

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Shifting Cultivation, Livelihoods and Change:
A study of agricultural decisions in
Xieng Ngeun District, Lao PDR.**

A thesis presented in partial fulfillment of the requirements for the degree of

Master of Philosophy in Development Studies

at Massey University, Palmerston North,
New Zealand

Sarah Whittaker

2006



Abstract

Shifting cultivation has long provided a livelihood for upland farmers in the tropics. However, recent years have seen increasing political, environmental and economic pressure on these farming systems and those who practice them. In the Lao PDR, shifting cultivation is a priority development issue; government policy is to replace it with sedentary forms of agriculture by the year 2010. Alternatives to existing practices are being researched and extended to farmers through both the public and private sector, and farmers are faced with an increasing range of choices for their livelihoods, which remain largely agriculturally-based. Their responses to these new opportunities, and their ability to take advantage of them, will be important to the sustainability of their livelihoods into the future.

Recognising that agricultural changes take place in the context of people's livelihoods, this thesis applies a livelihoods approach to the study of household agricultural decisions in the Lao PDR. It investigates farmer responses to introduced forage technologies for the intensification of livestock production in four upland villages of Xieng Ngeun District, in order to explore the relationship between livelihoods and change. Many aspects of people's livelihoods are found to shape their decisions. In particular, access to resources can be important in the ability to take advantage of opportunities. Activities such as livestock raising require an initial cash investment that may preclude poorer households from specialising in them; thus these households are less able to benefit from livestock-related technologies. Households' existing livelihood strategies and the resulting livelihood outcomes also influence their ability and desire to intensify livestock production through managed forages. The wider context within which livelihoods are constructed may both facilitate and constrain change in a particular direction.

In addition to those issues commonly identified in livelihoods frameworks, other factors also need to be considered. The importance of farmer perceptions in particular is highlighted and it is suggested that this, along with the characteristics of the technology itself in relation to people's livelihood situation, be included in the framework for application to the study of agricultural change. Finally, the thesis finds the livelihoods approach to be a useful and practical way of focusing attention on issues at the local level and placing rural people at the centre of development-related analysis.

Acknowledgements

I would like to thank the many people who have contributed to this thesis. Firstly, the research would not have been possible without the cooperation of farmers in Ban Houay Hia, Ban Kieuw Chaluang, Ban Kieuw Nya and Ban Silalek. I acknowledge and thank these men and women for giving up their time and sharing their lives with me. Special thanks are due to the respective village headmen and their families, for providing hospitality, as well as information and facilitation of interviews and meetings. To my interpreters, Miss Boualaphan Sichanthapadit (Noi) and Miss Oulaylack Inmyxai (Tou), thank you for your tireless hard work, guidance and friendship. Thanks also to the Xieng Ngeun DAFO team - Mr Sommay, Mr Suwan, Mr Somvanh, Mr Bounthanom, Mrs Gaeowsakorn, Mr Sangphet, Mrs Sidaphon and Mr Wayi - for organising my visits to the villages and sharing your knowledge with me. To Mr Viengxay Photakoun of NAFES, and Mr Sengpasith Thongsavath and Mrs Bounthom from the Luang Prabang provincial office, thank you for your assistance with translation, interpreting, organising and your participation in various aspects of the research.

I would also like to thank Dr Joanne Millar of CSU in Australia and Dr Peter Horne of CIAT in Vientiane, for giving me the opportunity to work with the FLSP and AIRP projects. Thank you both for your encouragement and input into the research, and for your help in facilitating the fieldwork. A special thanks to Joanne for your comments on earlier drafts of this thesis. Thanks also to these projects for financial contributions to the Xieng Ngeun fieldwork and for organising and financing my Lao visa.

To those in Lao who offered me their personal support and friendship, particularly Deborah and La in Luang Prabang and Alison in Vientiane - thank you for your hospitality and care when I was sick, for the use of your bicycles, and for allowing me to stay longer than expected!

At the New Zealand end, thank you to my supervisor, Dr John Overton, for your guidance, encouragement and patience. Thanks also to my second supervisor, Dr Manuhua Barcham, to Dr Maria Borovnik, Dr Hillary Smith, Kathryn Sanders and Ri Weal, for your useful feedback on earlier drafts. Also to Ri and Kelly, the walking encyclopedias of IDS Massey, for help throughout the three years of my time here. Finally, a big thank you to my Mum for your invaluable support and assistance, and to my family and friends for your understanding, support and prayers in times of need.

Financial assistance was provided by the Massey University Masterate Scholarship and the NZAid Postgraduate Field Research Award.

Table of Contents

Abstract	iii
Acknowledgements	v
Table of Contents	vii
List of Figures	xi
List of Tables	xi
List of Boxes	xi
Glossary of Terms and Acronyms	xiii
Chapter 1 Introduction	1
1.1 Theoretical background	1
1.2 Research context and methodology	3
1.3 Overview of the thesis	4
Chapter 2 Shifting Cultivation	7
2.1 Introduction	7
2.2 What is shifting cultivation?	8
2.3 Divergent views	11
2.4 Recent changes and the future of shifting cultivation	14
2.4.1 Changes and trends in shifting cultivation	14
2.4.2 Shifting cultivation into the future	17
2.5 Conclusion	19
Chapter 3 Agricultural Change	21
3.1 Conceptualising shifting cultivation and agricultural change	21
3.2 Population and environment	23
3.3 Macro-economic considerations	25
3.4 Household-level economic considerations	26
3.4.1 Incentives and capabilities	26
3.4.2 Risk	28
3.5 Social and cultural context	30
3.6 Political and institutional context	33
3.7 Technology	35
3.7.1 Technology as a factor in agricultural change	35
3.7.2 Factors influencing technology adoption	36
3.7.3 Factors specific to technology adoption	38
3.8 Conclusion	41

Chapter 4	Livelihoods.....	43
4.1	What is a livelihoods approach?.....	43
4.2	Applying a livelihoods approach.....	46
4.2.1	Livelihoods frameworks.....	46
4.2.2	Applications of a livelihoods approach	49
4.3	Application of a livelihoods approach to this study	50
4.3.1	Guiding and shaping the study as a whole	50
4.3.2	Inspiring and guiding methodology.....	51
4.3.3	Existing studies.....	56
4.4	Conclusion	57
Chapter 5	Lao People's Democratic Republic.....	59
5.1	Overview.....	59
5.2	Agriculture.....	61
5.3	The uplands: shifting cultivation-based livelihoods	63
5.3.1	Shifting cultivation: practices and policy	63
5.3.2	Livelihoods today - shifting cultivation in crisis?.....	65
5.3.3	Options for the future	67
5.4	Livestock and the FLSP	69
5.5	Conclusion	71
Chapter 6	Methodology	73
6.1	Approach	73
6.2	Research design	74
6.2.1	Sources of information	74
6.2.2	Selection of sites.....	75
6.2.3	Research participants	77
6.3	Methods and implementation issues	80
6.3.1	Fieldwork schedule	80
6.3.2	Village surveys.....	81
6.3.3	Household interviews.....	82
6.4	Conclusion	84
Chapter 7	Livelihoods in Xieng Ngeun.....	85
7.1	Livelihood assets and resources	85
7.1.1	Labour	86
	Household size	86
	Full and part-time labour	87
	Hiring, selling and exchanging labour.....	87

7.1.2	Livestock.....	88
7.1.3	Land	93
7.1.4	Crops and trees	94
	Trees and palms	95
7.1.5	Forest access and other non-timber forest products	96
7.1.6	Financial Capital	96
	Income	96
	Credit and savings	98
7.1.7	Physical Capital	98
7.1.8	Social Capital.....	99
7.2	Livelihood activities	100
7.2.1	Cultivation of food crops	100
7.2.2	Livestock raising	102
7.2.3	Collection of wild resources	103
7.2.4	Tree and palm crops	103
7.2.5	Off-farm activities.....	104
7.3	Livelihood outcomes	104
7.4	Conclusion.....	106
Chapter 8	Farmer Perceptions and Forage Adoption	109
8.1	Farmer perceptions of current livelihoods	109
8.1.1	Problems in the farming / livelihood system	110
8.1.2	Change over time	112
8.1.3	Factors influencing change and current livelihood situation.....	112
8.1.4	Goals and plans for the future	113
8.1.5	Alternatives/opportunities available	115
8.1.6	Expectations of using forages	116
8.2	Reasons for not adopting forages	118
8.2.1	Attitude	118
8.2.2	Labour	121
8.2.3	Awareness.....	124
8.2.4	Livestock.....	126
8.2.5	Other livelihood resources and characteristics	129
8.2.6	Fencing-related issues.....	132
8.3	Conclusion.....	132
Chapter 9	A Livelihoods Approach to Agricultural Change in the Lao Uplands ...	135
9.1	Core livelihood factors	135

9.1.1	Household assets and resources	135
	Livestock.....	136
	Labour	137
	Financial capital	139
	Land.....	139
	Forests.....	140
9.1.2	Livelihood activities and strategies	140
9.1.3	Livelihood outcomes	141
9.1.4	Institutional and organisational context	142
9.1.5	Vulnerability context.....	143
9.2	Factors that need to be included in the livelihoods framework.....	144
9.2.1	The technology available	145
9.2.2	Perceptions.....	146
9.3	Conclusion	149
Chapter 10	Conclusion	151
Appendix	158
Bibliography	163

List of Figures

Figure 4.1: The standard components of a livelihoods framework.....	48
Figure 5.1 Location of the Lao PDR.....	60
Figure 6.1 Location of the study district	77
Figure 6.2 Location of the study villages.....	77
Figure 7.1 Livestock holdings of adopters and non-adopters	89
Figure 7.2 Box plots showing distribution of livestock holdings	90
Figure 9.1 A livelihoods framework for assessing household-level agricultural change	150

List of Tables

Table 6.1 Characteristics of villages selected.....	76
Table 6.2 Households included in the research.....	79
Table 7.1 Household size by adoption group - all households.....	86
Table 7.2 Mean household size by village and adoption group	86
Table 7.3 Average labour endowments of adopter and non-adopter households	87
Table 7.4 Holdings of different types of livestock - summary.....	89
Table 7.5. Total livestock holdings of households with few livestock.....	91
Table 7.6 Livestock Index* for households by village and adoption group	92
Table 7.7 Average livestock holdings by livestock type, village and adoption group	93
Table 7.8 Rice insecurity in the survey results.....	105
Table 7.9 Rice insecurity in the interviewed households	106
Table 8.1 Livelihood goals and plans of non-adopters and stoppers.....	115

List of Boxes

Box 8.1 Tao Hok - a non-adopter focused on crops	117
Box 8.2 Tao Sip Sam - a non-adopter with labour and attitude as reasons for not adopting.....	123
Box 8.3 Tao Sip Jed - a non-adopter for whom awareness and attitude are factors ..	125
Box 8.4 Tao Haa - a stopper's story.....	126
Box 8.5 Tao Sao Hok - a non-adopter lacking in rice and livelihood resources.....	130

Glossary of Terms and Acronyms

Ban	Village
Tao	equivalent of 'Mr'; used in formal language
thamasat	traditional or 'natural' way
ACIAR	Australian Centre for International Agricultural Research
AIRP	Accelerating the Impacts of Participatory Research and Extension Project
ADB	Asian Development Bank
AFA	Asian Farmers' Association for Sustainable Rural Development
AusAID	Australian Agency for International Development
CIAT	International Center for Tropical Agriculture
CGIAR	Consultative Group on International Agricultural Research
CSU	Charles Sturt University
DAFO	District Agriculture and Forestry Office
DAFOs	Extension workers from the District Agriculture and Forestry Office
DFID	Department for International Development (British Government)
DHRRA	Development of Human Resources in Rural Asia
FAO	Food and Agriculture Organisation
FSP	Forages for Smallholders Project
FLSP	Forages and Livestock Systems Project
GDP	Gross Domestic Product
GOL	Government of Lao PDR
MAF	Ministry of Agriculture and Forestry
NAFES	National Agriculture and Forestry Extension Service
NAFRI	National Agriculture and Forestry Research Institute
NTFP	Non-Timber Forest Product
PAFO	Provincial Agriculture and Forestry Office
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme

Chapter 1 Introduction

This thesis is about shifting cultivation and livelihoods in the Lao People's Democratic Republic (Lao PDR). It addresses the issue of how agricultural change takes place, arguing that a livelihoods perspective can generate valuable insights into household agricultural decisions. Much of the literature on agricultural change has focused on the influence of specific factors or processes at the macro level, neglecting the complexity and diversity of farmers' everyday realities. The starting point for this thesis is the fact that agriculture is deeply embedded within people's livelihoods and therefore cannot, and should not, be conceptually divorced from this context. Decisions regarding change within agriculture are essentially livelihood decisions - they both depend upon, and in turn affect, the livelihoods of the decision-makers. The present study therefore applies what has become known as a 'livelihoods approach' to household agricultural decisions, asking the central question of *how* the livelihood context shapes people's decisions regarding opportunities to make changes to their farming systems. A secondary question concerning the practical application of a livelihoods approach to the study of agricultural change is also addressed.

These questions are investigated through a study of the livelihoods and agricultural decisions of shifting cultivators in four villages in the uplands of the Lao PDR. Specifically, it investigates their responses to the opportunity to incorporate managed livestock feed resources into their farming systems. Although the focus and context of this research is shifting cultivation, it could equally be applied to other types of small-scale agriculture. Shifting cultivation is, however, presently the focus of much attention in the countries where it is practised and is a major development issue in the Lao PDR, where an estimated one third or more of the population depend on it for their livelihoods.

1.1 Theoretical background

Shifting cultivation has often been viewed as a 'primitive' form of agriculture that, for one reason or another, has failed to evolve into more intensive and economically productive 'modern' agriculture (Boserup, 1965; Food and Agriculture Organisation (FAO), 1957; Rasul and Thapa, 2003). In general, cultivation for household subsistence is seen as somehow less valuable than market-oriented production, apparently because it contributes little to the national economy and to statistics such as Gross Domestic Product (GDP) (Watters, 1971). Shifting cultivation is also blamed for

much tropical deforestation and other environmental problems (Brady, 1996). For these and other reasons, shifting cultivation has generally been seen as an outmoded practice that is long overdue for replacement. Therefore, large-scale efforts have been undertaken with the aim of transforming shifting cultivation into sedentary agriculture. Often these have taken the form of restrictions on land use, thereby inducing farmers to reduce fallow periods, compromising the sustainability of their farming systems and thus their livelihoods. At the same time, outsiders are becoming increasingly active in developing and introducing alternatives to these farmers (either in support of government policies to eradicate shifting cultivation or to support farmers' livelihood needs, most likely a combination of these motives). Thus, many shifting cultivators are in a position where their traditional practices are becoming less able to provide them with a sustainable livelihood, while simultaneously they are being exposed to new opportunities to make changes.

Conventional views of shifting cultivation are related to ideas that agriculture changes in a linear, evolutionary fashion, progressing from low-input, extensive, subsistence-based agriculture to high-input, intensive, commercialised systems. Theories of agricultural change have often taken a 'top down' approach, with a focus on processes such as economic, demographic or social change and their effects on agriculture. Earlier theories, such as those outlined in Ester Boserup's (1965) *The Conditions of Agricultural Growth*, focused on identifying the 'trigger(s)' of change, in an effort to explain why and how certain processes of change took place. More recent theories have suggested a range of factors that may be involved in change, such as population, markets, infrastructure, household economics, institutions, society, culture and government policy. However, as a whole this body of theory tends to be somewhat dislocated and often reductionist in its approach to agricultural change. Prominent factors tend to be presented in isolation, with most works focusing on just one or perhaps a handful of variables. Although specific examples are often drawn upon in illustrating these theories, they generally aim to be universally applicable.

This thesis, while recognising that many meaningful contributions have been made in the theory on agricultural change (and bearing these theories in mind), consciously shifts the focus to the local level, drawing attention to individual household livelihoods as the context within which decisions are made. The livelihoods approach is a relatively recent addition to the field of development, and has been widely embraced by practitioners and academics alike. In general, it is seen as a way of putting people at the centre of development analysis and of acknowledging and valuing diversity (Ashley

and Carney, 1999:7; Chambers and Conway, 1992: 4; Department for International Development (DFID), 1999; Helmore and Singh, 2001: 3). It also provides a cohesive framework for investigating poor people's priorities and needs (Ashley and Carney, 1999: 7). It may thus be able to overcome some of the reductionism of conventional approaches and provide a more holistic and people-centred understanding of agriculture and change.

The livelihoods framework identifies several factors that affect people's livelihoods. The five main components of the framework are: livelihood assets or resources; livelihood activities and strategies; the outcomes of these activities; the institutional and organisational context; and the vulnerability context that households operate in (Ashley and Carney, 1999: 47; DFID, 1999; Ellis, 2000: 30, Scoones, 1998: 4). The framework is not intended to be a model of reality, but to provide a tool for ordering complexity and identifying the many factors that influence livelihoods (DFID, 1999). The livelihoods framework is commonly used in the planning and management of development interventions aimed at poverty reduction (Ashley and Carney, 1999: 1, 10; DFID, 1999; Ellis, 2000: 28). However, this research experiments with its use as an analytical tool for understanding household agricultural decisions.

1.2 Research context and methodology

The Lao People's Democratic Republic (Lao PDR) is an interesting country for the investigation of change within shifting cultivation-based livelihoods. As a communist country, relatively closed from 1975 to the early 1990s, it has been somewhat isolated from foreign influence. Lack of government funds has meant infrastructure has remained minimal and change has been much slower than in neighbouring countries. Shifting cultivation remains the primary system of land use in the mountainous north, where land suitable for paddy production is scarce. The government's agenda to eradicate shifting cultivation was stepped up in the 1990s with a programme of land use zoning and land allocation,¹ which has induced farmers to modify their farming systems, notably by reducing fallow periods and increasing cropping intensity. This has impacted on the productivity and sustainability of these systems, making livelihoods more vulnerable. However, market access has recently improved with the upgrading of the national highway and opportunities for change are now slowly

¹ Most farmers are yet to receive formal land title, but have been 'allocated' a limited number of plots for agricultural use (H. Sodorak, pers. comm., 9 February 2005).

becoming available. An exploratory visit to the Lao PDR prior to embarking on this thesis confirmed that shifting cultivation, an area of personal interest to the researcher, was indeed an important development issue and a topic worthy of investigation for its' very real and practical importance in the everyday lives of many rural Lao.

The research questions outlined at the start of this chapter are addressed through an investigation of farmers' responses to one opportunity – the intensification of livestock production through the cultivation of managed feed resources. This opportunity was offered by the Forages and Livestock Systems Project (FLSP), implemented at the local level by the District Agriculture and Forestry Office (DAFO) extension workers. The study was carried out using a mixture of qualitative and quantitative methods, with a focus on in-depth household interviews aimed at understanding household livelihoods and farmers' perceptions of their situation, as well as of the forage technologies on offer. Four villages were chosen in Xieng Ngeun District - one of five districts where the project was active. A total of 143 households were represented in the research, 30 of them participating in the in-depth interviews. The research included a mix of households who had never tried cultivating forages, those who were currently cultivating them, and those who had tried but stopped.

The case study was not selected to be representative of the whole of the Lao PDR. Other villages may face slightly different issues from those of the study villages, due to differences in factors such as market access, land type and availability, forest access, climate, village-level institutions, livestock-related experience and traditions and so forth. Many of the issues raised in this study, however, are expected to be relevant throughout shifting cultivation areas in the Lao PDR, particularly where livestock is seen as a promising avenue for development. On a wider level, this study illustrates the importance of understanding the livelihood situation within which potential farming system changes, including the introduction of new agricultural technologies, are offered to small-scale farmers.

1.3 *Overview of the thesis*

This chapter has introduced the question of how shifting cultivators' livelihoods shape their agricultural decisions. It has briefly introduced some of the issues associated with shifting cultivation today and situates this within ideas on why and how agriculture changes. The livelihoods approach has been suggested as a way of investigating

decisions at the household level, followed by an overview of where and how this study is undertaken.

Chapter Two provides a short overview of shifting cultivation, followed by a discussion of how it has been conceptualised in the literature, highlighting both negative and positive views of the practice and the impacts that such views have had on its practice. It then discusses some of the recent trends and changes that have taken place, assessing the current situation of shifting cultivators. Finally the prospects for the future of shifting cultivators are considered, including some of the avenues currently being pursued by research and development organisations, highlighting livestock as the option this thesis concerns.

Chapter Three turns to the wider issue of how shifting cultivation and other agricultural systems change, discussing a number of theories and the factors they identify as causing or shaping change within agriculture. The last part of the chapter focuses on technology adoption as a major path by which agricultural change takes place, considering how the wider factors of agricultural change relate particularly to technology adoption, as well as some factors that are specific to this avenue of change.

In Chapter Four the livelihoods approach is introduced as a way of bringing together many of the factors identified in the agricultural change literature, in a way that is holistic and people-focused rather than process-focused. After first outlining the features and principles of a livelihoods approach, the chapter turns to its practical application in the form of the livelihoods framework. The second part of the chapter considers how the livelihoods approach relates to the question of agricultural change and how the framework might be utilised in the study of change at the household level, finishing with two examples from the literature of how livelihood factors were found to influence differential strategies with respect to livestock.

Chapter Five gives an overview of the situation in the Lao PDR, describing the institutional context at the national level and how this has impacted on the practice of shifting cultivation. It then looks more specifically at the livelihoods of shifting cultivators and the challenges they face, along with the options for the future. The research is situated within this context and the FLSP project the research relates to is introduced.

Chapter Six provides an overview of the methodology employed for this research, covering the general approach, the sites and participants involved and how the research was carried out. An explanation of the data set referred to in Chapter Seven is also given.

Chapter Seven describes the livelihoods of farmers in the villages studied from a largely quantitative point of view. It begins with a discussion of the livelihood assets and resources people have access to, noting differences between households who have adopted forages and those who have not. It then describes how these resources are used in terms of the major livelihood activities these households are engaged in and the way these activities contribute to household livelihoods, as well as touching on some of the general problems, constraints and trends relating to these activities.

