officer, and planning officer for the Zanzibar Forestry Development Project funded by Finnida from 1992 to 1997.

Dietrich Schmidt-Vogt has been a staff member of the Geography Department at the South Asia Institute, Heidelberg University since 1981. His research focus is on the relations between people and forests in mountainous areas of South and Southeast Asia.

He obtained his Ph.D with a study of human impact on high altitude forests in Nepal and a postdoctoral degree with a comparative survey of secondary forests in shifting cultivations systems in northern Thailand.

Fergus Sinclair is a Senior Lecturer in Agroforestry at the School of Agricultural and Forest Sciences at the University of Wales, Bangor, UK. He has degrees in both agriculture (BSc Reading) and forestry (PhD Edinburgh) and has research interests in local knowledge and in the measurement and modelling of interactions in complex systems with projects currently active in Europe, Africa, Asia and Latin America.

Rekha Singhal is an Associate Professor, Indian Institute of Forest Management. She has a D.Phil in Psychology from Allahabad University, India, and her post-doctoral work is related to behavioural aspects of forest management. She was the recipient of the Young Scientist Award in the year 1982 from the Indian Science Congress Association and is cited in International Who's Who Professional and Business Women, 6th edition, American Biographical Institute.

Ramu Subedi is a forester with over twelve years of experience. He is currently working in Baglung in the western region of Nepal for the Nepal UK Community Forestry Project.

David Wall is a Senior Lecturer in the Faculty of the Built Environment, South Bank University, London. He trained as a construction cost consultant at the University of the Witwatersrand, Johannesburg and as an economist at the University of Oxford. He has worked and researched in South Africa, Botswana, Kenya and Tanzania and the United Kingdom on construction and development issues.

Jill Wells was formerly a Reader at South Bank University, but is now construction specialist at the International Labour Organisation, Geneva. She trained as an economist and geographer and has researched and published numerous reports and several books on the development of the construction and building materials industries, notably in East Africa and South East Asia.

Freerk Wiersum is associate professor of Forestry and Rural Development with the Forest Policy and Management Group of the Department of Environmental Sciences, Wageningen University. He has over twenty-five years of working experience in tropical forestry and has visited fourteen different countries in Asia and Africa. His PhD dissertation concerned the question of whether social forestry involved a paradigmatic change in forestry.

Robert George Wild is a graduate from Loughborough University, UK and has more than ten years' experiences in the field of protected area management, integrated conservation and development, and ecology. He has worked in development and conservation projects in Kenya, Uganda, Tanzania and South Africa.

APPENDIX I

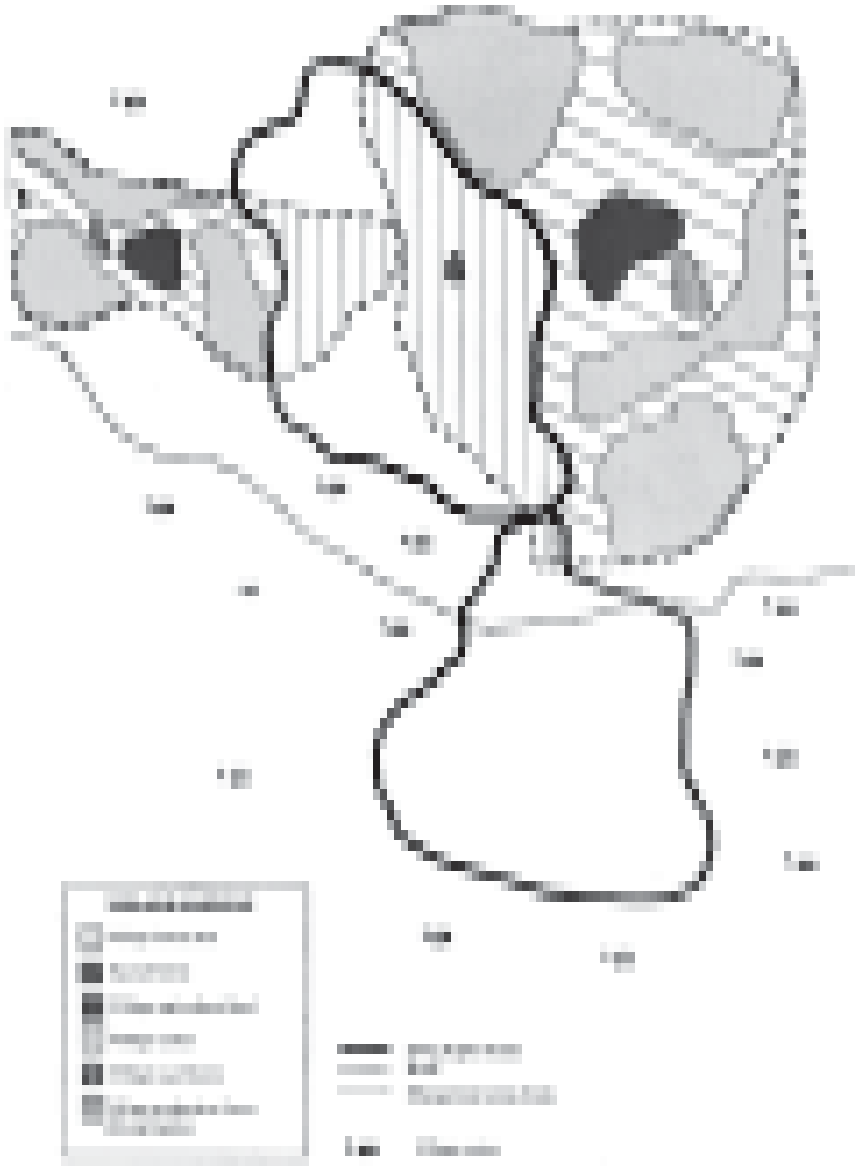

Figure 1: The integrated approach: schematic example for two villages.

APPENDIX II

Photo1: Argeli processing: Employment generation benefiting poor women and men.

Photo 2: Long Term Sustainability: Analysis of the Chiraito (*Swertia chirayita*) market chain..

APPENDIX III

Photo 3: Clearing a swidden at Ban Tun: woman cutting trees with smaller diameters.

Photo 4: Ban Tun: fallow swiddens with relict emergents.