Chapter Eight is based on the qualitative data from interviews and group discussions. It focuses on farmers' perceptions of their livelihoods and of the opportunities available to them, including their perceptions of livestock and forages. The reasons for not trying forages are described, largely from the point of view of the 'non-adopters' themselves, but incorporating the views of farmers who have adopted and of extension workers as to why many farmers have not adopted.

Chapter Nine discusses these findings in the light of the research questions outlined in this chapter, drawing on material presented in Chapter Three. The discussion is structured according to the livelihoods framework, considering how each component of the framework is contributing to household agricultural decisions. It also draws attention to the importance of the technology itself and particularly to farmers' perceptions both of the technology and of their livelihoods in general, suggesting the framework be amended to include these vital components affecting household-level agricultural change.

Chapter Ten summarises the main issues presented in this thesis and considers the wider implications of the findings discussed in Chapter Nine. It concludes that the household livelihood context is extremely important to agricultural decisions at the local level and that the livelihoods framework is a useful tool for guiding and structuring the analysis of the relationship between livelihoods and agricultural change. However, it is suggested that the explicit inclusion of both technology and farmers' perceptions makes the livelihoods framework an even more useful heuristic device for understanding local level agricultural change.

Chapter 2 Shifting Cultivation

2.1 Introduction

Agriculture is constantly changing. From the earliest cultivators of the soil to the industrialised farmers of today, people have always been altering the ways in which they work the land. Such changes originally came largely from within farming communities themselves, speeded by the introduction of new planting materials, equipment and techniques from contact with outsiders through trading and other activities. However, the level of outside involvement has been increasing to the point where today national governments, agricultural research institutions and development organisations are actively involved in the transformation of even the most isolated regions of the world. In the last century, particularly, the general consensus has been that 'professionals' know best - the educated, urban elites with their visions of modern, industrial, 'developed' societies, made possible by intensive and highly productive agriculture. The function of agriculture is now rarely that of simply feeding one's family. Instead, crops are increasingly grown for sale in regional or global markets and many farmers, just like their city-dwelling counterparts, purchase much of their food requirements from those same markets.

However, even in today's world - driven by science and technology and characterised by communication and connectedness - older, more 'traditional' forms of agriculture survive. Indeed, one of the earliest systems of land-use, known as shifting cultivation (also commonly termed 'swidden' or 'slash-and-burn' agriculture), continues to provide the basis of millions of people's livelihoods, particularly in the tropical regions of Asia, Africa and Latin America. Viewed by many as unproductive, environmentally destructive and unsustainable, these systems are increasingly under pressure from forces such as population growth, government policy and the interests of commercial farming and logging. While many policies and programmes are aimed at stopping the practice, they often fail to provide viable and socially acceptable alternatives for those who depend on it. This may be partly due to the fact that it tends to be practised in mountainous regions where soils are poor and market access is limited. Further, even where alternatives or improvements are offered by governments or development projects, uptake by farmers tends to be slow or only by a minority.

This chapter looks at some of the issues surrounding shifting cultivation and agricultural change. Although the scope is quite general, the focus of this thesis is on

agricultural change in the uplands of Southeast Asia and, as such, literature pertaining to this region receives most attention in the discussion. The chapter firstly introduces the phenomenon of shifting cultivation, exploring some of its characteristics and highlighting the diversity within this generalised agricultural type. It then looks briefly at the history and extent of shifting cultivation, following this with a discussion of some of the views that have been taken of its practice. Recent trends and their impacts on the current practice of shifting cultivation are briefly surveyed, the chapter concludes by touching on the prospects for shifting cultivation into the future, including possibilities for improvement or replacement of the practice.

2.2 What is shifting cultivation?

The term 'shifting cultivation' in fact refers to a variety of systems of land use, typically involving the clearance and burning of vegetation, followed by the cultivation of crops for a few years (often as little as a single season), after which the land is left fallow for a number of years (usually between three and thirty years, sometimes less and sometimes more) (Capistrano and Marten, 1986: 13; Pelzer, 1948; Thrupp et al., 1997: 3, 6; Watters, 1960;). The shifting of fields (through fallowing or abandonment) has been identified as the main distinguishing feature of shifting cultivation (Christanty, 1986: 227; Watters, 1960: 67). Although this definition appears relatively simple and concise, there are hundreds (probably thousands) of variations of the practice. Agricultural experts have, throughout the years, proposed various definitions and classifications of shifting cultivation. Some are relatively simple, such as that proposed by Harold Conklin, who identified four specific sub-types under two main categories (Conklin, 1957: 3; see p. 10).² Others have taken a broader view, concluding that the sheer diversity of forms of shifting cultivation precludes simple analysis and definition (for example Brookfield and Padoch, 1994; Spencer, 1966; Thrupp et al., 1997). In fact, it seems that one of the most pervasive characteristics of shifting cultivation is diversity, a concept which will now be used to discuss some of the features of shifting cultivation.

Let us first explore this theme of diversity in the context of the major components of shifting cultivation systems. To start with, the types of crops grown can vary enormously. Most often they include staples such as rice and maize, and may also

² Conklin's categories were *partial systems*, further divided into *supplementary* and *incipient*, and *integral systems*, divided into *pioneer* and *established* forms.

include root crops and other vegetables, fruit and other tree crops, herbs, spices, condiments and medicinal plants (Chazee, 1993: 71; Conklin, 1957: 147; House, 1997: 8-11; Kunstadter, 1978: 77; Srimongkol and Marten, 1986: 87; Thrupp et al., 1997: 12-13). Various types of cash crops may also be incorporated (Ruthenberg, 1980: 30). These are generally grown in conjunction with subsistence crops and may themselves be able to be either sold or consumed if necessary (Polthanee and Marten, 1986: 116; Stone, 2001: 171; Thrupp et al., 1997: 15-16). Diversity of crops is thus found not only between systems in different areas but also within individual systems, with most producing a wide range of products to fulfil a variety of needs, in contrast to more 'modern' forms of agriculture where monocropping is dominant (Brookfield and Padoch, 1994; Capistrano and Marten, 1986: 13; Christanty, 1986: 230; Conklin, 1957: 147; Geertz, 1963: 16-19; Sutthi, 1989; Thrupp et al., 1997:12).

The techniques used to clear fields and plant crops are also diverse. Variations can be found in the methods of clearing, burning, propagation and planting; the timing and spatial arrangement of crops; and the type of crop combinations used (Brookfield and Padoch, 1994; Conklin, 1957; Ruthenberg, 1980: 36-38; Spencer, 1966; Watters, 1960: 70-75). The length of the fallow period and type of vegetation allowed to grow can also differ. Fallows range from being completely natural to highly controlled and managed, with desired species planted either for their contribution to soil regeneration or their subsistence or economic value (Szott et al., 1999: 164; Place and Dewees, 1999; Cairns and Garrity, 1999: 41). The land that is cleared for cropping may be covered only with shrubs and bushes in the case of short to medium fallows of a few years; with secondary forest if left for a longer period of time; or it may be primary forest - land that has never been cropped before (Christanty, 1986: 230-1; Watters, 1960: 70). Shifting cultivation is often combined with other livelihood activities such as hunting, fishing and the gathering of 'wild' forest products, and sometimes with other cropping systems such as permanent field cultivation (for example, paddy rice where suitable land is available), plantation crops, home gardens and animal husbandry, as well as off-farm or non-farm work (Watters, 1960; Rerkasem and Rerkasem, 1994). Hence, there is usually a high degree of diversity not only within shifting cultivation systems, but in the livelihoods of those who rely on them.

Scholars have applied many different criteria for distinguishing different types of shifting cultivation, which itself highlights the complexity and diversity of these methods of agriculture. Some classificatory systems are highly detailed and as many as 25 distinct

typologies have been identified (Spencer, 1966: 163-165)³. The possibilities for classification are almost endless. Shifting cultivation systems are constantly evolving, and rigid typologies rarely encompass, much less explain, all of these systems adequately. Nevertheless, some simple distinctions can be made. One of these is between 'pioneer' shifting cultivation, which involves the regular clearance of new land, and 'cyclical' shifting cultivation, in which land is used in a rotational fashion, each plot being returned to after a period of fallow (Conklin, 1957: 3; Sutthi, 1989: 108-9). The pioneer type is often associated with migrants or 'non-traditional'⁴ shifting cultivators (Watters, 1971). Although this is not always the case,⁵ there do tend to be differences between traditional and non-traditional shifting cultivation systems in terms of their environmental impacts. The latter tend to be recent migrants to the uplands who are unfamiliar with both the local environment and the nuances of shifting cultivation. This lack of knowledge and skill often results in higher levels of deforestation and environmental degradation. Traditional shifting cultivators, on the other hand, often have an intimate knowledge of their environment and their practices, developed over many generations, are generally well-adapted to local conditions. Culture may play an important role in regulating land use and informing methods for planting and fallowing. (Conklin, 1957: 3; Spencer, 1966: 167; Thrupp et al., 1997: 15; Watters, 1971: 6-11)

The agricultural practices described above probably constitute the oldest systems of cropping still in use in Southeast Asia (Spencer, 1966: 4). Historically, shifting cultivation has been practised in forested regions all over the world, including South and East Asia, Europe, humid Africa and the Americas, and was common in temperate zones until the 19th century (Spencer, 1966: 53; Thrupp et al., 1997: 3). As Spencer (1966: 166) points out:

..the practice has been almost worldwide ... it ranges from sea level to the highest possible elevation at which crop growing is possible, and ... all kinds of peoples ... practice some form of shifting cultivation when the circumstances suggest its applicability .

³ For more detail on some of the major typologies proposed see Conklin (1957); Fujisaka et al. (1997); Spencer (1966); Watters (1971).

⁴ This term refers to those who have not traditionally practised shifting cultivation - in other words, relative newcomers to the practice.

⁵ Some groups, for example, have practised pioneer shifting cultivation for long periods of time and can therefore be considered traditional pioneer shifting cultivators (Keen, 1983: 298-300).

Although often associated with images of isolated mountain dwellers, shifting cultivation has been practised in both upland and lowland areas, and can still be found in diverse topographies and ecosystems in many parts of the world today (Spencer, 1966: 13; Thrupp et al., 1997: 3). Nothing in the nature of shifting cultivation requires the selection of hilly slopes, but as lowland areas tend to be both more accessible and more suited to agriculture, they have tended to have more outside influence and have become the sites of more permanent, 'modern' agricultural systems (Spencer, 1966: 13,26). It has also been suggested that some shifting cultivators, such as the Khamu of the Lao PDR, may have been 'pushed out' of the lowlands and into mountainous areas by other ethnic groups (Stuart-Fox, 1986: 45; see also Spencer, 1966: 5).

2.3 Divergent views

Shifting cultivation has received a lot of negative attention over the years. It is often accused of being primitive, wasteful, unproductive and, particularly in recent years, destructive and damaging to the environment (Brady, 1996; Cairns and Garrity, 1999: 37; FAO, 1957: 9; Vosti and Witcover, 1996: 23). Likewise, those who practise this type of agriculture, often but not always ethnic minorities, have been portrayed as 'backwards', traditional, simple, isolated, poor, etc. (Watters, 1971; Thrupp et al., 1997). Governments, academics and agricultural scientists in particular have tended to be highly critical of the practice, often resulting in policies and regulations which, intentionally or not, have made it more difficult for people to continue shifting cultivation as they had in the past. Many writers have described shifting cultivation as a 'problem' needing to be 'solved'. Overt examples include FAO (1957) and Watters (1971) but many others, in their focus on finding alternatives, have made similar suggestions (see for example Brady, 1996; Evenson, 1993a; Harwood, 1996; Rasul and Thapa, 2003).

Exemplifying the negative attitudes that prevailed in the 1960s and 1970s are the comments of Watters, who suggested that shifting cultivation 'could easily become an obstacle to economic development, checking still further the progress of those countries which have, for too long, tolerated its existence' (Watters, 1971: 26). This was seen to be partly because 'it is often accompanied by an attitude of resignation to hazard and generally of passive acquiescence to the mediocrity of the results obtained and the consequent low standard of life' (Watters, 1971: 2). The FAO have put forth similarly pejorative views, seeing shifting cultivators as 'without any possibility of progress' because they are unable to urbanise and specialise (FAO, 1957: 9). They and others have seen shifting cultivation as backwards, and it is commonly accepted

as an early stage in the evolutionary development of agriculture (Boserup, 1965; Conklin, 1957; FAO, 1957: 9; Greenland, 1974; Rasul and Thapa, 2003; Spencer, 1966; Watters, 1971).

Views of shifting cultivation such as those touched on above are closely related to a view of development that emphasises the economic performance of agriculture, within the overarching goal of economic growth. This Western model of development, with its roots in modernisation theory (see for example Rostow, 1956; Smelser, 1966), dichotomises the 'traditional' and the 'modern' and seeks to transform society into an efficient, specialised and standardised economic machine. Agriculture is reduced to a sector of the economy and judged by its contribution to national economic development, as Watters' comments above illustrate. Thus, older forms of agriculture such as shifting cultivation are judged in relation to 'modern' or industrial agriculture, with its high commercial outputs achieved through monocropping and the use of high yielding varieties, agrochemicals and machinery. Virtues such as diversity, stability, resilience and social sustainability tend to be considered less important than the production of an ever-increasing, marketable surplus. Such views reinforce the idea that in order for 'development' to take place, shifting cultivation must change, or be changed. This has been a major reason for the restrictive government policies and enthusiastic development efforts touched on later in this chapter (Section 2.4) and discussed more fully as part of the political and institutional context for agricultural change in Chapter Three (Section 3.6).

An alternative perspective, although resulting in much the same outcome, is that shifting cultivation in its traditional form is not a 'bad' agricultural practice (as it is often portrayed), but that outside forces have put pressures on the environment in which it is practised, to the extent that it is no longer viable. This view seems to be accompanied by a genuine sense of regret - maybe shifting cultivation was in fact ideal for sparsely populated uplands, but unfortunately, things have changed. The 'balance between man and nature' is seen to have been destroyed (Watters, 1960: 95), and thus the sustainability of traditional shifting cultivation has been undermined (Brady, 1996: 4; Cairns and Garrity, 1999: 38). Some authors have suggested that shifting cultivation has become 'perverted' or 'impoverished' by the changes that have taken place (Rasul and Thapa, 2003: 496; Sutthi, 1989: 107).

That shifting cultivation is or can be sustainable has been acknowledged by many of those promoting alternatives or improvements as well as by those simply defending

shifting cultivation or documenting changes to it (Brady, 1996: 4; Chazee, 1993: 69; Evenson, 1993b: 22; Harwood, 1996: 75; Rasul and Thapa, 2003: 496; Roder, 1997 : 2; Spencer, 1996: 167). The forces that are seen to have resulted in loss of sustainability are often external forces rather than inherent characteristics of shifting cultivation. These include the development efforts and restrictive land use policies mentioned above, as well as loss of land due to in-migration and appropriation by outsiders, as well as social and cultural changes (all of which are discussed in more detail in the following chapter) (Brady, 1996: 4; Cairns and Garrity, 1999: 38; Harwood, 1996: 76; Rasul and Thapa, 2003: 496; Spencer, 1966: 15; Thrupp et al., 1997: 8). With regards to Southeast Asia during and since the colonial period, Spencer argued that:

Constant encroachment upon the lands of shifting cultivators, coupled with economic exploitation, backed by superior political and economic power, historically has been driving shifting cultivators from their lands, upsetting the stability of their cultures, and promoting the decline of whole societies (Spencer, 1966: 15).

Spencer saw restrictions on land-use and the appropriation of traditional fallow lands as having led 'to the point where maladjustments have become severe and shifting cultivation has begun to exhibit all the faults that commonly are ascribed to it as a system' (Spencer, 1966: 168).

Some authors, while generally in agreement with many of the above points, actively contest some of the underlying assumptions that have contributed to this situation, arguing that many of the negative attributes commonly associated with shifting cultivation have been exaggerated or are simply untrue (Angelsen, 1995: 1713; Thrupp et al., 1997: 31, Spencer, 1966: 167). Thrupp et al. (1997), for example, refute what they see as commonly held 'myths' about shifting cultivation - such as it being primitive, uniform, unproductive and destructive - arguing that these perceptions are based on misinformation and oversimplifications and have resulted in inappropriate laws and policies which aggravate the problems already faced by shifting cultivators. They and others point out that shifting cultivation systems in fact have many positive aspects. They are, for example, diverse, dynamic, and relatively productive and efficient - returns to labour in particular can be high due to the low labour requirements for land preparation (Christanty, 1986: 226; Marten, 1986: 1; Sutthi, 1989: 108, 127; Thrupp et al., 1997: 23). Their stability, resilience, efficiency and sustainability are enhanced by the fact that they tend to resemble natural ecosystems much more than does modern agriculture (Amanor et al., 1993: 2; Marten, 1986: 1). They are generally well adapted to local environments and can be considered an ideal solution in the humid tropics,

when fallows are sufficiently long to restore soil fertility (Christanty, 1986: 226; Thrupp, 1997: 23). Further, in marginal environments where permanent cultivation can be made possible only with the addition of ongoing and costly inputs, allowing the soil to regenerate naturally through fallowing is a cost-effective way of ensuring the sustainability of future production (Mertz, 2002:156).

The diversity inherent in shifting cultivation systems contributes not only to ecological but also to social viability. It enables a variety of human needs to be met, reducing the risks of food insecurity, providing self-sufficiency and flexibility and allowing farmers to adapt to what are often 'uncertain and fluctuating social and environmental conditions' (Marten, 1986: 1). Those who practise shifting cultivation usually have complex knowledge of their environments, and are often 'sophisticated managers of biodiversity' (Thrupp et al., 1997: 23). In many cases production and cultural systems have developed side by side, each influenced by the other and, as Marten (1986:1) puts it, existing in 'intricate coadjustment' with each other. Specific practices are often embedded in the religion and customs of the people, and the strict rules and patterns generated by these cultural systems also contribute to sustainability (Christanty, 1986: 226; Sutthi, 1989: 108, 111).

Despite these arguments in favour of shifting cultivation as a viable and perhaps even ideal solution to tropical upland agriculture, the dominant view continues to be that shifting cultivation is something we should be concerned about; something that we should try to change for the benefit of all. For this to happen, ways must now be found to 'improve' farmers' practices so that poverty and environmental degradation can be mitigated. Some of the avenues currently being pursued are outlined later in this chapter.

2.4 *Recent changes and the future of shifting cultivation*

2.4.1 *Changes and trends in shifting cultivation*

The discussion so far has introduced the concept of shifting cultivation and touched on some of the issues surrounding this form of agriculture and the ways in which it has been conceptualised. As already noted, shifting cultivation has long been subject to many outside forces resulting in significant changes to traditional methods, and to the environmental and social outcomes of the practice. This section looks at changes within shifting cultivation, focusing on some of the trends of the last few decades, and

assesses the situation currently faced by shifting cultivators as they seek to secure a sustainable livelihood into the future.

Over the centuries, the various pressures on shifting cultivation have often resulted in its transformation into permanent agriculture. In other areas shifting cultivation has expanded into new territories, due to population increase, the migration of lowlanders in search of new agricultural frontiers and the migration of shifting cultivators themselves. In some areas colonial economies initiated the growing of cash crops, and this trend has continued as formerly remote regions have become increasingly integrated into their regional and national economies (Capristrano and Marten, 1986: 14). The development of infrastructure such as roads and markets have brought new possibilities for farmers, and exposed them to different cultures, commodities and technologies. Increased accessibility has brought extension services and development projects to villages previously unreachable. Recent decades have seen a continued increase in production for the market rather than for subsistence. Few farmers now produce all of their household's subsistence needs on their own farm, and it is similarly uncommon to produce crops purely for subsistence. Shifting cultivators have been encouraged not only to grow cash crops but also to experiment with hitherto unknown plants, animals and inputs. Sometimes these 'solutions' have been ecologically, culturally or economically inappropriate, or markets have proven to be unreliable, resulting in increased instability (Thrupp et al., 1997: 7). In other cases they have been 'successful' and shifting cultivation has been replaced altogether.⁶ An increase in monocropping, particularly where cash crops are being grown, has reduced the diversity of many shifting cultivation systems. Shifting cultivation is also increasingly practised side by side with other agricultural activities or non-farm livelihood strategies (Raintree and Soydara, 2000; Rerkasem and Rerkasem, 1994: 89; Rigg, 2005b).

Another major trend is the reduction of fallow periods. Population pressure is often cited as a main reason for this, but changing regulatory environments have possibly had an even greater impact on many shifting cultivators. Heightened awareness of issues associated with deforestation and the economic goals of national governments have brought about increasingly assertive campaigns to 'stabilise' or eliminate shifting cultivation. Land use and allocation programmes, including the creation of conservation areas and other classes of forest in which agriculture is prohibited, have

⁶ This has happened for example in Nepal, Java and Bali in Indonesia, peninsular Malaysia and some parts of northern Thailand (Rasul and Thapa, 2003: 500).

often encompassed fallow lands vital to the functioning of shifting cultivation systems. The granting of household land titles or use rights to fixed portions of land, often far smaller than the area previously used by farmers, has the dual outcome of encouraging investment in the land and restricting future movements to these allocated plots - again reducing fallow periods and sometimes forcing longer or even continuous cropping periods (Mertz 2002: 156). Such land use restrictions have been implemented in for example Bangladesh (Rasul et al., 2004: 217), Indonesia (Potter, 2001: 306), Lao PDR (Roder, 1997 : 4) and Thailand (Keen, 1983: 304-5; Rasul and Thapa, 2003: 502; Rerkasem and Rerkasem, 1994: 22). The resulting reduction in fallow length often leads to soil degradation, increasing weed problems (and subsequent labour requirements) and falling productivity overall, eventually forcing farmers to look for alternatives (Rerkasem and Rerkasem, 1994: 90, 95; Roder, 1997 : 9). Some farmers have become increasingly reliant on wild forest products for their subsistence (Rerkasem and Rerkasem, 1994: 89), which can lead to over harvesting particularly where forests are already scarce. Generally, the problem is framed as one of increasing demand for resources and falling supply (Foppes and Ketphanh, 2005: 188-9; Raintree, 2000: 15; Rerkasem and Rerkasem, 1994: 96).

As this brief discussion shows, systems of shifting cultivation and the livelihoods of those who practise this form of agriculture have undergone increasingly rapid change over the last few decades. These changes can be separated into two main themes - that of shifting cultivation being 'squeezed' or forced to change due to limitations on land availability, and modifications of a more voluntary nature in response to new opportunities brought about by economic and social development. In some cases the sustainability of traditional systems has been undermined, along with their viability as a livelihood strategy. Many shifting cultivation systems cannot continue as they had in the past, due to outside pressures that have changed the environment within which people construct their livelihoods. Even in areas where it can be argued that shifting cultivation is still sustainable, governments have often already decided that the practice is to be stopped and replaced with sedentary, more economically productive forms of agriculture. There is thus pressure on shifting cultivators from many sides to make changes to their agricultural practices. Many options are currently being pursued by research and development projects. The next section outlines some of these options.

2.4.2 Shifting cultivation into the future

Many programmes are aimed at the development and dissemination of sustainable alternatives to shifting cultivation in the uplands. One alternative is the creation of terraced land that can be used for paddy rice (Pandey et al., 2005; Rasul and Thapa, 2003: 500). However, this requires suitable land and sufficient water, is often very labour-intensive, and can involve high costs to resource-poor farmers. It appears that there are few alternative crops that can be grown continuously on sloping upland soils without the use of ongoing and costly inputs, particularly fertilisers. In this case, cash crops seem to be the preferred strategy as they enable the purchase of such inputs. Tree crops can be grown permanently without high inputs. Converting fallow lands into pasture for livestock has also been put forward as a potential solution for some areas, as have mixed farming systems with draught animals and managed feed sources (Raintree, 2005: 47; Watters, 1971: 279). Other possibilities include fish ponds, home gardens and mulch farming systems (Raintree 2005: 47).

Another avenue is to attempt to increase the sustainability and/or production potential of existing systems, rather than attempting to replace these systems altogether. This has the advantage of being less disruptive and more familiar to farmers, as it builds on what they are already doing and involves making relatively minor adjustments to their practices and their livelihoods. A number of possibilities exist which are aimed at maintaining or improving soil condition and fertility and ultimately improving yields (Roder, 1997 : 6). Improved cropping practices can reduce nutrient loss during the cropping period. Examples of this include mixed cropping, relay or sequential cropping with legumes, use of cover crops, increased planting density, mulching and contour planting (Linguist et al., 2005: 301; Rerkasem and Rerkasem, 1994: 94). Agroforestry is another option, involving the incorporation of woody perennials into existing crop or animal systems (Harwood, 1996: 82-4; Raintree, 1985: 1). Improved fallows can also provide various benefits. The intentional planting of species that speed restoration of soil fertility can mean that the negative effects of short fallow periods can be mitigated and productivity improved (Cairns and Garrity, 1999; Fahrney et al., 1998: 152; Reijntjes, 2000: 4; Sanchez, 1999: 4). Planting of commercially valuable fallow species such as tree crops (also a form of agroforestry) means that fallow land can become more productive in terms of the economic benefits to farmers' livelihoods (Fahrney et al., 1998: 152), but may not provide all of the environmental services of natural fallows (Rerkasem and Rerkasem, 1994: 95). The use of improved crop varieties could potentially provide benefits such as increased yields, improved drought resistance,

shorter growing periods and higher value crops (Linguist et al., 2005). Finally, the use of commercial fertilisers is sometimes advocated as a feasible way to improve productivity in shifting cultivation systems, although these of course require cash to purchase them (Mertz, 2002: 156).

Another way to 'improve' existing shifting cultivation systems is to incorporate activities with the potential to increase cash income so that food can be purchased if necessary, relieving pressure on struggling systems where productivity has declined. Some of these activities have the potential to replace shifting cultivation as the major source of livelihood, if successful enough to provide sufficient income to purchase household food requirements. As such, they are particularly favoured by governments and projects seeking the gradual replacement of shifting cultivation. A range of possibilities have been identified and these are currently being pursued by various organisations and projects. Many of these activities are already part of farmers' livelihood systems and may be modified or intensified to provide added benefits (Chanpengxay et al., 2005: 250). Such activities include: raising livestock (Peters et al., 2001: 6); agroforestry (Harwood, 1996: 83; Raintree, 1985); harvesting and sale of non-timber forest products (NTFPs) (Foppes and Ketphanh, 2005: 188-189); cultivation and management of some traditionally 'wild' forest products, where there are markets for these (Linguist et al., 2005: 302); and adoption or intensification of non-farm activities such as the sale of home-crafted items, trading and other small enterprises (Raintree, 2005: 45). The existence and accessibility of markets is important for these types of activities to succeed.

Of these options, livestock production is of particular relevance to this thesis, as the case study chosen involves a project focusing on livestock with the long-term aim of providing an alternative to shifting cultivation. Livestock are an existing element of many traditional shifting cultivation-based livelihood systems in Southeast Asia. Although traditionally kept largely for purposes of ritual and prestige, today livestock are often a major source of cash income, even when kept on a very small scale (Potter and Lee, 1998: 43; Pravongviengkham, 1998a: 96). This is, therefore, one existing component of many shifting cultivation systems that has potential to be expanded and intensified, and which is often seen as 'a stepping stone out of the cycle of increasing poverty' (Peters et al., 2001: 6). The benefits of livestock production are: livestock can be easily converted to cash at any time, on relatively stable markets (Peters et al., 2001: 6-7; Horne, 1998: 158-9); large livestock can be walked long distances to markets, making them suitable for remote areas (Hansen, 1998: 39; Horne, 1998: 158-

9); livestock can potentially be used for a variety of purposes, including income, savings, food, ritual, status, draught and manure (Simaraks, 1998: 22); livestock production requires minimal inputs, as shifting cultivation areas tend to provide natural grazing lands (Simaraks, 1998: 20; Stur et al., 2002: 77); and livestock can also utilise crop residues and other resources not useful for other purposes (Horne, 1998: 158-159; Simaraks, 1998: 22). Some negative features which may be associated with livestock are: they are often subject to high mortality from disease and poor feed resources, leading to low productivity (Hansen, 1998: 39); large livestock require high initial investment and so may be less accessible for poorer households (ibid); and livestock may compete with crops, particularly under systems of free grazing (Fahrney et al., 1998: 152). The development of feed resources is seen as a promising avenue for the gradual intensification of livestock production, particularly where livestock numbers are increasing and traditional grazing areas are coming under pressure (Hansen, 1998: 39; Peters et al., 2001; Phimpachanhvongsod et al., 2005; Stur et al., 2000, 2002). Fodder production can be incorporated into many parts of the farming system (ibid).

Many of the options discussed above have the potential, at least in theory, to be intensified to the point where shifting cultivation is no longer 'necessary' - in other words, to provide an alternative means of livelihood for those currently dependent on shifting cultivation. However, it is generally accepted that in countries such as the Lao PDR, such alternatives are more likely to be incorporated into existing farming systems as modifications or supplementary activities, with the hope of reducing pressure on shifting cultivation, increasing productivity and reducing land degradation and food insecurity (Pandey et al., 2005; Roder, 1997).

2.5 Conclusion

This chapter has provided the background to the research question by introducing shifting cultivation and some of the issues and possibilities confronting those who practice it and, to a greater or lesser extent, rely on it for their livelihoods. Shifting cultivation is a diverse set of practices that has often been labelled as backwards and destructive and contrasted with 'modern', intensive agriculture with its high output and contribution to Gross Domestic Product - overlooking the potential ecological and social benefits of systems that have survived for generations. Many outsiders hold negative views of shifting cultivation and governments and other powerful actors have taken often harsh measures to eradicate it. However, these and other actions have often

simply placed increasing pressure on already vulnerable shifting cultivation systems, creating or exacerbating environmental problems and further impoverishing those who rely on it. Recent years have seen some dramatic changes in shifting cultivation systems and in many cases further adjustment seems inevitable. The livelihoods of many shifting cultivators are increasingly vulnerable. Due to the nature of the environments in which shifting cultivation tends to be practised, the practical options for alternative farming systems seem to be few. Many research and development projects are currently underway with the aim of finding and disseminating potential solutions to the problems now faced by shifting cultivators. Such farmers may be faced with a range of choices and opportunities to make changes to their farming systems. They may for example choose one option over another, decide that none are suitable for them, or that change is unnecessary. This research investigates how processes of agricultural change take place in the context of shifting cultivation and what kinds of factors affect and shape such change. The following two chapters discuss some different ways of exploring this issue.

Chapter 3 Agricultural Change

The previous chapter introduced some of the issues relating to shifting cultivation and discussed a number of changes that have recently taken place, both within this form of agriculture and in the livelihoods of those who depend on it. This chapter turns to the broader issue of how agricultural systems such as shifting cultivation change, looking at various theoretical perspectives that have been offered over recent decades and highlighting some of the variables identified as leading to and shaping change. These ideas and theories have influenced the kinds of interventions that have been pursued in order to effect the desired changes - such as the reduction of shifting cultivation, the increased commercialisation of small-scale agricultural systems and the increased use of external inputs for increased production.

3.1 Conceptualising shifting cultivation and agricultural change

The dominant view in the literature on agricultural change has been one which sees agriculture as progressing in a linear, evolutionary fashion: from simple, low-input and low-output, extensive, subsistence-oriented, 'traditional' agriculture to complex, intensive commercial high-input and high-output 'modern' agriculture. The work of Ester Boserup (1965) has been influential in shaping the views of academics on the nature of this apparent progression, particularly as it relates to shifting cultivation. Boserup presented what she saw as the evolutionary stages of agricultural development, using fallow length as the variable and seeing population growth as the mechanism causing change. Boserup's argument was that as population increases, farmers are induced to intensify land-use by cropping more frequently, which results in loss of production due to natural deterioration of the soil. More labour is thus required in order to maintain output, consequently reducing overall labour productivity but at the same time absorbing the extra labour force. As land-use intensifies, new methods and technologies are applied to increase productivity in order to maintain subsistence levels. Eventually, if population becomes too dense, there may be a transition to annual or multi-cropping - that is, the fallow period is eliminated altogether rather than shortened. In this way agriculture progresses from extensive to intensive, a process seen by Boserup as defining the history of agriculture in general. (Boserup, 1965: 15-16, 24-31; Brookfield, 1984; Stone, 2001)

A few years after Boserup's seminal publication, Harold Brookfield, another influential writer, added to this approach, offering a tentative 'theory of intensification' (Brookfield, 1972). Building on Boserup's population-based theory, Brookfield introduced the importance of the 'social and cultural contexts within which people produce and consume' in understanding agricultural change. He was later to admit that this too was a 'population-based theory' and in 1984 attempted to offer an alternative 'social' theory (Brookfield, 1984: 15). An important distinction made in this latter paper was between 'intensification' - the increasing application of inputs - and 'innovation' - the development of new practices. The importance lies in the fact that they represent different trajectories in agricultural change, each pursued for different reasons and with often disparate outcomes. Intensification, which had received prominence in the literature until this time, was now understood to be only a 'part of the story' of agricultural change (Brookfield, 2001: 190). Innovations are, according to Brookfield, triggered not only by pressures (as intensification tends to be) but also by opportunities - to increase security, reduce risk, and gain advantage (Brookfield, 1984: 39). While '[i]ntensification is always burdensome, and is adopted from necessity ...[, i]nnovation, on the other hand, offers the hope of advantage' (ibid: 35). This distinction offered a new way of looking at agricultural change and has shaped a good part of the debate on this subject since.

Although it has gained wide acceptance, the basic linear, evolutionary model of agricultural change, along with the 'population' trigger, has come under harsh criticism by many who regard it as too simplistic and reductionist, ambiguous, empirically untenable or ethnocentric (Brookfield, 2001: 181; Rasul and Thapa, 2003: 495; Thrupp et al., 1997: 10). In his later works, Brookfield challenged this model, which assumes that shifting cultivation always precedes more 'intensive' practices, and its 'supposed stepwise transition from less to more intensive forms of land use ... [which] has tended to impose a deterministic template on a highly diverse set of actual histories' (Brookfield, 2001: 182). Instead he argued that agriculture is constantly adapting to changing conditions but 'in no one direction nor along any one dimension' (ibid). Similarly, Thrupp et al. (1997: 10) argued that linear models neglect 'the complexities of historical change', overlooking many factors other than population. They see agricultural transitions as 'dynamic processes rather than categorical divisions' and cited examples of people going 'backwards' from agriculture to hunting and gathering (ibid).

A recent article by Jonathan Rigg (2005b), drawing on Brookfield's earlier works, discussed agricultural change in Southeast Asia in terms of changes in society and in the contribution that agriculture makes to people's livelihoods. He proposed a 'generalised typology of agrarian transitions' in Southeast Asia with six different categories associated with the past, present and future (Rigg, 2005b:180). Using the categories of 'subsistence', 'semisubsistence', 'pluriactive', 'professional' and 'remnant smallholder', this too appears to be an evolutionary model (with the possible exception of the last category) and, although apparently based on empirical evidence, may be open to some of the same charges laid against previous evolutionary models.

These models or theories about agricultural change have been influential in studies attempting to identify the factors involved in shaping or causing change. While some of the theories essentially provide a hypothesis (for example that population increase or social change 'triggers' agricultural change), in more general terms they have directed attention to certain processes and, conceivably, away from other elements of the 'big picture' of change in this most central aspect of rural people's lives and livelihoods. The next sections focus on some of the main variables that have been used in explaining the reasons for or direction of agricultural change, beginning with those that come out of the above theories and then looking at some alternative suggestions.

3.2 *Population and environment*

The idea that population growth causes agricultural change, particularly as regards shifting cultivation being transformed into permanent agriculture, has already been introduced. Boserup argued that increased population density would induce the development of technology and the intensification of agricultural production, ultimately increasing the carrying capacity of the land. The causal mechanism of change was seen to be ecological - extensive, efficient farming is possible under low population pressure, but with increased population, soil fertility has to be improved through a change in agricultural methods. Population pressure was thus seen as the major force for change (Boserup, 1965: 13; Stone, 2001: 164).

Whether or not they agree with Boserup's theory in its entirety, many scholars have seen population growth as contributing to change in shifting cultivation and agriculture in general (for example Elson, 1997; Geertz, 1963; Pingali et al., 1987; Ruthenberg, 1980). That shifting cultivation is usually found in sparsely populated upland areas would appear to support this theory (Capistrano and Marten, 1986: 13). Specifically,

population pressure is often seen as a major cause of agricultural expansion and deforestation; of adoption of cash crops and development of paddy; and particularly of shorter fallows, resulting in reduced yields, environmental problems and/or permanent fields (Brady, 1996: 4; Cairns and Garrity, 1999: 38; Capistrano and Marten, 1986: 14; Harwood, 1996: 75; Keen, 1983: 301-302; Place and Dewees, 1999: 324; Rasul and Thapa, 2003: 496; Rasul et al., 2004; Rerkasem and Rerkasem, 1994: 90; Roder, 1997 : 4). Keen's discussion of shifting cultivation in northern Thailand is illustrative of this view - he maintained that '[i]t takes only a few additional land users to upset the delicate balance between man and land in this self-replenishing system of agriculture' (Keen, 1983: 301).

As can be seen, the issue of population growth has received a lot of attention and is seen as both a natural cause of agricultural change and as a justification for outside interventions aimed at stopping shifting cultivation (see for example Brady, 1996: 4; Cairns and Garrity, 1999: 38; Cramb, 2005: 75; Pingali and Binswanger, 1987: 28-30; Rerkasem, 1998: 57). However, some authors have proposed that factors other than population may be more significant causes of agricultural change and that population growth may be merely coinciding with intensification, or that growth in production may in fact be facilitating population growth (for example Henley, 2005; Place and Dewees, 1999). A series of case studies in Sulawesi, Indonesia suggested that the extent of commercialisation of the local economy was a major factor in determining both population density and agricultural intensity (Henley, 2005: 153). It has also been pointed out that fallowing continues to be used as an agricultural strategy even in areas where population density is high (Place and Dewees, 1999: 324). Regarding the idea of a maximum population density possible under shifting cultivation (see for example Conklin, 1957: 146), Spencer (1966: 15) argued that there were few areas where such a theory could be tested - that is, where cultivators 'have been allowed the economic and political freedom' necessary to test it. Nevertheless, some authors assert that population, whether acting as a limiting or facilitating factor, does have an impact on the patterns of land use and the types of intensification employed (Thandee, 1986: 162).

Environmental factors such as land and climate are obviously important in shaping and limiting the types of agriculture practised and the possible avenues for change (Brookfield, 1972: 41; Cramb, 2005: 5; Roder, 1997 : 3). For instance, shifting cultivation is prevalent in marginal, sloping upland areas of the tropics because other types of food crop production are difficult or impossible in such environments. Farmer

choices regarding which crops to produce, where, when and how depend on the natural resources available and are often constrained by seasonality and the availability of land (Cramb, 2005: 71; Marten and Saltman, 1986: 43; Vosti and Witcover, 1996: 26). The above discussion of population density has already suggested that reduced availability of land may induce intensification or innovation (Potter, 2001: 315). Marten and Saltman (1986: 44) agree, stating that the amount of land available is 'critical in determining the technology to be applied, particularly the intensity of labour used for the agroecosystem'. Not only is the amount of land important, but the capability of that land, and the mix of different types of land available are also seen as major considerations in household agricultural decisions (Marten and Saltman, 1986: 43; Roder, 1997 : 3).

Population and environmental factors clearly have some bearing on agriculture and on processes of change. They may in various ways induce, shape or hold back change in shifting cultivation, but as the above discussion suggests, they are often not the only, or even the most important, factors in such change. The discussion now turns to some of the other factors that may be involved.

3.3 *Macro-economic considerations*

While the Boserup-inspired theories discussed earlier see population as the trigger for agricultural change, others argue that economic factors are just as, or even more, important. In one of his more recent papers, Brookfield (2001: 189) pointed out that intensification 'is only part of the story' of agricultural change, which may also involve diversification, investment and finding new ways of using and managing resources. Such changes are not necessarily triggered by external pressures - alternative 'triggers' may include market signals, price incentives and new opportunities encouraging commercialisation (Brookfield, 2001: 182; Cramb, 2005; Henley, 2005). Where intensification is concerned, these processes may work together with population growth, the latter providing the imperative and the former facilitating the ability to intensify, but they may provide incentives to intensify and innovate even in the absence of land shortage, overriding 'Boserupian energetics'⁷ (Stone, 2001: 171). For example, if purchased inputs become more accessible, this may ease constraints on

⁷ 'Boserupian energetics' refers to the idea that population growth is necessary for intensification to take place.

intensification by saving labour or economising on land (Cramb, 2005: 72; Tomich et al., 1995).

The existence and nature of markets and the degree of commercialisation of the economy can influence agriculture in many ways. Market opportunities can provide incentives for farmers to increase productivity through either the intensification of traditional food crops or the integration of different cash crop and livestock products, and may involve innovation and investing in soil and land improvements (Angelson, 1995: 1724; Brookfield, 2001: 182; Cramb, 2005: 72-73; Elson, 1997: 108; Marten, 1986: 4; Rerkasem and Rerkasem, 1994: 22). With regards to Southeast Asia, Elson saw markets as having been a major force for change in all areas of agricultural production and rural society, in both lowland and upland areas (Elson, 1997: 82, 186). Shifting cultivators responded to opportunities for the production of cash crops such as opium and teak, which could be incorporated into existing systems (Elson, 1997: 82). There were increases in specialisation, in livestock production and in the ratio of cash crops to subsistence crops, and fallow periods were shortened to make up for reduction of land for food crops (Elson, 1997: 108-112). Harwood (1996: 76, 81) argued that the specific pathways following shifting cultivation (where this is undergoing change) depend on the overall level of economic and market development, with market forces - together with population pressure - determining the course of change.

Access to markets is often dependent on infrastructure. This has been found to be a factor in facilitating the change from extensive to intensive, commercial agriculture in peninsular Malaysia and northern Thailand (Rasul and Thapa, 2003: 505); in the differential continuation or transformation of shifting cultivation in different areas in Bangladesh (Rasul et al., 2004: 217) and the type of changes that take place in shifting cultivation areas generally due to differences in comparative advantage (Pender, 2004: 361; Rasul et al., 2004); and in the slow pace of change in both the uplands and lowlands of the Lao PDR (Elson, 1997: 88; Vilaymeng, 2002 cited in Rasul and Thapa, 2003: 502).

3.4 *Household-level economic considerations*

3.4.1 Incentives and capabilities

We turn now to the level of the individual household. It has been recognised that both incentives and capabilities are generally required for farmers to make investments or

adopt innovations. Farmers are assumed to assess the costs and benefits of different options, including the price of inputs and outputs, together with the risks involved (Place and Dewees, 1999: 330). For example, Reijntjes (2000: 4) suggested that improved fallow management using fodder to intensify livestock production is likely to be adopted only in situations where it 'can provide attractive alternatives in terms of labour productivity and costs'. It should be noted that economic incentives to invest are often affected (positively or negatively) by government efforts such as economic reform and adjustment programmes, and may be hampered by issues such as poor infrastructure (Place and Dewees, 1999: 330).

In addition to the incentives required, farmers must also have the capacity to make investments, which may require labour, land, capital or knowledge. Available supplies and secure rights over resources may also be important. Sometimes credit is needed and this is often unavailable to small farmers, particularly in poorer households (Cramb, 2005: 73; Place and Dewees, 1999: 327-328). Poverty can inhibit the ability to plan and invest for the long-term, as it often means exchanging 'current needs for future gains' (Place and Dewees, 1999: 328). Lack of capital, therefore, may inhibit but does not necessarily preclude investments.⁸ With regards to the ability to adopt innovations, Potter noted that inequality of access to certain types of capital may result in differences in adoption between different households (Potter, 2001: 314-315). One study illustrating this point found that the adoption of forages was closely correlated with different wealth categories, with households having more land, labour and cattle seen to possess 'both the incentive and the capacity to integrate forages into their livelihood strategy' (Cramb et al., 2004: 270; see also Section 4.3.3).

Labour may be a particularly important resource for many investments and innovations. Cairns and Garrity (1999: 45-46) pointed out that even though some innovations can result in increased overall returns, the actual labour requirements are sometimes overlooked by researchers and extension workers. They argued that from the farmer's perspective, returns to labour may be more important than simply yields per unit of land. Momsen (1988) emphasised the importance of time in small-scale agriculture, particularly as it constrains people's options and influences access to other resources. She argued that many dimensions of time can be relevant, with seasonality of

⁸ Brookfield (2001: 189), however, does point out that small farmers often make incremental changes, slowly building up capital and making 'investments that would be beyond their means in the short term'.

particular significance, often resulting in competing demands for labour at certain times of the year. Daily and weekly patterns also:

...need to be considered if we are to understand how time constrains the adoption of innovations on small farms. Life cycle patterns must also be understood, as change will be affected by the age of the farmer and the opportunity costs of farming (Momsen, 1988: 3).

Many others have drawn attention to the importance of household demography, including Chayanov (1926), Shanin (1971) and Elson (1997).

3.4.2 Risk

As mentioned above, farmers often incorporate an assessment of risk in their agricultural decisions (Place and Dewees, 1999: 30). Various models have been proposed regarding how such decisions are made, each with assumptions about the particular type of economy in operation (for example, the existence or non-existence of markets) and about the behaviour of farmers within these contexts. Two major and opposing theories dealing particularly with farmer behaviour in regards to risk-taking, investments and innovation are those put forward by James Scott (1976) and Samuel Popkin (1979). Although these writers were considering subsistence-based 'peasants' as a particular type of farmer, their ideas have been influential in shaping the debate on farmer behaviour in general and are therefore considered relevant to the discussion on agricultural change, particularly as it relates to shifting cultivators, many of whom continue to be largely subsistence-oriented.

The basic premise of Scott's argument is that subsistence-oriented farmers tend to be averse to risk; in his words, they 'typically prefer to avoid economic disaster rather than take risks to maximise their average income' (Scott, 1976: vii). This idea is echoed by Chambers (1983: 142) who noted that such people tend to be 'cautious about new practices which might jeopardise their familiar sources of food or make them poorer ... the struggle is both a daily one for basic necessities, and also a longer-term one to gain control of assets and build up buffers against contingencies'. Risk is therefore seen as a major factor in the decision-making of subsistence-based cultivators. This theory emphasises the often high levels of uncertainty (environmental, economic, political and social) that prevail in developing countries, explaining 'peasant conservatism' or slowness to adopt innovations (Ellis, 1993: 82). Tomich et al. (1995: 21) pointed out that even subtle changes in the factors of production (for example planting trees, improved livestock or new production methods) can have significant impacts on

production itself, which may have important consequences for livelihoods close to subsistence level. Such farmers may, therefore, face trade-offs between livelihood security and economic efficiency, with the need to manage risk 'easily overrid[ing] the desire to optimise efficiency' (Stone, 2001: 172). This may result in intensification or extensification rather than innovation (Angelson, 1995: 1716; Brookfield, 1984: 38; Ellis, 1993: 95-6; Stone, 2001: 172). According to this theory, the diffusion and adoption of innovations with the potential to improve output and incomes may be inhibited or resisted because 'it means departing from a system that is efficient in minimizing the risk of a catastrophe for one that significantly increases the risk' (Joy, 1969: 378). Ellis (1993: 96) pointed out that lack of information and knowledge regarding innovations may be important factors in farmers' risk-aversion or scepticism associated with innovations.

Where risk is a factor in farmers' agricultural decisions, it follows that those closer to subsistence-level and therefore more vulnerable to food insecurity will be more averse to risk than their better-off neighbours. Scott (1976: 20-22) saw variables such as family size, land area, and savings as affecting the ability to tolerate risk, while Ellis suggested a relationship between income and risk-aversion, with farmers earning higher incomes likely to be 'more efficient, more prepared to specialise in cash crops, and more willing to innovate' as well as being 'likely to be better informed and have greater access to credit' (Ellis, 1993: 96). Poor households may devote much of their effort to getting enough food, and their 'investment decisions focus on the allocation of family labour and the division of income between investment in productive assets and immediate consumption' (Tomich et al., 1995: 21). As Tomich et al., pointed out, these households are often the most vulnerable to disease and the 'least able to compensate for income lost', therefore they 'incorporate risk considerations into their decisions' in order to avert disaster (ibid). To summarise in the words of Scott:

...the stabilization of real income for those close to subsistence may be a more powerful goal than achieving a higher *average* income; it indicates that we may learn more about ... peasants by asking not merely how poor they are but also how precarious their livelihood is (Scott, 1976: 34, emphasis in original).

In his 1979 book *The Rational Peasant*, Popkin challenged the above approach, pointing out that peasants (even the poor, risk-averse peasants Scott refers to) do often make risky investments - even if only with small amounts and only if their loss will not threaten their current position or lead to disaster (Popkin, 1979: 19-22). Rather than seeing peasants as aiming merely to maintain subsistence, Popkin saw them as

'continuously striving ... to raise their subsistence level through long- and short-term investments, both public and private' (Popkin, 1979: 4). Potter (2001: 320) agreed, finding that some small farmers are 'ready to chance anything ... even food security'. The argument that peasants are motivated to maximise profit had been put forward by Schultz in 1964 and although many empirical studies of the 1970s found peasants to be risk-averse (Ellis, 1993: 97), Popkin suggested that it may have been 'the absence of incentives to change' rather than 'a resistance to innovation and a defence of traditional ways' that was being observed (Popkin, 1979: 3).

Economic considerations at the household level clearly have a significant impact on agricultural decisions. For farmers to make changes that require investments, even if these investments appear to outsiders to be small, they must have both the means and the incentive to do so. Such incentives are usually in the form of increased outputs providing economic benefits, or reduced inputs freeing up resources for other activities. Farmers who are lacking in certain types of resources or who are close to subsistence level may not have the means to undertake the required investments or they may be unable or unwilling to take the risks involved in some investments or innovations. These are all important factors to consider in understanding farmers' responses to opportunities to change their farming systems even in a small way.

3.5 Social and cultural context

One of the major contributions of Brookfield's 1972 paper (Section 3.1) was in noting the particular importance of the human or social context in understanding agricultural change. Weitz (1971: 69) had already acknowledged that individual farmers' objectives and abilities were both 'influenced by and dependent on' the social systems they were a part of. Brookfield continued this line of argument, saying that 'intensification, and hence the adoption and extension of innovations requiring higher labour inputs, thus emerge as a product of change in the social organisation of production' (Brookfield, 1984: 20). Stone (2001: 168-9) also noted that social institutions constitute the means through which agricultural production is carried out, both adapting to and themselves influencing adaptation to production. In this way they affect the efficiency of a given production strategy and the costs and benefits of exploiting a given resource (ibid). Highlighting the importance of 'interactions between agroecosystems and human social systems', Marten and Saltman (1986) argued that social interactions between households, the sum total of which constitutes the village social system, are 'a major determinant of the village agroecosystem', with social systems beyond the village also

seen as influential. The social and cultural contexts for agricultural production have been recognised as important by many other writers and are generally seen as providing a richer view than the Boserup's population model (see for example Minnegal and Dwyer, 2001; Netting, 1993; Stone, 2001).

Both Spencer and Brookfield drew attention to the existence and impact of 'social production' (where goods are produced to meet social needs, such as for rituals and festivals, rather than economic needs) and 'obligational-exchange elements' as they relate to agricultural change, arguing that they sometimes restrict the adoption of agricultural innovations by ensuring relative equality and preventing the accumulation of surpluses (Brookfield, 1984: 34; Spencer, 1966: 71). When there is no surplus to invest, people are less likely to innovate and take risks in adopting new practices (Brookfield, 1984: 34-5; Spencer, 1966: 71-3). Therefore, as Brookfield (1984: 35) surmised, 'the mediating context [for change] must be a social situation in which individuals can hope to gain by innovating'.

Spencer further argued that for shifting cultivation to be transformed into permanent agriculture, whole new economic systems, together with an understanding of economic theory that appreciates the value of surplus, were needed (Spencer, 1966: 73-4). In his view, this would require whole cultures to be 'upgraded' because 'many ... facets of culture ... have a strong impact upon the whole of the economic system of the peoples involved' (Spencer, 1966: 74). He therefore argued that education and even a new religious philosophy were necessary in order for people to appreciate the value of surpluses and acquire the desire to produce more. Similarly, Watters (1960: 93) suggested that cultural advancement in the form of social organisation allowing the specialisation of labour would be necessary to overcome the problems perceived to be associated with shifting cultivation. In Spencer's view, cultural differences were the main reason why change had occurred in regions such as Europe, while people were still practising shifting cultivation in other parts of the world (Spencer, 1966: 82).

At the time Spencer was writing (only a few decades ago) the 'peasantry' were often viewed as backward and in need of cultural change. They were characterised as fatalistic, with low aspirational levels and a limited time perspective, lacking in innovation and the capacity for deferred gratification (Rogers, 1969). Expressed academic views have undoubtedly moderated since, although the idea that culture is a barrier to change has certainly not disappeared entirely from the vocabulary of scientists, academics and development workers. In addition, the 'failure' of farmers to

adopt technologies is still often blamed on cultural barriers, social factors such as a lack of interest in economic betterment, and even a lack of education (Roder, 2004: 114).

On the other hand, the failure of many rural development projects to achieve their objectives has given rise to the realisation that such projects may be entirely incompatible with 'the aspirations and expectations of the farmers' (Lian, 1988: 47). Although from a current perspective his view of 'peasants' and traditional societies appears rather patronising, Weitz (1971: 68) did point out that farmers' objectives are very important in their agricultural decisions: 'Underlying every man's overt actions is a whole private world of unconscious drives and half-conscious hopes'. Brookfield (1972: 46) also noted that an 'understanding of human needs and motivation' was necessary to understand agricultural change. That farmers' 'inner drives and aspirations' (Weitz, 1971: 68) needed to be considered and understood rings just as true today in analyses of farmer behaviour and agricultural change.

Also at the level of the individual, the skills that farmers possess may also have an impact on both the choices they make and the options available to them. Schultz (1964: 181, 205) argued that farmer knowledge and skills such as literacy are related to agricultural productivity because they enable the use of scientific and technical solutions. Brookfield (2001) suggested that farmers' organisational (as opposed to technical) skills may also be important. He also pointed out that in all groups or societies there tends to be an innovating, experimenting minority who are important in catalysing change and leading 'farmer-driven agricultural revolutions' (Brookfield, 2001: 189).

This section has covered a number of issues related to the 'human' contexts - social, cultural and individual - within which agricultural production takes place. It is suggested that these are all relevant to agricultural change, although to what extent they impact on farmers' decisions is less clear. Some writers have argued that certain cultural traits and social practices act as a barrier to intensification and technology adoption but this theory seems to be lacking in empirical evidence and is no longer considered the deterministic factor that it used to be. Farmers' objectives and priorities at the community or individual level, however, are likely to have a more direct impact on their agricultural decisions. These may or may not be related to the cultural and social systems they are a part of, and so need to be considered as separate factors.

3.6 Political and institutional context

The political and institutional context (which can also be considered part of the social environment) can have a significant impact on how and where agriculture is practised (Stone, 2001: 167). Factors such as political systems, power structures and social relations therefore need to be considered alongside the environmental, economic and socio-cultural factors described above. According to Porro (2005: 22), a 'political' approach to agricultural change sees such change in the context of wider structural transformation and considers conflict between 'multiple social actors ... over access and control of limited resources'. 'Outside' forces often limit the ability of farmers to carry out their farming systems as they would like, whether that means continuing with what they are doing or being able to 'intensify as they wish' (Spencer, 1996: 167; see also Stone, 2001: 175). Rasul and Thapa (2004: 220) have pointed out that farmers may possess knowledge and skills but these alone may not be enough for agricultural innovation to take place. This is due to constraints imposed by institutions governing the creation of scientific and technical knowledge and facilitating the introduction and use of new agricultural technologies. On the other hand, supportive social institutions can facilitate agricultural development by increasing farmers' opportunities and building their capacity to make investments.

Shifting cultivators (and other agriculturalists) have been influenced by outsiders in various ways and at various times. For example, education can result in cultural change and sometimes the loss of traditional knowledge, as well as in young people leaving their villages for off-farm employment once educated (Brady, 1996: 3; Rasul and Thapa, 2003: 503). Outsiders, in the form of states, have often denied legal status to ethnic minorities practising shifting cultivation, resulting in a lack of rights and vulnerability to encroachment on their lands (Brady, 1996: 4-5). In particular, global efforts to modernise tropical countries have led to large-scale policies and programmes aimed at transforming agriculture through Western technology and involvement in a cash economy (Marten, 1986: 1). Growth-oriented development models emphasising increased productivity for export have been adopted by many countries and pursued through vehicles such as land titling, technology, mechanisation, subsidies, extension services, encouragement of agricultural entrepreneurship and the creation of agricultural research institutes (Thandee, 1986: 166-167). While some such strategies appear to have worked for the benefit of upland farmers, others have worked against their interests - including for example protection of non-agricultural industries,

unfavourable exchange rates and taxes, lack of investment in upland infrastructure and 'coercive policies for land settlement and development' (Pender, 2004: 73).

There are many examples of unsuccessful programs aimed at replacing shifting cultivation with sedentary agriculture. Angelson (1995: 1713) argued that in Indonesia this has often been due to an 'inadequate understanding of the logic of shifting cultivation and factors influencing farmers' decision making'. In Malaysia, too, development schemes involving subsidies for cash crops and resettlement projects have been largely unsuccessful, whereas shorter-term efforts to introduce innovations aimed at increasing production have had better results (Lian, 1988: 48). Policies and programmes may generate change and serve to accelerate the trends put in motion by factors such as increased population and commercialisation, or they may retard these trends and even foster resistance among rural populations (Cramb, 2005: 73; Thandee, 1986: 167). They may affect household livelihood strategies directly, through the promotion of particular practices, or indirectly, by investing in various forms of capital, influencing farmers' abilities and constraints (Pender, 2004: 344).

As mentioned in Chapter Two, shifting cultivation has often been viewed as a problem requiring 'solutions' (to be provided by educated outsiders). Policies regarding shifting cultivation have tended to be 'negative - reactionary and restrictive' (Freeman, 2001: 399). Land use zoning, for example, often alienates shifting cultivators from their traditional lands, limits their rights 'to those perceived by outsiders as 'environmentally sustainable'' (Freeman, 2001: 400), and/or results in reductions in fallow length and the 'forced' adoption of intensification strategies (Potter, 2001: 306). In Thailand, opium cultivation in particular has been targeted, with 'both local and foreign interventions ... [concentrating] to a very large degree on trying to *change the land use systems* of the hill dwellers' (Keen, 1983: 304; emphasis in original). In this case, however, ideas from outside were not readily accepted, as the people 'could not, and did not, identify' with the 'series of narrowly defined (but administratively convenient) land use programmes' imposed from above (Keen, 1983: 305; parentheses in original).

The above discussion has focused on the political and institutional 'push' factors, but there are also many 'pull' factors that facilitate or encourage, rather than force, land use change. Many authors have argued that institutional conditions can be extremely important in this sense (for example Rasul et al., 2004: 234; Pender, 2004: 363; Watters, 1971: 38). Institutional support was identified by Rasul et al. (2004: 234) as the most important differentiating factor in land use changes in a study of shifting

cultivation in Bangladesh. Relevant institutional factors include security of land tenure, adequate credit and marketing facilities, transportation and communication facilities, extension services and the provision of information (Pender, 2004: 363; Place and Dewees, 1999: 331-332; Rasul et al., 2004: 234). For example, Pender (ibid) suggested that improved fodder technologies may not be adopted in areas where free grazing is the norm, as they are likely to be seen as unnecessary. In other situations, security of land tenure can affect land use decisions involving a move from shifting cultivation to permanent agriculture, as investments are usually required; insecure tenure may constrain such investments and restrict access to credit, as well as to inputs and other institutional services that may be necessary (Rasul et al., 2004: 220). In such cases, farmers may be forced to continue shifting cultivation even if they are willing to change to permanent cultivation.

As this section has shown, the political and institutional environment can have a considerable impact on processes of change within agriculture. In particular, government policy and programmes directed at shifting cultivation often induce people to change their farming systems, while institutional conditions can either facilitate or impede change, depending on their nature. It is important to recognise these factors and understand how they affect people's choices - or lack of choices.

3.7 Technology

3.7.1 Technology as a factor in agricultural change

The development and availability of agricultural technology⁹ also has a powerful influence over the forms of agriculture employed by smallholders and the speed and direction of change within these farming systems. The emphasis on technology-driven development during the 1960s and 1970s stemmed from the notion that the possibilities for intensification were limited and once opportunities had been exhausted, innovation would become necessary. Therefore, increased production could only be achieved through the creation and dispersal of new technology (Schultz, 1964; Herath

⁹ 'Technology' may be understood to mean any thing or technique developed by people, including for example new seeds developed through breeding or genetic modification, crops or animals that are new to the farmer(s) using them, inputs such as fertilisers or pesticides (whether natural or man-made), specific techniques relating to processes such as cultivation, storage or general management techniques.

and Jayasuriya, 1996: 1185-1186). Technology can be seen as a resource which contributes to and sets the parameters within which households make crop, land use and livelihood decisions (Brady, 1996: 7; Marten, 1986: 4; Vosti and Witcover, 1996: 35).

According to Marten and Saltman (1986: 43), agroecosystems are structured by farmers' decisions regarding the agricultural technology they apply. Farmers have always experimented with crops and cultivation methods, through a continuous process resulting in diversity and conservation of crop species and the capacity for further adaptation and experimentation (Amanor et al., 1993: 1). New technology has also come from outside both through informal social contact and through more formal processes of agricultural research and extension. Externally imposed processes of agricultural modernisation often involve external inputs as well as attempts to standardise and homogenise the environment (Amanor et al., 1993: 2). New crop varieties have been a driving force in this process and 'have had an enormous impact on agriculture in many regions of the world' (ibid). Approaches to agricultural technology development and dissemination have evolved over the last few decades. While early approaches focused on technology transfer, the current trend is in participatory technology development, involving farmers in the testing and adaptation of new technologies (see for example Chambers, Pacey and Thrupp, 1989; Martin and Sherington, 1997; Pretty, 1995; Reijntjes et al., 1992).

3.7.2 Factors influencing technology adoption

Many of the factors identified in earlier sections of this chapter as influencing agricultural change in general are also important to the more specific process of technology adoption. Markets, and infrastructure providing access to them, for instance, can be very important in providing options and facilitating the adoption of cash crops and commercially available inputs (Caviglia-Harris, 2003: 28; Cramb, 2000: 11; Roder, 1997, 2004: 115). Economic incentives are also necessary, while the amount and type of investment required can influence farmers' ability to adopt some technologies (Place and Dewees, 1999: 331; Roder, 2004: 117). For example, low investment requirements combined with low risk were found to be important features encouraging the adoption of animal traction for potato production in Bhutan (Roder, 2004: 116), while the introduction of livestock as a fallow management pathway may be constrained by the labour investment required for herding, tethering and fencing the livestock (Burgers et al., 2005: 8). Households often face conflicting demands for the

allocation of labour, especially in relation to seasonal peak periods and labour constraints (Botchaway, 1993: 29-30). As poor farmers' labour allocation often prioritises food crops over commercial activities, their ability to adopt technologies requiring significant investments of labour may be affected.

Where investments are required, the availability of credit and/or subsidies can facilitate technology adoption (Cramb, 2000: 11; Herath and Jayasuriya, 1996: 1185, 1188, 1200). Herath and Jayasuriya (ibid) pointed out that this was often the case with subsidised credit programmes for the adoption of High Yielding Variety (HYV) technologies in Asia - credit was found to reduce real or perceived risks associated with new technology, while lack of access to credit was seen to inhibit adoption. The availability of other resources such as land, cash and other forms of capital can also facilitate or constrain technology adoption (Adams, 1988: 93; Adesina and Zinnah, 1993: 297; Caviglia-Harris, 2003: 23; Cramb, 2000: 11, 2005: 71; Jones, 2002: 1609; Marten and Saltman, 1986: 43; Nazarea-Sandoval, 1995: 172).

Many authors have highlighted the importance of the socio-economic position of decision makers. For example, Nazarea-Sandoval's (1995: 172) study of rice preference in the Philippines found that households of differing socio-economic status prioritise different qualities of the rice. Poorer households tended to watch and wait, taking note of various details. Roder (1997: 7) noted that most households adopting teak in the Lao PDR also owned lowland rice areas, while the resource-poor upland farmers expected to benefit from teak production were generally unable to take risks with the long-term investments required such as land, labour, fencing and planting material. Caviglia-Harris (2003: 45) also found that wealthier farmers were more likely to use new farming methods. Because the distribution of knowledge is often uneven and socially-patterned, Nazarea-Sandoval (1995: 172) argued that 'the ability to recognise the existence of alternatives and exercise choice is directly proportional to the individual's standing in the hierarchy of social and economic relations'.

Some researchers report that attitudes such as risk-aversion and 'cultural conservatism' among some farmers can inhibit the adoption of technology (Herath and Jayasuriya, 1996: 1186-7; Raintree, 2000: 19; Tully, 1966: 393). For example, it has been suggested that the higher risk and cash costs involved in HYVs may have offset their potential productivity benefits and resulted in their limited adoption by risk-averse farmers aiming for utility maximisation over profit maximisation (Caviglia-Harris, 2003: 28; Herath and Jayasuriya, 1996: 1186-7). Raintree discussed the idea that some

shifting cultivators may express cultural conservatism 'as resistance to technological change, even when the old ways of swidden livelihood are no longer sustainable and some kind of adaptive change is necessary' (Raintree, 2000: 19). Tully (1968: 374) similarly argued that farmers' values, beliefs and attitudes influence their perceptions of the relative advantages of technologies.

The importance of the socio-political context of technology adoption is highlighted in the 'actor-oriented perspective' employed by Cramb (2000: 12). Such an approach recognises that research and extension projects involve multiple social actors, each pursuing their own objectives and strategies. These actors may include farmers, village leaders, researchers, extension workers and project and government officials, who 'manoeuvre, negotiate, organise, cooperate, participate, coerce, obstruct, form coalitions, adopt, adapt, reject, all within a specific geographical and historical context' (Cramb, 2000: 12). Adoption decisions are seen as 'highly contingent on the interplay between these actors' (Cramb, 2000: 14), and may include factors such as obligation or conflict within communities. Rather than expecting clear-cut adoption versus non-adoption decisions, this perspective suggests that a range of responses or 'adoption-adaptation behaviours' are more likely, depending on farmers' differing 'goals and circumstances, hence livelihood strategies, and the complexity of intra-household, group, and project interactions and decision-making' (Cramb, 2000: 15).

Policy and institutional environments can also have a bearing on technology adoption (Burgers et al., 2005). Land tenure security, for instance, was identified by Cramb (2000: 1) as being associated with technology adoption and can be particularly important in household decisions to adopt soil conservation technologies or other long-term land improvements (Jones, 2002: 1609). Tenure security can also affect farmers' perception of the risks, benefits and access price of a particular technology (Nazarea-Sandoval, 1995: 172).

3.7.3 Factors specific to technology adoption

Many other influencing factors are specific to the phenomenon of agricultural technology adoption (as opposed to agricultural change in general). These include factors relating directly to the technology itself, to the way that farmers perceive their problems and potential technological solutions, to the characteristics and situations of individual households and their position in society and to the socio-political context within which the technology is developed or delivered.

Firstly and most obviously, the existence and availability of relevant agricultural technologies such as crop varieties, tools, inputs or methods, the range of choices available and the availability of information regarding these options shape farmer decisions on what technology they apply (Jones, 2002: 1608-1609; Marten and Saltman, 1986: 43; Roder, 2004: 115; Rogers, 1962: 132). Once technologies are available, their characteristics in relation to farmers' situations will probably be a major factor in their adoption or rejection. In the first instance, they must be perceived by farmers as necessary, appropriate and relevant (Adesina and Zinnah, 1993: 298; Roder, 2004: 116; Rogers, 1962: 124; Tully, 1968: 377). For example, factors such as the need for winter fodder, high yield and ease of cultivation and storage contributed to the successful adoption of fodder pumpkin in Bhutan (Roder, 2004: 116). Rogers (1962) identified five characteristics of innovations that affect adoption rates: relative advantage (offering an improvement over old technology); compatibility (consistency with farmers' values and past experiences and existing behaviours); divisibility (the ability to be trialled on a limited basis); communicability (how easily they can spread from farmer to farmer); and complexity (how easy or difficult the technology is to understand) (Rogers, 1962: 124-133; Tully, 1968: 374-376).

In reference to Rogers' criteria, Tully argued that farmers' perceptions and attitudes are more important than the technology itself, and in particular that their ability to define their problem 'in terms in which a solution is possible' is the first step required for the adoption of technology to take place (Tully, 1968: 376). This involves understanding the problem in terms of its nature and cause, which is easier for some problems than others. Following this, there must be motivation to solve the problem, which stems from the recognition that the problem is important to the farmers concerned and which, Tully argues, often requires a learning process on the part of farmers (Tully, 1968: 379). Finally, the complexity of the innovation, as noted by Rogers, is seen as a major factor in its adoption. In Tully's analysis, 'complexity' of an innovation can mean several things, including: the difficulty for farmers to see its relevance in relation to alternative solutions; its requirement for a number of related and interdependent changes in activities; or its abstraction or inconsistency with farmers' existing values and attitudes (Tully, 1968: 380). Similar variables have been found to affect farmer decisions regarding natural resource management practices such as soil conservation technologies (Jones, 2002) and improved fallows (Place and Dewees, 1999). Factors such as farmer awareness of a problem, knowledge and understanding of techniques with the potential to remedy the problem, the incentive to remedy the problem

(including the importance of the resource to the farmer and their willingness to invest in it) and finally the capacity to invest in solutions, were all found to be important in the adoption of these types of technology (Jones, 2002: 1608-9; Place and Dewees, 1999: 331).

Other authors also highlight the importance of farmers' perceptions in technology adoption decisions. In a study of mangrove swamp rice farmers in Sierra Leone, farmers' perceptions of the attributes of available technologies (improved rice varieties) 'were found to be the major factors determining adoption and use intensities' (Adesina and Zinnah, 1993: 297). Similarly, Herath and Jayasuriya (1996: 1187) found that perceptions were crucial in decisions to adopt HYVs, as unfamiliarity with these technologies meant that farmers faced or perceived higher risks in adopting them. Access to information often plays a large role in shaping farmers' perceptions, both of their problems and of the potential solutions available. One model explaining adoption decisions holds that the key determining factor is access to information about the innovation and emphasises the extension process as the best way to increase the diffusion of innovations (Adesina and Zinnah, 1993: 298). Other authors highlighting the importance of the provision of information and/or access to it include Caviglia-Harris (2003: 23, 28), Herath and Jayasuriya (1996: 1185, 1188), Lipton (1968: 349-350) and Nazarea-Sandoval (1995: 155, 172). However, Tully (1966: 392) cited many authors who found that lack of knowledge was not a major factor in determining late or non-adoption, suggesting that the provision of information alone is not sufficient, since unless information is seen as relevant by farmers, it will not be used.

Farmers make decisions in the light of their previous agricultural experiences, current farming activities, their multiple objectives, available resources and constraints (Adams, 1988: 3; Adesina and Zinnah, 1993: 298; Cramb, 2000: 14, 2005: 71; Vosti and Witcover, 1996: 26). Their objectives may include household food security, cash income, a secure asset or resource base or social security, and their livelihood strategies are selected in pursuit of these objectives (Cramb, 2000: 14). Household objectives and the resources available to meet them can change over time and, more importantly, differ between (and within) households (Adams, 1988: 93; Cramb, 2000: 15; Jones, 2002: 1609; Nazarea-Sandoval, 1995: 155). For this reason, the same technology may receive very different responses from farmers in different situations (Cramb, 2000: 15). Relevant influencing factors may include age, education and personal characteristics of the household head; access to labour; size, location and

tenure status of the farm; availability of cash and/or credit; and access to markets (Cramb, 2000: 11; Jones, 2002: 1609).

The fact that agricultural development efforts are sometimes met with resistance or indifference by their intended beneficiaries suggests that there may be gaps in outsiders' understanding of farmers' situations and their experienced or perceived opportunities and constraints (Nazarea-Sandoval, 1995: 155). In addition, there may also be outright conflict between the goals and strategies of farmers and those of outsiders (Botchaway, 1993: 29). In his discussion of land use change in Northern Thailand, Keen (1983: 305) noted that the 'innovations proffered by outsiders have evolved from totally different assumptions, experiences and aspirations' to those changes originating from within farming communities. They are often rejected by farmers, who do not identify with programmes designed and implemented from above. Pretty (1995: 27) also echoed the importance of recognising that farmers have:

...differing conditions, needs, values and constraints to those of researchers. When they reject a technology, say because it does not fit their needs or is too risky, modern agriculture can have no other response but to assume it is the farmers' fault.

Adams argued that it is necessary to consider the complexity of farmers' previous experiences, current activities and perceptions of outsiders. New techniques 'cannot be delivered like some magic package to solve a farmer's problems and launch him as a micro agribusinessman, especially since the peddler of the package will come as the latest in a series of suspicious and more or less coercive outside influences ... and will be judged against previous experience and in the light of present circumstances' (Adams, 1988:83).

3.8 Conclusion

This chapter has discussed a broad range of factors and themes within the literature on agricultural change, each identified as in some way causing or shaping the development of agriculture. Factors relating to population and environment were seen to affect the 'natural' limits of the amount and quality of natural resources available to households, although issues of access to these resources are determined by the social, political and institutional context. Economic factors, both micro- and macro-, influence the specific agricultural pathways followed and may encourage or constrain certain activities. Agricultural technologies set the parameters within which decisions are made and facilitate new opportunities. Their adoption may be influenced by a

number of factors including: economic considerations including costs, benefits, resource availability and risks; institutional arrangements such as land tenure; social and cultural factors such as farmers' perceptions, attitudes and socio-economic status; factors relating to the technology itself (its availability and characteristics) and to its congruence with farmers' situations and goals.

In the identification of these factors the literature displays a somewhat reductionist approach to understanding agriculture, in order to make generalisations about how and why agriculture changes. Often this is for the purpose of directing policy or targeting interventions aimed at encouraging or inhibiting particular types of changes. Consequently, much research is driven by the priorities and expectations of outsiders and may not capture the diversity and complexity of local realities. The next chapter introduces an alternative approach that attempts to overcome such reductionism by understanding change from 'below', taking as its unit of analysis individual households and their livelihood situations. This approach incorporates many of the factors identified in this chapter, but rather than seeing them in isolation it focuses on how they and other factors work together to shape agricultural practices at the local level.

Chapter 4 Livelihoods

The previous two chapters have introduced the long-practised form of agriculture known as shifting cultivation and some of the issues associated with its practice today, and have examined various theories of how and why agriculture changes. Many of these theories and the factors they identify come from a reductionist perspective that views changes from 'above' and looks for isolatable and generalisable explanations. This chapter discusses an alternative approach to the study of change in agriculture that starts with people and their livelihoods. Rather than seeing agricultural change as an independent process, this approach recognises that agricultural decisions are made in the context of people's livelihoods, which themselves are modified (often in different ways) by various 'outside' conditions. Thus the focus is shifted from the broad and the general to the local and the particular, allowing an understanding of differing responses to what may appear to be similar external conditions. It is out of this livelihoods approach that the central question of the thesis arises: how do people's livelihoods shape changes in their agriculture?

This chapter firstly considers what constitutes a 'livelihoods approach', outlining the main features and factors that are usually incorporated in livelihoods analysis through the livelihoods framework. It then introduces some of the uses of a livelihoods approach, followed by an exploration of how such an approach may in practice be applied to questions of agricultural change. The chapter finishes with two examples of studies relevant to this research, illustrating how livelihoods factors may shape household decisions and strategies with regards to livestock.

4.1 What is a livelihoods approach?

The concept of 'livelihoods'¹⁰ has been in development vocabulary since the late 1980s and is increasingly recognised as a valuable approach for the research and practice of development. It has found its way into the programmes of several large development

¹⁰ As an approach to development, the term 'livelihoods' is often accompanied by 'sustainable' and/or 'rural' (Ashley and Carney, 1999; Chambers and Conway, 1992; Scoones, 1998; WCED 1987). While sustainability is an important consideration in development work and theory, particularly in regards to people's livelihoods, for the sake of brevity this chapter focuses on the usefulness of a generalised livelihoods approach for understanding agricultural change.

organisations¹¹ and can now be considered part of mainstream development practice. It has been described as a 'way of thinking' about development (Ashley and Carney, 1999: 1), an approach or perspective that centres on the realities and priorities of poor people and attempts to capture the diverse and dynamic nature of their livelihoods (Ashley and Carney, 1999; Chambers and Conway, 1992: 4). Livelihoods approaches have been developed in part in response to the apparent failure of previous approaches in eradicating poverty, and as a way of overcoming the 'defects' of conventional development thinking, which tends to focus on concepts and measures related to production, employment and poverty lines, and on things rather than on people (Ashley and Carney, 1999: 5; Chambers and Conway, 1992: 3; De Haan and Zoomers, 2005: 29-30). In contrast to these narrow, reductionist forms of analysis, a livelihoods perspective aims for a more holistic, multidimensional understanding, encompassing both material and non-material factors, micro and macro levels of analysis and the complex interrelationships that shape the diverse ways in which people make a living (ibid; Helmore and Singh, 2001).

A livelihood is commonly defined as comprising 'the capabilities, assets (stores, resources, claims and access) and activities required for a means of living', with the outputs of a livelihood system being what people gain from what they do (Chambers and Conway, 1992: 7-9). The idea of capabilities is especially pertinent to this study as it involves 'being able to cope with stress and shocks, and being able to find and make use of livelihood opportunities' - the specific capabilities including 'gaining access to and using services and information, exercising foresight, experimenting and innovating, competing and collaborating with others, and exploiting new conditions and resources' (Chambers and Conway, 1992: 5). All of these are relevant in the context of agricultural decision-making involving the adoption and adaptation of new technologies aimed at improving livelihoods.

The livelihoods approach emphasises human agency, stressing that people are active in exploring opportunities and adapting to change, but also recognising that inequalities in the distribution of assets and power are important in determining the options available to them - and ultimately the outcomes in terms of well-being, sustainability and future capabilities (De Haan and Zoomers, 2003: 350, 2005: 28). Baumgartner

¹¹ Such organisations include donors such as Britain's Department for International Development (DFID) and the United Nations Development Programme (UNDP), and Non-governmental organisations such as CARE and Oxfam (Ashley and Carney, 1999: 10).

sees livelihoods as encompassing the economic, social and cultural 'universe' within which people make their living. He argued that development projects and strategies must be compatible with poor people's livelihood strategies; a livelihoods perspective can facilitate understanding of these strategies and is therefore an essential part of development work (Baumgartner 2004: 22-3; Ashley and Carney, 1999: 7). The issue of power and politics is one many have criticised the livelihoods approach for overlooking. Indeed, most frameworks for livelihoods analysis do not explicitly incorporate power relationships and wider issues of political economy, which may have a significant impact on poverty (Adato and Meinzen-Dick, 2002; Ashley and Carney, 1999: 35; Bury, 2004: 79).

There has been considerable discussion about the finer points of a livelihoods approach, particularly concerning what is and is not included, under what categories (see Section 4.2.1) and the terminology employed.¹² However, it is not the purpose of this thesis to engage in these debates but rather to draw inspiration from the various (sometimes conflicting) contributions that have been made. The research employs the livelihoods approach primarily as a source of guidance for the possible issues to explore and the linkages between them, in order to assess how different aspects may contribute to an understanding of agricultural change.

Several common guiding principles or ideas have been identified in the livelihoods literature as central to the approach. Those of relevance to this study include that development and related analysis should:

- be people-centred; emphasising livelihood impacts rather than sectoral outputs, and basic needs and long-term security over production of goods and services or environmental concerns (Ashley and Carney, 1999: 2, 7; Baumgartner, 2004: 23-4; Dorward et al., 2003: 319);
- be holistic, encompassing all of the relevant dimensions of the livelihood system and employing multi-level (including both micro and macro) analysis (Baumgartner, 2004: 23; Dorward et al., 2003: 319; Freeman et al., 2004: 152);

¹² One such example is the debate concerning the use of the terms 'assets', 'resources' or 'capital', each of which has a particular meaning in economics (DFID, 1999; Arce, 2003: 205). Some authors prefer to use only one of these terms, while many use them almost interchangeably (for example Ellis, 2000: 31; Scoones, 1998: 7-8). For a critique of this 'mix-up' see Arce (2003: 205- 206).

- appreciate the importance of less tangible outcomes such as improved well-being and enhanced capabilities rather than simply income or consumption (Ashley and Carney, 1999: 7; Ellis, 1998: 4; Freeman et al., 2004: 152; Scoones, 1998: 6);
- be responsive and participatory, and based on the needs and priorities of poor people (as opposed to a top-down implementation of professionals' plans) (Ashley and Carney, 1999: 7; Chambers, 1987: 14; Dorward et al., 2003: 319);
- appreciate the diverse and dynamic nature of the resources, activities and strategies that combine to form people's livelihoods (Ashley and Carney, 1999: 7; Birch-Thomsen et al., 2001: 43; Bury, 2004: 79; Chambers, 1983; Helmore and Singh, 2001: 3);
- appreciate the importance of adaptability, resilience and sustainability as they relate to people's livelihood strategies (Ashley and Carney, 1999: 7; Helmore and Singh, 2001: 3; Scoones, 1998: 6).

4.2 Applying a livelihoods approach

4.2.1 Livelihoods frameworks

In order to apply the above principles to development practice and research, a number of frameworks for livelihoods analysis have been developed. While they differ slightly in the level of detail and the terminology used, many of these frameworks involve the analysis of five main components: assets or resources (often termed 'capitals'); the livelihood activities that are employed in the pursuit of livelihood goals (which collectively make up a household's livelihood strategy); livelihood outcomes (the achievements or outputs of the activities); the 'vulnerability context' (or risk environment) within which livelihoods are constructed; and the institutions and organisations that influence access to resources, strategies and outcomes (Ashley and Carney, 1999: 47; DFID, 1999; Ellis, 2000: 30; Scoones, 1998: 4).

Assets and resources may be considered the 'building blocks' of livelihoods - what people have to work with (DFID, 1999; Ellis, 2000: 31). These are commonly conceptualised as the 'asset pentagon' comprising human, natural, financial, social and physical capital (ibid).¹³ Other types of capital have also been suggested, such as traditional (including cultural) and political capital (Bebbington, 1999; Cahn, 2002). A

¹³ Some frameworks combine physical and financial capital under the heading 'economic' or 'produced' capital (for example Scoones, 1998; Bebbington, 1999).

household's¹⁴ asset status is seen to be critical to the options available to them in terms of activities and outcomes, particularly for the poor (Ellis and Freeman, 2005: 5). A livelihood strategy may comprise multiple activities carried out at different times (Adato and Meinzen-Dick, 2002: ii). Some frameworks distinguish between various types of activities, such as natural resource and non-natural resource based activities (Ellis, 2000: 40-41), and/or between different types of strategies or 'pathways', for example agricultural intensification or extensification, livelihood diversification, and migration (Scoones, 1998: 4).¹⁵

The results or outputs of these strategies make up the fifth component, the livelihood outcomes (DFID, 1999). Outcomes may relate to factors such as health and well-being, food security, income, poverty, risk, stability, capabilities, adaptability or sustainability in terms of both the livelihood and the natural resource base (Chambers, 1983: 146; DFID, 1999; Ellis, 2000: 30; Scoones, 1998: 4). Outcomes may be positive or negative, but either way they feed back into the other livelihood components (resources, vulnerability context, future capabilities) (Adato and Meinzen-Dick, 2002: 8; DFID, 1999).

Access to resources, and their translation into activities and outcomes, is modified by a number of contextual factors, generally divided into two main categories. What is here termed the 'institutional and organisational context' includes both formal and informal rules and norms regarding the way things work (including such things as customs, markets in practice and land tenure), government policy, government and non-government organisations and services and social relations (including power relations) (Ashley and Carney, 1999: 20, 47; Dorward et al., 2003: 327; Ellis, 2000: 3, 38; Ellis and Freeman, 2005: 5; North, 1990: 3-6; Scoones, 1998: 12). These may be understood as the social structures and processes that 'mediate the complex and

¹⁴ While livelihood analysis can be undertaken at many levels, the most common is that of the household (Ellis, 2000: 31). This is particularly so with regard to livelihood resources, strategies and outcomes. It is also the level at which the present study is largely undertaken.

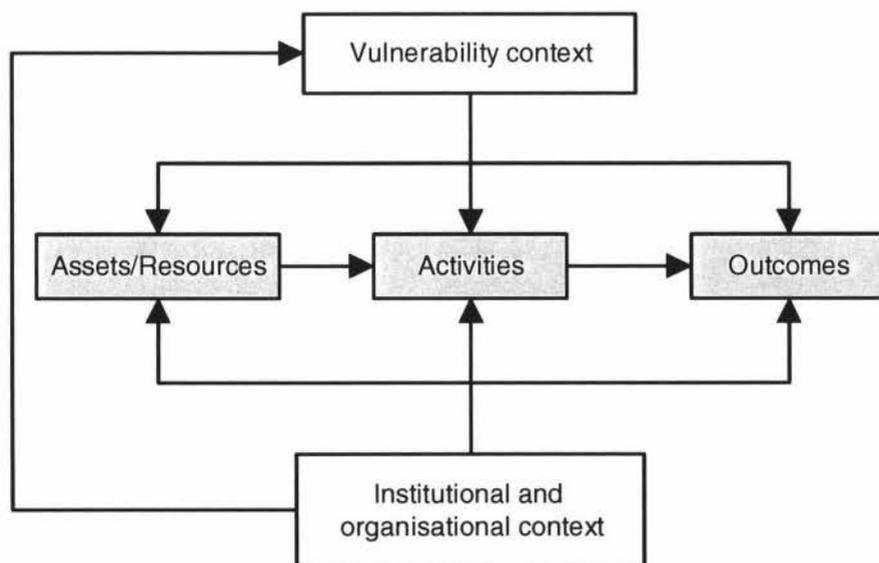
¹⁵ The Institute of Development Studies at Sussex University (IDS) has also published several working papers exploring these different strategies - for example Hussein and Nelson (1998) on livelihood diversification and Carswell, 1997 on agricultural intensification. Ellis (2000) focuses on diversification (of assets and activities) in general, which may be within or outside of agriculture.

highly differentiated process of achieving a sustainable livelihood' (Scoones, 1998: 11-12).

The other set of contextual factors can be seen as the external environment, or the risk factors that households must consider in constructing their livelihoods (DFID, 1999; Ellis, 2000: 37-38; Ellis and Freeman, 2005: 4). This includes trends, shocks and seasonality (Ashley and Carney, 1999: 7; DFID, 1999; Ellis and Freeman, 2005: 4). These are included in the 'vulnerability context' in most frameworks, drawing attention to 'the fact that this complex of influences is directly or indirectly responsible for many of the hardships faced by the poorest people', although it is recognised that not all trends are necessarily negative (DFID, 1999).

Figure 4.1 below presents a simple livelihoods framework, showing the five main components discussed above and the multiple linkages between them. It is important to recognise that the livelihoods framework is not linear or even circular, but is composed of multiple linkages between the various factors that together make up the complex and diverse livelihoods of rural people (Chambers, 1997: 162-170; DFID, 1999).

Figure 4.1: The standard components of a livelihoods framework



Source: Adapted from Ellis and Freeman (2005: 4).

4.2.2 Applications of a livelihoods approach

The livelihoods approach has a wide range of potential applications. Development organisations and donors have found it a useful guide in the identification, design, implementation and assessment of projects and programmes (Ashley and Carney, 1999: 10; Baumgartner and Hogger, 2004; Hinshelwood, 2003). A livelihoods approach can also be valuable in the formulation of policies at the micro level and analysis of the impacts of macro policies at local levels (Ellis, 2000: 28-9), in informing strategic thinking and guiding participatory planning (Ashley and Carney, 1999: 10) and in improving the effectiveness of interventions to strengthen people's capabilities and options (Scoones, 1998: 14).

In addition to these 'practical' uses of a livelihoods approach, research of many kinds can benefit from such a perspective. Geographers and other social scientists have used the approach to enhance their understanding of local trends and changes (Birch-Thomsen et al., 2001; Bury, 2004; De Haan and Zoomers, 2003). Bury (2004: 79) for example applied such an approach to evaluate access to and utilisation of resources in Peru, to understand 'how livelihoods are produced and transformed in particular geographic settings, as well as [to] link the activities of actors at broader scales to local resource transformations' (Bury, 2004: 79). Focusing on livelihoods rather than farming systems helped Birch-Thomsen et al. (2001) to uncover and explain processes of land degradation and intensification in Tanzania.

Of particular relevance to this study is the research by Adato and Meinzen-Dick (2002: ii-iii), which applied a livelihoods framework to assess the impact of agricultural research on poverty. They found that the framework provided 'a common conceptual approach to examining the ways in which agricultural research and technologies fit (or sometimes do not fit) into the livelihood strategies of households ...'. The framework used was based on a model similar to Figure 4.1 above but incorporated agricultural technology as a separate component, indicating that agricultural research and technologies can interact with (and be part of) the vulnerability context, the asset base, livelihood strategies and the institutional environment. This approach highlighted the 'multilayered interactions' between technologies and these other components at the household level (ibid). Many other aspects of livelihoods may also usefully be investigated through in-depth field research informed by the livelihoods framework (Ashley and Carney, 1999: 10).

4.3 Application of a livelihoods approach to this study

4.3.1 Guiding and shaping the study as a whole

Chapter Three described the many different theories as to why agriculture changes. Most have attempted to isolate particular variables and identify causal mechanisms behind change, taking a macro perspective and looking at how and why societies have changed their agricultural patterns over time. The above discussion of livelihoods approaches, however, suggests that a different perspective may be taken; one that has people at the centre, that attempts to understand the particular and the local, that seeks to uncover diversity rather than make generalisations. In a way, a livelihoods perspective turns the analysis on its head, by looking at the world from the bottom up and, as Birch-Thomsen have found, studying change from below rather than from above (Birch-Thomsen et al., 2001: 43). Such an approach therefore has the potential not only to change the way we do development, but the way we understand development issues, including the way we do research. It does this by focusing on poor people and putting them first, understanding their perspectives on the world and on their situation, understanding their priorities and uncovering what they perceive to be the opportunities for and constraints to achieving a sustainable livelihood (Chambers 1983, 1997).

Within the wider landscape of agriculture and change lie individual farms, usually associated with a particular household or family. The purpose of the farm is to provide food and other goods (often but not always including cash) to the household; for them, it is part (or the whole) of their strategy to make a living. Decisions are made in the context of this living (that is, their livelihood), based on their goals and preferences, the options available and the constraints to achieving these goals. It is logical, therefore, that to understand agricultural change we need to understand people and their livelihoods. People generally do not reduce the complexity of their lives into discrete categories and decisions are not made in isolation; rather, everything is linked, all part of a complex and dynamic whole that is their lives and livelihoods. In contrast to the general theories examined in Chapter Three, the livelihoods approach attempts to capture this holism, providing a slightly less artificial lens through which to understand how and why their agriculture changes (or does not change) in a particular direction. In this study of household agricultural decisions, it is asked how these decisions are shaped by the household's livelihood situation. The remainder of this chapter looks at how a livelihoods approach might in practice be used to address this question.

4.3.2 Inspiring and guiding methodology

To begin with, a thorough livelihoods analysis of a particular agricultural context has the potential to be enormously complicated and would likely generate a volume of data requiring a level of analysis beyond the means of most development organisations, let alone a single masterate student (Ellis, 1998: 47). The principle of 'optimal ignorance' must therefore be applied, which means seeking out only the information which is most relevant to the study and avoiding the collection of data superfluous to requirements (Ellis, 2000: 47, Scoones, 1998: 13). Livelihoods frameworks are not intended to be exact models of reality, but provide 'a checklist of issues and a way of structuring analysis', or 'a way of thinking through the different influences (constraints and opportunities) on livelihoods' (Ashley and Carney, 1999: 8). In applying such a framework to the study of household decisions regarding agricultural change, each of the five main components mentioned in Section 4.2 above needs to be considered. The remainder of this section takes a closer look at these components and the sorts of issues they represent that may be relevant to agricultural decisions.

There is no set sequence for analysing the various components of the livelihoods framework. However, prior appreciation of the wider context within which people construct their livelihoods may be useful when investigating the household-level components of assets, activities and outcomes. It might, for example, suggest reasons for some of the constraints and opportunities regarding resources or external support.

Part of this context corresponds to the institutions, organisations and social relations of the society involved, at both micro and macro levels (see p. 47). Relevant factors may include government policies, laws, social rules and customs regarding access to and use of resources, including for example rights to use land, forest and water resources; the existence of government and non-government organisations providing services or infrastructure (for example, agricultural extension services, roads, electricity, education and healthcare); services and opportunities offered by the private sector (for example, agricultural companies, traders, employers); civil society groups or organisations (such as farmer groups); the existence of markets (including commodity, labour and credit markets) and how they work in practice; and how factors such as age, gender and ethnicity are embedded in power relations (De Haan and Zoomers, 2005: 36; DFID, 1999; Dorward et al., 2003: 326-237; Ellis, 2000: 3; Scoones, 1998: 12). Livelihoods analysis involves identifying the specific institutional and structural conditions which influence people's access to resources and the activities they are able to pursue and in

doing so restricting or providing opportunities to achieving sustainable livelihoods (Scoones, 1998: 12). The analysis of the institutional and organisational context in this study is largely contained within Chapter Five, which describes the Lao context at the national level.

Another aspect of context involves the trends, shocks and conditions (the 'vulnerability context', p. 48) that shape the external environment in which people live. Trends may relate to a wide variety of phenomena, such as population, natural resources, economy (both micro and macro) and technology, while shocks may include drought, human and livestock disease and sudden law changes (Chambers and Conway, 1992: 14-15; DFID, 1999; Ellis, 2000: 3; Scoones, 1998: 4). All of these types of trends and shocks may have a direct impact on people's agricultural practices, by affecting their assets and resources and the options available to them. More regular conditions such as climate and seasonal shifts and fluctuations can impose severe limits on what people can do (Chambers and Conway, 1992: 15; DFID, 1999; Scoones, 1998: 4). This can be particularly relevant to labour allocation and food security, and may cause people to resort to strategies they otherwise would choose to avoid, such as hiring out labour or mortgaging crops in order to survive the 'hungry months' (Birch-Thomsen et al., 2001: 55; Chambers and Conway, 1992: 15-16; De Haan and Zoomers, 2005: 40; Ellis, 1998: 12).

Vulnerability concerns a household's 'degree of exposure to risk, shocks and stress; and proneness to food insecurity' (Ellis, 1998: 14, after Chambers, 1989 and Davies, 1996). People's perceptions are critical here, as Adato and Meinzen-Dick (2002: 8) point out: 'both perceived and actual vulnerability can influence people's decisions and hence their livelihood strategies. This is especially important for whether people are willing or interested in adopting agricultural technologies'. Vulnerability also encompasses the notion of resilience, meaning 'the ability of the system to absorb change or even utilise change to advantage' (Ellis, 1998: 14). This relates directly to the present study, in which the ability to take advantage of opportunities for change is potentially a key factor in forage adoption decisions. In summary, livelihoods research should look for the specific conditions, trends and shocks that are having the most influence on local livelihoods and try to understand how these factors, and particularly, farmer perceptions of them, impinge on their opportunities and decisions.

In the present research the vulnerability is not addressed explicitly at any one point in this study. However, information relating to vulnerability is considered throughout

Chapters Five, Seven and Eight, notably regarding national-level trends in Chapter Five. It relates closely to livelihood outcomes such as rice security (Sections 7.3 and 8.2.5), as well as to financial capital, in terms of the savings a household has to fall back on (Section 7.1.6). This context is also touched on in Sections 8.1.1 and 8.1.2 where farmers' views of their livelihood problems and related changes are described. The case of Tao Sao Hok, as described in Box 8.5, provides an example of the vulnerability of livelihoods in terms of ongoing rice insecurity.

Returning now to the level of the household, the assets and resources that people have (or have access to) is central to the livelihoods approach. As noted earlier, these can be seen as the building blocks of livelihoods, a range of which are required to achieve positive livelihood outcomes (DFID, 1999). Of obvious and direct importance to agriculturally based livelihoods are natural resources, such as land, forests, water and biological diversity; human capital, including skills, knowledge, health and ability to labour; and financial resources, such as savings in the form of cash or livestock, access to credit, and sources of income¹⁶ (Cramb et al., 2004: 264; DFID, 1999; Ellis, 2000: 32-34; Helmore and Singh, 2001: 4; Scoones, 1998: 7-8). Less obvious but also potentially relevant are social and physical capital. Physical capital includes infrastructure such as roads, water supply and sanitation, energy, communications and buildings, and tools and equipment used for productive purposes (ibid). Their relevance to understanding agricultural change may vary depending on the context being investigated. Social capital is the most complex and difficult to investigate and describe of all the types of capital (Ellis, 2000: 37). It involves the social resources and claims on which people draw in pursuing their livelihood strategies and may include networks (both horizontal and vertical), membership of groups and relationships of reciprocity and exchange, enabling people to work together, improving efficiency and facilitating innovation and the spread of knowledge (DFID, 1999; Ellis, 2000: 31-7; Scoones, 1998: 7-8). In this research, household assets and resources are described primarily in Section 7.1 and are also discussed in relation to forage adoption in Section 8.2.

¹⁶ Financial resources/capital in the livelihoods framework includes both stocks and flows and can contribute to consumption as well as to production. The general idea is to consider the 'availability of cash or equivalent, that enables people to adopt different livelihood strategies'. Income sources are the means by which financial capital is obtained (DFID, 1999)

In understanding agricultural change at the household level, the livelihoods approach suggests the investigation of household access to these different types of capital or resources. As differences in access may be crucial in determining the livelihood options available, analysis should seek to understand these differences and how they may relate to the variable under consideration (in this case, technology adoption). Key questions regarding livelihood resources may include: whether one type of resource or a certain combination of resources is required for a particular activity or strategy; whether one resource is required to gain access to others; whether certain types of resources can be substituted for others; what trade-offs are faced by people with different access to different kinds of resources; what trends in availability of different types of resources are occurring and how and by whom different assets are being depleted or accumulated (Scoones, 1998: 8). The adoption of technology may, for example, require specific resources such as labour, land, savings, credit, knowledge, skills, or roads providing access to markets (see Section 3.7.2). Farmers' perceptions of the resource requirements may also influence adoption. Adato and Meinzen-Dick (2002: 25) have suggested that the key question to ask is how 'poor people's capacity to access and manage assets affect[s] their ability to access research outcomes/technologies and convert them into positive livelihood streams'.

A further component of livelihoods analysis involves the mix of activities undertaken by a household, resulting in their livelihood strategy. It is important to understand not only what people are doing now but also what they are able to do in the future, as well as the factors that lie behind their choice of livelihood strategy (DFID, 1999). There are many different ways of looking at livelihood strategies, as noted in Section 4.2 above. While some analysts focus only on the three distinct strategies of agricultural intensification, livelihood diversification and migration (for example Carswell, 1997; Hussein and Nelson, 1998), others take a wider view of the agricultural strategies that may be followed. The first category can thus be seen as the 'strategy' of continued or increased reliance on agriculture, which may involve intensification (as defined in Chapter Three - increased inputs on the same amount of land), extensification, or diversification within agriculture (Ellis, 2000: 41-42; Scoones, 1998: 9). It is suggested here that, for the purposes of livelihoods analysis, innovation may also be seen as a further agricultural strategy. A household's available resources and the different levels of risk associated with different options may influence the choice of livelihood strategy, including the 'degree of specialisation or diversification', both within and outside of agriculture (Scoones, 1998: 10). For example, certain activities may have particular 'entry conditions' such as assets or resources, with the result that better off households

are more able to take up such activities (thus potentially increasing existing inequalities) (Adato and Meinzen-Dick, 2002: 14-15; Dercon and Krishnan, 1996: 850).

Livelihood strategies can be viewed in another way, in terms of the household's response to conditions, with some studies differentiating them along a kind of coping-adaptation continuum which tends to place poorer households with high vulnerability to risk (or those currently dealing with shocks or other adverse conditions) at one end and better-off households in the process of accumulating assets or consolidating and stabilising their well-being at the other end (Ellis, 2000: 62; Birch-Thomsen et al., 2001: 55; Zoomers, 1999, in De Haan and Zoomers, 2005: 39-40). Somewhere in between are households employing what Zoomers identified as 'security' strategies, often adopted in uncertain environments (such as high altitudes) where risk tends to be high and diversification is commonly used to spread these risks (ibid). As noted earlier, vulnerability to risk, and people's 'subjective evaluations about the degree of risk' associated with different activities, can have a marked effect on people's livelihood strategies (Adato and Meinzen-Dick, 2002: 8; Ellis, 2000: 62). Livelihood activities in the study villages are presented primarily in Section 7.2 and are also mentioned throughout Chapter Eight, notably in Section 8.1, where farmers' perceptions of their livelihood, including activities and opportunities relating to these activities are described.

The interaction of all of the above factors - assets and resources, the vulnerability context, transforming structures and processes and the activities and strategies pursued - determines the livelihood outcomes for a particular household. Part of livelihoods analysis involves 'thinking about the critical links' between these components (Ellis, 2000: 45-6), in an effort to understand how and why various livelihood outcomes result. It also involves understanding how particular outcomes feed back into the other components - for example, improved food security may increase human capital (improving people's ability to work), making the household better able to pursue accumulation strategies rather than forcing it to convert certain types of capital into urgently needed food. Conversely, negative outcomes such as the degradation or depletion of certain natural resources may mean that these resources have to be substituted for, or that activities depending on them may no longer be viable. People's goals and priorities with regard to their livelihood outcomes must also be taken into consideration (DFID, 1999). This is an important point, although it receives little attention in the literature.

Priorities and objectives may even be more important than a household's asset status, affecting the kinds of strategies they are interested in pursuing, the kinds of assets they value, and the kinds of trade-offs they are willing to make (Zoomers, 1999, in De Haan and Zoomers, 2005: 39-40). It is therefore suggested that understanding people's priorities should be part of any livelihoods analysis, particularly where household behaviour and decision-making is concerned. Livelihood outcomes are considered in this study in Sections 7.3, 8.1.1 and 8.1.2.

Two areas that are not explicitly recognised in the livelihoods framework but that may be relevant to studies of agricultural change are technologies themselves and farmers' perceptions of both their livelihood situation (as represented by the five components described above) and of the technologies on offer. These factors are included in the present research, with findings related to them comprising much of Chapter Eight.

4.3.3 Existing studies

As livelihoods research is relatively new, few studies have been documented that apply the approach specifically to household agricultural decisions, and fewer still to the adoption of agricultural technologies. However, two studies were found to be pertinent to this research and illustrate the relevance of applying a livelihoods approach to further an understanding of household level agricultural change. In one instance (Cramb et al., 2004), a livelihoods framework was applied as part of the monitoring and evaluation of a participatory research project involving the introduction of forages into upland communities.¹⁷ The study, conducted in Viet Nam, found that forage adoption behaviour was to some extent explained by households' livelihood assets and activities, with better-off households (those with more land, labour and cattle) more willing and able to incorporate forages into their livelihood strategy (Cramb et al., 2004: 270). The study revealed that the main difference between households of different wealth categories was in the number of cattle kept. It highlighted the key role of livestock (cattle in particular), in households' ability to pursue a livelihood strategy that could be augmented by the addition of managed forages, which 'helped explain why ... [this] was an attractive option to those farmers with the necessary resources' (ibid). The study by Cramb et al. is the only one found to document research into a case

¹⁷ In fact, this project was the direct predecessor of the Forages and Livestock Systems Project (FLSP) to which the present research relates.

similar to that of the present study, and the findings suggest that household access to livestock and other resources such as land and labour may be relevant factors in this study also.

The second study (Dercon and Krishnan, 1996) carried out in Tanzania and Ethiopia, was not identified by the authors as a 'livelihood study' but investigated livelihood-related reasons for differential income diversification, with an emphasis on livestock-raising as the key activity. The study looked at why more households were not engaging in livestock production as a high return activity. Again, the major difference between wealth groups was livestock ownership, particularly cattle. While livestock were found to be the preferred investment type for many households, they could only be acquired through purchase, requiring substantial investment. As credit was largely unavailable, this investment had to come from household savings. Households with greater resource endowments were thus better able to accumulate savings and subsequently invest in livestock. In this way, 'relatively small differences in land and labour endowments may ultimately result in a very different ability to invest in lucrative activities such as livestock raising' (Dercon and Krishnan, 1996: 861). This study, too, indicates that households' level of resources may be important in determining their ability to pursue livestock-related activities and, as the Viet Nam study above showed, this may have an impact on the adoption of forages.

4.4 Conclusion

This chapter has introduced the main features of a livelihoods approach and discussed how it might be applied to an understanding of agricultural change. Such an approach has the potential to incorporate many of the issues identified in the literature on agricultural change, including the availability of different types of resources and assets, 'economic' factors such as markets; infrastructure, general trends and the notions of risk and vulnerability that affect the way people make decisions; the political and institutional context; and access to information and technologies. The focus in this approach, however, is on the local level, considering how these and other factors affect households' capabilities, opportunities and constraints. Central to such an analysis is an understanding of what people have (or have access to), how they use what they have to construct their livelihoods and how external forces influence these factors. These are all considered under the five main components of livelihood assets, activities and outcomes, and the institutional and organisational, and vulnerability, contexts. This chapter has also suggested the need to incorporate technology and perceptions in

the framework in applying it to the analysis of household-level agricultural change. The livelihoods approach promotes recognition and appreciation of complexity and diversity and, while a livelihoods framework as currently understood may not be able to pick up every factor relevant to agricultural change, it provides a lens through which such changes can be viewed and is a useful heuristic tool for guiding research.

Chapter 5 Lao People's Democratic Republic

This chapter introduces the country context within which this research is located. It first gives an overview of some of the notable features of the Lao People's Democratic Republic (Lao PDR) in terms of development, its people and the political situation. It then describes the agricultural sector and related issues such as the land tenure situation. The remainder of the chapter focuses on shifting cultivation in the Lao PDR. It considers the way shifting cultivation has been perceived and the resulting policy situation, following this with a discussion of shifting cultivation-based livelihoods today and the pressures they face, as well as the options for change and alternatives currently being pursued. The chapter finishes with an overview of livestock production and the two projects which constitute the context within which the present research is carried out.

5.1 Overview

The Lao PDR is a small, landlocked country located in the Mekong region of Southeast Asia (see Figure 5.1). It is overwhelmingly agrarian with about 79 percent of its 6.2 million¹⁸ inhabitants living in rural areas and an estimated 85 percent deriving their livelihoods from agriculture (Cabungcal-Cabiles and Penunia, 2004; World Bank, 2005a, 2005b).¹⁹ It is also largely mountainous, with a third or more of the population living in such areas, most of them depending to some extent on shifting cultivation (Cabungcal-Cabiles and Penunia, 2004: 147; Hansen, 1998: 34; Souvanthong, 1995: 3). Lao PDR is also considered one of the poorest countries in the world, currently ranking 133rd of 177 countries in the United Nations Human Development Index and being designated a 'least developed country' (UNCTAD²⁰ website; UNDP website). The government aims to lose this status by the year 2020, through 'sustained equitable economic growth and social development' with a focus on industrialisation and modernisation and a transition from a subsistence to a market driven agricultural economy (GOL, 2003: 1, 6, 54). The uplands are the focus of many such policies, as well as those policies aimed at conserving the nation's natural resources.

¹⁸ As at mid-2005 (CIA 2005)

¹⁹ Country-wide statistics pertaining to the Lao PDR should be treated with caution and taken as approximates at best, as few reliable figures are available.

²⁰ United Nations Conference on Trade and Development.

Figure 5.1 Location of the Lao PDR



Source: University of Texas website

For such a small country, Lao PDR is extremely ethnically diverse, with over 230 distinct ethnic groups (although the government only officially recognises 48) (Asian Development Bank (ADB), 2001: 3; Ministry of Agriculture and Forestry (MAF), 1999: 13; United Nations Development Programme (UNDP), 2001: 57). Four major ethno-linguistic groupings have been identified. The dominant Tai-Kadai groups, commonly known as 'Lao Loum'²¹, tend to inhabit the lowland areas (although not exclusively) and constitute somewhere between 52 and 67 percent of the country's population (ADB, 2001: 25; Sisouphanthong and Taillard, 2000 in Ducourtieux et al., 2005; Souvanthong, 1995: 3). Within this group, the ethnic Lao are estimated to make up approximately 30 percent of the total population (UNDP, 2001: 58; ADB, 2001: 25). The Mon-Khmer groups, known as 'Lao Theung', are the original inhabitants and now mostly live in the uplands, comprising between 23 and 34 percent (ADB, 2001: 25; Souvanthong, 1995:

²¹ The terms Lao Loum ('lowland Lao'), Lao Theung ('Lao of the middle slopes') and Lao Sung ('Lao of the highlands or upper slopes') were coined by the Royal Lao Government in the 1950s and have been used as a way of uniting the country's many ethnic groups. However, such categories are clearly unrealistic and mask the diversity of people groups inhabiting the country. As such they have been discredited by academics and are no longer used in official government communications, but remain common in many people's thinking and everyday language. (Halpern, 1964: 5; Pholsena, 2002; Roder et al., 2001: 124)

3; Savada, 1995). The Hmong-Mien and Tibeto-Burman groups, who are the most recent arrivals, live mostly in the highlands of the north, are collectively known as 'Lao Sung' and together make up about 10 percent of the population (ibid). Largely a factor of the environments they currently inhabit, those inhabiting middle and upper slopes are predominantly shifting cultivators, while those in the lowlands are on the whole more likely to cultivate paddy rice (ADB, 2001: 24; UNDP, 2001: 58). No absolute distinctions can be made, however, and farmers of all ethnic groups often employ a variety of methods depending on the land available (ADB, 2001: 24-5; Evans, 1990: 39; Roder, 2001: 3; Souvanthong, 1995: 3; UNDP, 2001: 58)²². The lowland Lao have long been considered the 'majority' ethnic grouping and continue to be dominant politically, socially and economically (Halpern, 1964: 8; Stuart-Fox, 1986: 131).

The Lao PDR has had a communist government since 1975, when the Royal Lao Government was defeated and the royal family deposed by the Lao People's Revolutionary Party. Before this time the Lao people suffered decades of war, particularly from the late 1960s to early 1970s when American planes bombed much of the country in an unsuccessful attempt to halt the spread of communism (Evans, 2002: 147-149). Many unexploded ordnance remains throughout the Lao countryside today. After the revolution the government sought to establish a centrally planned, socialist economy, including a short-lived attempt at collectivisation in the late 1970's. However, in the mid 1980s there commenced a 'drastic policy reform' (KRI International Corp., 2001: 2-1) which saw a transition to a market economy in the form of the 'New Economic Mechanism' (Bourdet, 2000: 1-3; Evans, 2002: 195; KRI International Corp., 2001: 2-1).

5.2 Agriculture

The Lao PDR is a tropical country and experiences a definite rainy season from May to September, which determines agricultural activities. The Government's Strategic Vision for the Agricultural Sector (MAF, 1999) identifies two distinct agricultural 'economies', based on geographic differences. One consists of the flat lands along the

²² It is thought that some of the indigenous upland-dwelling people, such as the Khamu, in fact have a long history of paddy rice cultivation and only retreated to the uplands when forced by the incoming ethnic Lao. In addition, lowland populations commonly practised shifting cultivation to supplement their paddy rice in the recent past and some continue to do so (Stuart-Fox, 1986: 45; UNDP, 2001: 74).

Mekong corridor where considerable commercialisation has already taken place and modern agricultural inputs are being used in order to increase production. The other consists of the sloping lands which account for over three quarters of the country's area (Cabungcal-Cabiles and Penunia, 2004; MAF, 1999: 3). In these latter regions agriculture is primarily for subsistence and is extensive rather than intensive, with shifting cultivation predominating (Government of Laos (GOL), 2003: 26; MAF, 1999: ix-x). The economy is basically non-monetised, infrastructure is limited and market access and information is lacking (MAF, 1999: x). These areas are inhabited mostly by ethnic minorities and poverty is widespread (ADB, 2001: xiii; MAF, 1999: x; Bouahom et al, 2005: 18). While separate development strategies for these two main agro-economic zones have been identified, both are aimed at 'further market expansion and market development' (MAF, 1999: ix). For the uplands, this includes initiatives such as: land-use zoning and land allocation; farming systems diversification; environmental protection and improvement; provision of credit and rural finance system development to promote technology adoption; improving infrastructure to increase market access and information delivery (MAF, 1999: xi).

In all areas of the country (with the possible exception of some highland areas) rice is the major crop, cultivated in both lowland paddies and upland fields. This is usually supplemented by other crops and activities (see Section 5.3.2). All land is owned by the State but until recently, land use rights in practice were managed according to customary rules within villages. In general anyone who cleared a plot of land had usufruct rights to it, which ceased upon prolonged abandonment (Ducourtieux et al., 2005: 502). The government has undertaken a programme of land reform since the early 1990s, centred on land use zoning and land allocation, known as the Land and Forest Allocation Programme (LFAP) (Ducourtieux et al., 2005: 504; Vandergeest, 2003: 52). By decree²³, Lao citizens have the right to own and use land, but in practice villagers are granted use rights through the land allocation process, with the government retaining ultimate rights to the land (ibid; UNDP, 1998: 31). The LFAP affects (or will affect) all Lao farmers, although in different ways; its impacts on shifting cultivators are discussed in the following section.

²³ Decree by the Prime Minister on land (99/PM 19/12/1992) (cited in Ducourtieux et al. 2005: 505)

5.3 The uplands: shifting cultivation-based livelihoods

5.3.1 Shifting cultivation: practices and policy

Shifting cultivation has long provided a livelihood for the majority of people in the Lao PDR, integrating crops, animal husbandry and forest resources using a diversity of techniques in a range of situations (Roder et al., 1996: 402, 408). It is widely considered that in the past, this system was the 'best land-use option for upland farmers', due to the hilly topography and low population density (ibid). However, it seems that fallow periods have been falling quite dramatically over recent decades (Chazee, 1993: 72; Hansen, 1997b: 35), one study reporting that farmers remember fallows of 38 years in the 1950s, 20 years in the 1970s and five years in 1992 (Roder et al., 1994: 158), while fallows even shorter than this are now becoming commonplace (de Rouw et al., 2005: 139). A recent report for the Ministry of Agriculture and Forestry identified three main types of shifting cultivation currently practised in Lao PDR: traditional, rotational systems with long fallows (15-20 years) - recognised as sustainable under low population densities; pioneering systems where land is cropped until degraded and abandoned for new forest areas – obviously seen as unsustainable, and not necessarily a new phenomenon; and 'transitional' rotational systems in which fallows are becoming progressively shorter, eventually becoming continuous cultivation. The report sees this latter type as resulting from the LFAP, which has 'truncated' the shifting cultivation cycle to four to six years, causing declining productivity which has the potential to present 'serious livelihood problems' unless something is done (KRI International Corp., 2001: 3-43).

Interestingly, the very policy that has created (or at least contributed to) this situation is itself based on the idea that shifting cultivation is the culprit, and that to transform or stop its practice will enable the national goals of poverty reduction and environmental preservation to be met (GOL, 2003: 3; MAF, 1999: 4). Specifically, it has been assumed that shifting cultivation '(1) causes poverty, (2) is becoming unsustainable given increasing population densities, (3) destroys forests, and (4) reduces water available for lowland agriculture' (Vandergeest, 2003: 53). These assumptions have all been challenged by research in the Lao PDR and the wider literature on shifting cultivation. For example, with regards to the population argument, Lao information suggests that its impact on shifting cultivation 'is often exaggerated' and the role of government restrictions has been downplayed (Vandergeest, 2003: 53). Vandergeest notes that in Lao PDR 'there is little evidence in support of the argument that

population density overall is too high to support swidden cultivation by those who lack access to land suitable for permanent cultivation' (ibid). Drawing on many Lao studies, he also suggests that commercial logging, not shifting cultivation, is the main cause of deforestation. Nevertheless, the assumptions above have resulted in a long-term campaign to change people's agricultural practices (ibid). In the late 1970s resettlement was the main strategy to sedentarise farmers and stop shifting cultivation, although this was largely abandoned and many families returned to their original upland areas (Sandewall et al., 1998: 15). However, transformation of shifting cultivation into permanent agriculture remained on the agenda and was pursued through a number of initiatives during the late 1980s and 1990s.

Prominent among these initiatives is the LFAP,²⁴ which has become a primary vehicle for the policy of 'stabilising' (which apparently means eliminating) shifting cultivation by the year 2010 (GOL, 2003: 3).²⁵ It aims to do this by zoning all the land in each village and allocating plots of agricultural land to individual households according to their labour capacity. In this way households are restricted in the land that they can clear and use - they typically receive three to four plots of land for the production of rice and other crops, which they must then use on a rotational basis. Thus fallow periods have dramatically reduced, leading to a range of productivity problems as discussed in Section 2.3.

Although the LFAP is supposed to be a participatory process, in practice it has often been carried out hastily with a focus on achieving quantitative targets (including reduction in area under shifting cultivation) rather than on peoples' livelihood needs (Bouahom et al., 2005: 35-6). According to one observer, land allocation 'has already proceeded at a frightful pace, and yet the means to take advantage of the new "opportunities" are still being developed' (Raintree and Soydara, 2000: 20). As a result, many studies have concluded that land allocation has caused poverty and undermined the sustainability of livelihoods by reducing access to land and forest resources (ADB, 2001; Ducourtieux, 2005a: 91; Bouahom et al., 2005: 35-6; Raintree

²⁴ Begun in the early 1990s, the LFAP was apparently originally intended to protect the rights of villagers in the face of illegal logging (ADB, 2001: 45; Sandewall et al., 1998: 15). It has been noted that restrictions on land-use allowing for a maximum fallow of four years have been in place since the late 1980s in some provinces, including Luang Prabang (Chazee, 1993: 84).

²⁵ Originally this was set for the year 2000 but this goal has had to be revised a number of times (MAF, 1999: 26; Ducourtieux, 2005b: 504)

and Soydara, 2000: 20; Vandergeest, 2003: 51). At a recent workshop on shifting cultivation stabilisation, it was claimed that the policy was intended to be aimed at stopping only the pioneer form of shifting cultivation, but that in implementing it, 'local authorities do not generally distinguish between ... [different] types of shifting cultivation systems' (Bouahom et al., 2005: 24-25). Implementation issues were thus seen to require urgent and drastic attention if the government's aim of reducing poverty is to be met (ibid). Other studies echo this sentiment (ADB, 2001; Ducourtieux et al., 2005b; Vandergeest, 2003).

5.3.2 Livelihoods today - shifting cultivation in crisis?

The above section has introduced the general situation of shifting cultivation in the Lao PDR today, and has discussed some of the salient aspects of the institutional and policy environment of particular significance to the livelihoods of shifting cultivators. This section takes a closer look at how people construct their livelihoods from shifting cultivation, what changes in the external environment have meant for them and what challenges, opportunities and constraints they face today.

Glutinous or 'sticky' rice is undoubtedly the single most important crop in the Lao PDR, even in the uplands where productivity is low compared to some other upland crops, and also compared to paddy production (Roder, 2001: 10). It is the preferred staple food for most ethnic groups, with alternatives only being consumed when farmers are unable to produce or purchase sufficient rice for their needs (Roder, 1996: 407). Although more productive, maize and tubers like cassava are usually used as livestock feed, their consumption being associated with low social status. Increased commercialisation has probably contributed to this as it has made possible the purchasing of rice produced elsewhere (Roder, 1996: 407). Household-level rice shortages are common and apparently not a new phenomenon - they were noted by Gourou in 1942 (Gourou, 1942, in Roder, 2001: 406) and as far back as 1901 it was observed that farmers lacked the incentive to produce a surplus, due to the lack of markets (Pavie, 1901, in Roder, 2001: 406). Today, rice has also become an important source of cash, particularly for those with few livestock (Roder, 1996: 406). Many households have to sell their rice before or immediately after harvest, when prices are low - a major reason for rice shortages later in the year (ADB, 2001: 45; Roder, 2001: 406-7). The recent Participatory Poverty Assessment (PPA) found rice security to be the primary indicator of poverty (ADB, 2001: 44). It has also been suggested that farmers 'are ready to invest most of their labor in rice production' (Roder, 1996: 408).

Rice security is thus an important factor to consider when investigating farming system changes, as it is likely to have enormous bearing on the decisions farmers make.

The usual pattern of shifting cultivation in the Lao PDR involves planting a single crop, followed by a fallow of two to ten years (Roder, 2001: 9). Recent studies in Luang Prabang Province have reported households having access to three upland plots each, used on a rotational basis with fallow periods of only two years as promoted by the government (de Rouw et al., 2003: 16; Hansen, 1997b: 35; McAllister et al., 2000: 87). In addition to rice, which may take up 80 percent of the area planted (National Statistical Centre, 1993, in Roder, 1996: 405), other crops grown in the same plot may include maize, cucumber, pumpkin, taro, cassava, chillies and sesame, along with many others (Roder, 2001: 9). In addition, households often have fruit trees and small permanent vegetable gardens, raise livestock and collect and hunt wild resources in the forests and streams (Horne, 1998: 156; Raintree and Soydara ?2000: 4-5; Stuart-Fox, 1986: 113; Stur et al., 2002). Livestock can be a particularly important component of people's livelihoods and ranked the second most important indicator of well-being in the PPA (ADB, 2001: 47). Some studies have found livestock to be the most important source of cash income (Roder, 2001: 10), although others rank non-timber forest products (NTFPs) as the top earner (Foppes and Ketphanh, 2005: 181; UNDP, 2001: 78). In the PPA, selling livestock in order to purchase rice was found to be a last resort as they are an important form of savings and their sale increases vulnerability (ADB, 2001: 47). Livestock disease was cited in the PPA as a major problem and, therefore, a major cause of poverty (ibid).

A combination of the government policies described above and population increase is generally agreed to have resulted in reduced fallows, which themselves lead to many other problems (Roder et al., 1996: 402; Hansen, 1997b: 35). Many farmers are finding that weeds are increasingly becoming a problem (Horne, 1998: 57; Roder et al., 1996: 402,). Studies have found weeding requirements to have increased substantially over recent years; it is now often the single most important labour requirement, amounting to about half of the total labour input (Roder, 2001: 9). In addition, erosion and other forms of soil deterioration are becoming apparent (ibid). In order of frequency, farmers have cited the main constraints to rice production to be: weeds, rodents, lack of rain, lack of land, insect pests and lack of labour (Roder, 1997 : 111; 2001: 9). Researchers believe other constraints to upland livelihoods include: topography (steep slopes); preference for and dependence on rice; uncertain land

tenure; difficult communication; uncertain market opportunities; lack of alternative employment; and poor access to social services (Roder, 2001:10).

Overall, most observers agree that upland farmers in the Lao PDR are facing severe difficulties, with the productivity and sustainability of their traditional strategies increasingly undermined (Hansen and Sodorak, 1996: 1). Government staff themselves realise that 'poor implementation of the government policy in shifting cultivation areas' has meant that, even when population density is low, too many restrictions have been placed on shifting cultivators, 'who are then not able to sustain their livelihoods by utilizing natural resources' (Bouahom et al., 2005: 22, 24).

As Rigg (2005: 63) has pointed out, debates over shifting cultivation often swing between those who view it as efficient and sustainable and those who see it as destructive, unproductive and unsustainable. However, such binary discourse tends to ignore both the diversity and dynamism of shifting cultivation systems, in Lao PDR as in other countries. These systems are constantly changing, whether that be due to internal or external forces and whether these forces be opportunities or pressures. It can probably be said that within Lao PDR today the entire spectrum of situations can be found; from traditional, sustainable, long-fallow systems relatively unaffected by population increase and government pressure, to those which are suffering the effects of short fallows (induced by a variety of causes) and are barely able to meet subsistence requirements, and everything in between. From a livelihoods perspective, it is not so much a question of whether 'shifting cultivation' as a system is sustainable or not, but in each situation we should be asking whether people's livelihood needs are being met, and if not, what are the options available to them?

5.3.3 Options for the future

At the household or village level, various responses to government initiatives such as LFAP have been identified. These include: avoidance (seeing no viable options and constrained by poverty and risk, they continue shifting cultivation); dependence on the government (waiting for solutions to be provided - this has been identified as an historically dominant feature in some regions); continuing largely as before, but on a larger scale and embracing the market; embracing new technologies and opportunities for diversification (observed as a response in most villages studied) (Sandewall et al., 1998: 7-9). Where new systems or technologies have been offered to farmers, Chazee (1993: 94) suggests that the attitudes of farmers may be important in differentiating

those who are quick to respond and adopt and those who seem to have a more 'passive attitude'. He sees some farmers as having a negative perception of alternative systems in terms of their socio-economic impacts, 'leading to a psychological blockade to modify[ing] the system (he does not believe in it)' (ibid). Although Chazee was comparing adoption at the village level, these factors could also apply to individual farmers within the same village. Factors relating to perceptions have already been suggested as important in Section 4.3.2. Such factors are investigated in this research, with the findings presented in Chapter Eight (notably Section 8.2.1). Other important village-level factors cited by Chazee as 'prerequisites for stimulating the adoption of a new technique' include communications, markets and education (Chazee, 1993: 95; see also Sections 3.3 and 3.5).

Some of the options and technologies currently being pursued by the government and by development agencies in the Lao PDR include: improvements of existing upland rice cropping systems such as varietal selection, agro-ecological practices aimed at increasing sustainability, integration of fruit trees and other forms of agroforestry, crop-livestock integration, and other improved practices for upland rice production; development and improvement of upland paddies (including terracing); cash cropping; livestock production including improved livestock management and feed technologies; production of NTFPs and forest management solutions (Ducourtieux, 2005a: 15; Hansen, 1997b: 38; Raintree, 2005). While some of these are aimed at improving rice production, others are intended to provide cash-generating alternatives, so that rice can be purchased. Many farmers are already incorporating various income-generating activities 'to complement the importance of rice as the central element in their household economy' (Pravongviengkham, 1997a: 98). Although the government strategy continues to pursue the goal of agricultural sedentarisation, it is commonly recognised that, in the Lao PDR, 'cyclical shifting cultivation will remain the most realistic option for many farmers for yet many years' (Hansen and Sodorak, 1996: 3). At the same time, however, incremental improvements and diversification through the adoption of new products and technologies seen as appropriate and beneficial to livelihoods are likely to be incorporated.

At the NAFRI uplands workshop in February 2004 it was recognised that there is a need for improved understanding of the 'conditions of adoption' of all new upland technologies, including the need to better understand why some farmers do not adopt particular technologies (Bouahom et al., 2005: 28). Issues regarding the development and dissemination of new technologies were identified, including that farmers appear to

be concerned primarily with meeting household consumption needs before venturing solely into income generating activities; 'fencing is considered a big problem in cropping system intensification and livestock integration' (ibid); and the labour requirements and opportunity costs of labour must be understood and considered when developing new technologies (ibid). Other authors have pointed out that poverty can restrict farmers' opportunities to adopt technologies 'because they lack investment capital and are unable to wait for long-term returns', and because of the risk involved in many new technologies (Hansen, 1997b: 38). In this case Hansen is referring to cash cropping, but such restrictions could apply to various technologies. This issue is considered in the present research.

5.4 Livestock and the FLSP

As mentioned above, livestock production is one of the opportunities for the potential improvement of upland livelihoods. Livestock are already part of most upland farming systems in the Lao PDR and, as the PPA and many other studies have found, are increasingly important in people's livelihoods as a form of savings, a source of income and protein and, for some farmers, a source of draught or manure (Hansen, 1997a: 2, 1997b: 39; Phengvichith, 1997: 1; Pravongviengkham, 1998b: 47). They are integrated with shifting cultivation in many ways, including 'fodder production, the use of agricultural by-products for animal feed, the grazing of fallow areas, the use of animals for transport, and the sacrifice of animals for crop production and protection' (Hansen, 1997a: 1). Small livestock (particularly pigs and goats) can be particularly important for groups including women, ethnic minorities and the poor and can therefore be used as a way to 'reach' these groups (Bouahom et al., 2005: 33).

Intensified livestock production has the potential to generate substantial income, but is seen to be constrained by disease and lack of feed resources (Chapman et al., 1997: 188; Horne, 1998: 159; Phimphachanhvongsod et al., 2005: 129; Pravongviengkham, 1997b: 194). Management and feeding issues in particular have been identified as major constraints, perhaps contributing to livestock mortality even more than disease (Bouahom et al., 2005:32). Typically, large livestock are allowed to graze freely in the forest and on fallow land, resulting in extensive, low-input and low-output systems (Phimphachanhvongsod et al., 2005: 130; Pravongviengkham, 1998: 96-97). This makes disease control difficult and also often results in loss of livestock due to them wandering off, being stolen or killed (ibid). Consequently, managed feed resources have been identified as 'the key factor enabling farmers to intensify their livestock

systems in the uplands', allowing animals to be kept closer to the village where they can be better cared for, their manure can be collected and used for fertiliser, and they can be fattened for sale (Phimphachanhvongsod et al., 2005: 129).

The Forages and Livestock Systems Project (FLSP) is a participatory research project that aims to improve livelihoods in the northern uplands by improving livestock productivity, increasing labour efficiency and enhancing sustainable cropping systems (CIAT website). The main component of this project is the extension of various forages and other feed resources developed using participatory research approaches under the preceding Forages for Smallholders Project (FSP). These forages include grasses such as guinea grass, napier grass, gamba grass and brizantha, legumes such as stylo and mulatto, and sweet potato. They are intended to enable farmers to manage their livestock more intensively, and are expected to save labour currently spent on collecting local feed (Millar et al., 2005: 17).

The FLSP project, implemented by NAFRI and CIAT (the International Centre for Tropical Agriculture), has been running since July 2000 and in 2005 was working in 106 villages in five districts of two provinces in northern Lao PDR, some of which participated in the FSP project (which began in 1997).²⁶ Extension and technical support is provided by the Provincial and District Agriculture and Forestry Offices (PAFOs and DAFOs) (Millar et al., 2005: 9). Many of the 1350 farmers involved have improved the productivity of their livestock systems and have experienced other benefits such as increased labour efficiency, improved soil fertility, reduced soil erosion and increased cash income (ibid). About 12 percent have intensified their livestock production to the extent that they have reduced or stopped shifting cultivation (Horne, 2005 in Millar et al., 2005: 9). However, many farmers in the villages in which the FLSP works have not adopted forages. In fact, those that have tried and are still using forages are in most cases a minority (Millar et al., 2005: 18).

A related project, Accelerating the Impacts of Participatory Research and Extension on Shifting Cultivation Farming Systems in Lao PDR (AIRP), has been researching ways to scale out technologies, working with the FLSP to 'understand the factors that influence farmers' capacity to make the transition from shifting cultivation to more

²⁶ The FLSP project is funded by AusAID.

sustainable farming systems' (within the context of the FLSP).²⁷ This involves, among other things, understanding why some farmers adopt forages and others do not or are slow to adopt. It is this goal to which the present research is expected to contribute. To date the AIRP has noted several factors which appear to be constraining the widespread adoption of forages, including: the availability of land, labour and time; farmers' prior experiences; attendance at various extension outreaches and their level of understanding; the availability of seeds; and village regulations (Millar et al., 2005: 18, 22). In addition, it was found that many farmers want to see the impacts first hand (in their own village) and so wait for others to try it first (ibid).

At the NAFRI conference it was also recognised that the poorest households often have few livestock (Bouahom et al., 2005: 33). In this case the provision of credit may be necessary, which could possibly include 'schemes that could also target mechanisms enabling livestock intensification such as fencing' (ibid). The AIRP study also mentions this as a possible requirement to enable poorer farmers to participate (Millar et al., 2005: 23). A further issue involves farmers' perceptions of livestock production and relates to the traditional low-input methods they are accustomed to. As Pravongviengkham (1998a: 95-96) has noted, '[l]ivestock management ... is often viewed very casually by farmers, as of secondary importance to crop production'. This means that intensive livestock production may require a significant shift in farmers' attitudes - from seeing livestock primarily as a source of livelihood security to seeing it as a reliable source of income, perhaps with the potential to reduce or even replace their dependence on upland rice production (Connell et al., 2005: 362).

5.5 Conclusion

As this chapter has shown, the Lao PDR is a country particularly suitable for the study of shifting cultivation. Although up to a third of its people rely on this form of agriculture for their livelihoods, the government continues to pursue the goal of 'stabilising' this practice in the next few years, notably through the programme of land use zoning and land allocation, which essentially restricts households to a few plots of land. It is not yet clear what will take the place of shifting cultivation, or indeed whether this goal of elimination will ever be reached. The uplands remain largely isolated; without easy

²⁷ The AIRP project is funded by the Australian Centre for International Agricultural Research (ACIAR). It is a collaboration between Charles Sturt University in Australia, the Lao National Agriculture and Forestry Extension Service (NAFES) and CIAT.

market access it is difficult for farming systems to become commercialised. However, for those villages that are accessible, research and development projects are starting to become active in identifying and disseminating potential 'solutions' to the problems of the shifting cultivators within them. Livestock has been identified as one option with the potential to improve upland livelihoods. The FLSP project is pursuing this option with the introduction of managed forages in place of or as a supplement to local feed resources. The AIRP project, related to the FLSP, is investigating ways of increasing the impacts of FLSP to more farmers. It is within this context that the present research has been undertaken.

Chapter 6 Methodology

6.1 Approach

Understanding processes of change in the social world requires analysis of the context within which such change takes place. In the case of shifting cultivation and the adoption of agricultural technology, changes are deeply embedded in people's livelihoods and effected by decisions central to those livelihoods. With this in mind, the research aimed at understanding livelihoods at the household level, including farmers' perceptions of their situation, seeking to understand how agricultural decisions are shaped by this livelihood context. While the focus was largely at the level of the individual household, as the unit within which most agricultural decisions are made, an understanding of the various external factors influencing household livelihoods was also sought. This chapter provides an overview of the research methodology employed in the investigation of livelihoods and technology adoption in Xieng Ngeun District, Lao PDR (see Figure 6.2).

The research question concerned the nature of the relationship between household livelihoods and agricultural change, investigated through the case of forage technology adoption in the Lao PDR. Such an investigation necessitated a period of fieldwork, principally involving going to villages and talking to farmers. A mixed methods approach incorporating the use of both qualitative and quantitative data was taken, in order to capture both difference (in terms of household livelihoods) and depth (in terms of farmers' perceptions). Primary research was largely based on semi-structured interviews, complemented by household surveys and a group discussion. Secondary data also contributed to the analysis.

As suggested above, the livelihoods approach was central to this research. It not only provided the conceptual basis from which the overall research question was formulated, but was instrumental in guiding and informing the overall methodology and the actual questions asked, using the framework presented in Chapter Four (see Sections 4.2.1 and 4.3). Thus, the research involved finding out about households' assets (what they have), their livelihood activities (what they do with what they have) and the outcomes of these activities, in terms of their current situation, their goals and priorities and the possibilities available for the future. It also sought to understand farmers' perceptions of forages as an option for their livelihood, and of livestock more generally. In addition to factors particular to each household, an understanding of the

wider situation within which these households construct their livelihoods was sought - that is, the institutional and organisational context and the vulnerability context (see Section 4.2.1).

Given the limited time and resources available, it was necessary to be selective in the aspects of the framework that could be covered. Thus the focus of the research was on assets, activities and outcomes most relevant to forage technology adoption. The vulnerability context was considered but not investigated in depth, with shocks and seasonality considered at the household level and overall trends at the local and extra-local level. The organisational and institutional context largely related to the local and national levels. Some of these contextual issues have already been described in Chapter Five. As mentioned above, the research emphasised farmers' perceptions of their livelihood situation and of the technology on offer, even though these are not explicitly addressed in the livelihoods framework, in order to better understand their decisions. In fact, this was to form a major part of the research.

6.2 *Research design*

6.2.1 Sources of information

The research made use of both primary and secondary sources of information for the analysis of livelihoods and their context. Primary sources were used to investigate household assets, activities and outcomes, farmer experiences and perceptions of change and of the technology on offer. In the main these were sources were individual farmers representing households with differing forage adoption status, although information was also gathered from village leaders. Other key informants included staff of the District Agriculture and Forestry Offices (responsible for extension of the project's forage options), government officials and expatriates working in the area of rural development. Access to most of these primary sources was facilitated by FLSP and AIRP project staff through CIAT, with whom contact was initially made on a 'reconnaissance' trip early in 2005. Secondary sources included government documents (policy, strategy, statistics, etc); studies undertaken by other individuals, organisations and projects; and documents pertaining to the FLSP project.

6.2.2 Selection of sites

The study was limited to villages in which the FLSP project is active. In 2004, the project was working in five districts across two northern provinces of the Lao PDR. The fieldwork began with a short trip to each province in which the project works. Accompanying an employee of NAFES, who works with CIAT on the FLSP project, I was taken to a variety of villages, including some with no upland fields at all. We were able to interview a few farmers, see some of their forage plots and get some general information about the villages, as well as verifying and expanding on the project's information on adopters and stoppers. Approval for future research plans was also gained from provincial and district authorities on these trips. They proved to be a useful introduction to the project and the variety of situations within which it operates, but I was not able to get a lot of meaningful research done.

Originally it was hoped that both provinces could be included in this research, as the situation in each is quite different, both ethnically and agro-ecologically. However, for logistical reasons it was decided to focus on one province only. The province of Luang Prabang was chosen largely because my interpreter had already made plans to work there in January 2005 with others involved in the project (see below). An additional factor was potential difficulties with interpreting in Xieng Khouang province, where villagers are predominantly of the Hmong ethnic minority and are less proficient in the Lao language. In the event, such difficulties were apparent in Luang Prabang also, although possibly not to the extent they would have been in Xieng Khouang.

The project has been active in two districts of Luang Prabang province since 2001 (and was started in a third district in 2004). Luang Prabang District surrounds and includes the city of Luang Prabang, while Xieng Ngeun is adjacent but further south along the main highway (see Figure 6.1), meaning there are fewer opportunities available for off-farm livelihoods and less proximity to major markets, possibly making livestock a more favourable option. Discussions regarding village selection were held with AIRP project staff in Australia prior to fieldwork, who expressed particular interest in understanding why people in this district (Xieng Ngeun) were not using forages considering the lack of viable alternatives. Shifting cultivation is also more common in this district, making it more suitable for this study.

The project works in 11 villages ('*ban*') in Xieng Ngeun District (not including new villages for 2004). A number of factors were considered in village selection for this study, with the aim of getting a sample representative of the different situations in the district. The following criteria were considered: ethnic group²⁸ (with the aim of including at least one of each of the three main ethnic groupings in the district); location on or off the road (at least one off the road); extent of dependence on shifting cultivation (preferably a high level of dependence); villages with and without paddy land (most without; preferably one with); village size (preferably a range of sizes but not too big as this makes it difficult to get a representative picture of the whole village); FLSP start-year (a range of start-years but the majority from 2001 or 2002 as farmers have had more time to become aware of forages); percentage of households having tried forages; percentage of farmers having tried but stopped. In the event some of the information I had to work with (ethnicity in particular) was based on somebody's best guess and turned out to be inaccurate. Table 6.1 shows a summary of the villages selected and their characteristics in relation to the above criteria.

Table 6.1 Characteristics of villages selected

Village	Houay Hia	Kieuw Nya	Kieuw Chaluang	Silalek
Ethnic group	Khamu / Kasak	Khamu	Kasak	Khmu / Hmong
No. Households	82	54	43	101
Road	On - nat'l highway	On - nat'l highway	Off - 45 min walk	On - secondary
Paddy	no	no	no	yes, some
FLSP year	2002	2002	2001	2003
% tried forages	21%	35%	58%	14%
% stopped forages	35%	16%	48%	9% (possibly 55%) ²⁹

Source: Fieldwork notes, Jan-Feb 2005

Initially, five villages apparently of different ethnic groups were chosen, but it was later discovered that information regarding one village (Ban Kieuw Nya) was wrong (thought

²⁸ Many people (including Lao and foreign development workers) suggest that the various ethnic groups can be quite different in terms of their livestock-raising traditions. Hmong farmers, for example, have experience raising large livestock and using fences, while Khamu farmers tend to raise livestock on a smaller scale and more often keep small livestock (Simana, 1998: 81-89). It is also commonly thought that there are differences in these groups' attitudes towards change and innovation. (B. Linquist, pers. comm., 11 Feb 2005; P. Bouw, pers. comm., 14 Feb 2005)

²⁹ The larger figure is based on FLSP project documents, while the smaller figure is based on what villagers themselves told me.

to include ethnic Lao). Most FLSP villages in the district are of the Khamu and Kasak ethnic groups so it was difficult to get a representation of all ethnic groups. A fifth village was to be included, of Hmong ethnicity, but in the event it was not possible to go to this village so the research focused largely on Khamu and Kasak farmers.

6.2.3 Research participants

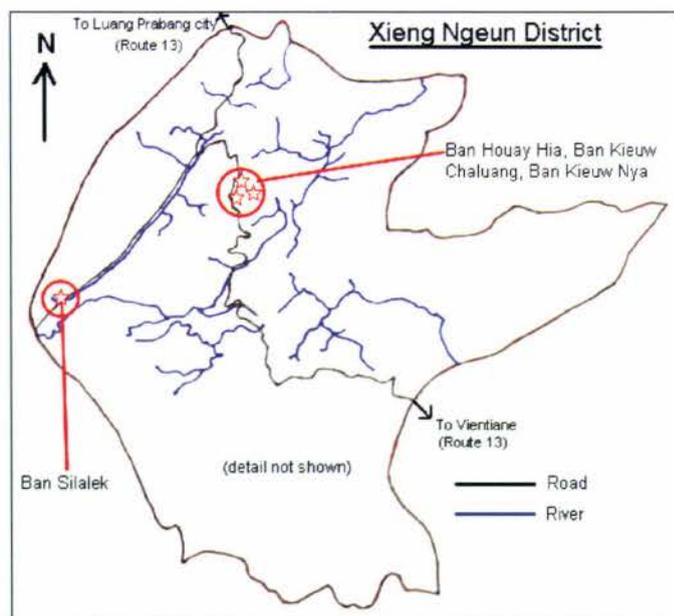
The fieldwork covered a total of 143 households over the four villages described above. Interviews were carried out with 30 of these households (see Section 6.3.3), the remainder being included in the survey (Section 6.3.2). About half of those interviewed were also part of the survey, which covered 127 households. Table 6.2 shows the distribution of households included in the research (as a percentage of the total population) from each category in each village. Those households included in both the survey and interviews are represented as interviews in the table.

Figure 6.1 Location of the study district



Source: modified from CIAT website

Figure 6.2 Location of the study villages



Source: modified from map provided by PAFO

Table 6.2 Households included in the research

Village	Houay Hia					Kieu Nya					Kieu Chaluang					Silalek					Total sample	Total popn
	Survey	Inter-views	Total sample	Popn	%	Survey	Inter-views	Total sample	Popn	%	Survey	Inter-views	Total sample	Popn	%	Survey	Inter-views	Total sample	Popn	%		
Non – Adopters	32	4	36	65	55	5	2	7	35	20	6	4	10	18	56	29	6	35	131	27	88	249
Stoppers	0?	2	2	6	33	0	1	1	3	33	5	2	7	12	58	0	0	0	2 ³⁰	0	10	23
Adopters	9	2	11	11	100	11	3	14	16	88	11	2	13	13	100	5	2	7	20	35	45	60
Totals	44	8	49	82	60	18	6	22	54	41	22	8	30	43	70	34	8	42	153	27	143	332

Source: Fieldwork notes, Jan-Feb 2005

³⁰ There was confusion over the number of 'stoppers' and 'adopters' in Ban Silalek. Project documents, based on extension workers' contact with farmers in 2004, recorded 12 farmers assumed to have stopped, as they were not participating in FLSP group meetings. However, during my stay in Ban Silalek the villagers themselves said only two had stopped growing forages.

The largest group covered was that of 'non-adopters' - those households who had never tried growing forages as part of the FLSP project; these being the main focus of this study and also the majority of the population. 'Adopters' were included in order to compare their situation to that of the non-adopters. A few of those who had tried but stopped using forages ('stoppers') were also included in order to understand what kinds of constraints they faced and why they decided forages were not a suitable option for them. It should be pointed out that in some villages it was not possible to get the desired numbers of adopters and non-adopters. In Ban Kieuw Nya, for example, the majority of those included were adopters, and only 20 percent of the non-adopters in that village were able to be included. However the aggregate sample from all villages reflects the desired ratio of non-adopters to adopters (roughly two to one)³¹.

The averages given in the following chapter are not necessarily representative of the whole population, as results for adopters and non-adopters have not been weighted according to their actual proportion of the population, and selection criteria were not decided according to rigorous statistical methods. They simply represent those who were included, which in some villages was more than half of the population, and over all four villages, 43 percent were covered by the survey (see Table 6.2). In some cases 'stoppers' have been included³², but for the most part the focus is on comparing adopters with non-adopters. The data for adopters relates to their situation at the time of adoption - between one and four years ago.

6.3 *Methods and implementation issues*

6.3.1 *Fieldwork schedule*

The bulk of the research was carried out in a total of four villages (as per Table 6.1) over a period of five weeks. Each village was visited three to four times, with the length of each visit ranging from a few hours to three days. I was able to stay overnight in each village at least once. Visiting and staying in the villages relied on the district

³¹ This ratio does not reflect the actual numbers of adopters and non-adopters in the villages studied - adopters are relatively few at 18 percent of all households in the villages studied - so a higher percentage of adopters were covered in order to get enough of them.

³² It should also be noted that the total sample of stoppers is only ten households, hence the limitations in creating statistics for this group.

extension workers (DAFOs) being available to accompany me. The benefits of this arrangement were in securing the cooperation of the village leaders, but its drawbacks included being restricted to times when the DAFOs were available and being rushed by them to finish quickly - meaning that my time spent in the villages was shorter than planned and there was almost no time available for personal observations and casual conversations which may have increased the richness of the data and allowed for more triangulation to take place.

The first visit to each village involved talking with the headman and a group of other village representatives in order to get background information about the village (relating to issues such as household statistics, livestock numbers, crops grown, problems and opportunities for the village as a whole). The second activity was gathering livelihood-related information on many households in the village, from both primary and secondary sources in the form of a survey. The third and primary activity for the research was in-depth interviews with selected households.

6.3.2 Village surveys

Quantitative household livelihood data was collected in order to get an overall picture of livelihoods in the villages and to see if it was possible to make an initial characterisation of those who were and were not using forages. This data was intended to inform the interviews in terms of household selection and possible areas to explore, by increasing my understanding of the range of situations and the degree of variation (or homogeneity) within and between the villages chosen. In each village a meeting was held with a number of village leaders (including leaders of the various units within villages) and other villagers arranged by the DAFO staff and headman. These participants provided quantitative information about their own households and two to four others in their unit, whose situations they were familiar with. Various interpreters (of varying competence) were used during these exercises. The survey was intended to include more households who had not used forages than those who have in each village, but in two villages this was not possible due to communication difficulties. However, the average over all the villages was acceptable (see Section 6.2.3). This exercise generated a large amount of data that, due to time and resource constraints, could not be analysed in depth prior to starting the interviews. I was able to utilise some of this information before commencing the interviews, including for the selection of two or three households for interview, and later found that it made a useful

contribution to the overall analysis. The data relating to these surveys, combined with information gathered in the interviews, is presented in Chapter Seven.

6.3.3 Household interviews

Household interviews were the main focus of this research and provided both quantitative and qualitative data, some of which is presented in Chapter Seven together with the survey data, but the bulk of which constitutes Chapter Eight. Because the focus of the research was on agricultural change, using the example of forage adoption, adoption status was the primary selection criterion for the interviews. The aim was to carry out eight interviews per village, with half the informants having never used forages, a quarter having stopped and a quarter being adopters. This was achieved in two villages, but in one no 'stoppers' were available for interview so non-adopters were interviewed instead, while in another it was only possible to conduct six interviews. Ultimately sixteen non-adopters, six stoppers and eight adopters were interviewed, although one 'stopper' turned out to be in fact continuing with forages. All the households interviewed were also selected because they relied primarily or completely on upland fields (where shifting cultivation was employed) and all had some livestock; very few households have no livestock at all and, as the project is really aimed at those with livestock and feed problems, it was decided to focus on those who do have livestock in order to find out why they had not tried forages.

Interviews were arranged by the extension workers and village headmen. In most cases interviews were with household heads only (all men), although sometimes both husband and wife were present and in one case the interview was with the wife only. Selection was based on the above criteria and a few of the households were chosen on the basis of the data collected earlier in the research, but apart from this most households were chosen by their headmen and were, in the case of afternoon interviews, limited to those available, i.e. those not out working in their fields. While every effort was made to spend sufficient time in each village to interview according to the selection criteria, some daytime interviews could not be avoided due to pressure from the district staff accompanying me to complete them and leave as quickly as possible. It eventuated that half of those interviewed held some position of leadership in the village - higher than the proportion of the whole population. This was probably partly due to the fact that village headmen ultimately selected the farmers for interview, and partly because nearly a third of those interviewed were adopters, the population of which may well be composed largely of leaders (almost all of the adopters interviewed

were leaders). It is not clear what the effects of this may have been on the overall representativeness of the data - the leaders may (or may not) be slightly wealthier than the general population, but as the research aimed to find out why households with at least some livestock had not adopted forages the very poor were excluded anyway.

The interviews were carried out in most cases over two one- to two-day visits to each village. Two interpreters (English students from the university in Vientiane) were employed at different times. The initial plan was to carry out a livelihoods analysis using participatory methods, including mapping, scoring and other visual exercises, and to follow this up with discussion around agricultural change and the FLSP technology. The major way in which the actual research deviated from this plan was in the use of these methods. The most important constraint was time - farmers tended to be very busy and attempts made to 'hand over the stick' (Chambers, 1997: 117, after Mascarenhas et al., 1991) for activities such as mapping and ranking took quite a long time. Farmers also seemed reluctant to participate in this way, or perhaps just found the concepts difficult. To set these methods up really well, using local materials, would have taken a substantial amount of time (and even then may not have worked). Unfortunately I was not able to spend enough time in each village to build up both the rapport and participant confidence that I felt would be necessary to make such activities work well. I also gained the impression that participants were more comfortable sitting and talking rather than taking part in visual exercises. After the first few attempts I decided to focus on semi-structured interviews with the use of pre-prepared cut-out pictures for farm mapping, which involved a visual depiction of the household's farm assets and activities, including land (type, use and location), crops and trees cultivated, livestock held and forest access.

The interviews lasted up to two hours, following a basic set of questions or topics (see Appendix) but remaining flexible enough to discuss things as and when they arose. Difficulties with interpretation and what seemed to be the reluctance of some participants to openly express their thoughts and opinions meant the interviews gravitated towards quantitative questions more than I had intended. As a result I perhaps did not get the richness of data I was hoping for, though the data proved to be sufficient to answer the research questions.

Each interview began with introductions and explanation of the purpose of the interview, assuring participants of confidentiality, their right to decline to answer any question, and asking permission to conduct and tape the interview. Some general,

historical questions were asked first in order to help participants relax and start talking about themselves. Next I asked about their household members in order to find out about factors such as labour, household size, social capital, followed by an indirect discussion of their livelihood assets and activities, using farm mapping (inspired by documented methods (Kumar, 2002) but adapted to the situation). Probing questions were used throughout in order to build up a picture of livelihood resources, activities and outcomes, followed up with a few questions relating to financial capital (income sources, savings and access to credit). Discussions then turned to problems, goals, and causes of change in the household's livelihood.

Non-adopters of forages were also asked about the alternatives they perceived to be available to them, and then were asked specifically about their knowledge and perceptions of FLSP forages. Farmers who had tried forages but stopped were asked about their experiences with forages and the reasons they stopped. Interviews with those currently using forages focused on their livelihood situation at the time of adoption, including their goals and reasons for adoption. They were also asked about their experiences, and finally, for their views on why other farmers do not adopt.

6.4 Conclusion

This chapter has described the research methodology used in the study of household agricultural decisions in Xieng Ngeun District, Lao PDR. A mixed methods approach was taken, with the focus on 30 in-depth household interviews across four villages in which the FLSP project works, complemented by a survey of a further 118 households. Both households who have used forages and those who have not were included in the research, with the main focus being on the latter. A number of difficulties were encountered during the data-collection stage, including being restricted by the availability of others, such as project workers to accompany me in the villages, translators and farmers; communication difficulties when competent interpreters were not available; and time constraints due to a variety of reasons. However, the data collected was comprehensive and sufficient to meet the research objectives.

Chapter 7 Livelihoods in Xieng Ngeun

The central question of this thesis concerns the relationship between household livelihoods and agricultural decisions. After introducing some of the issues relating to shifting cultivation and agricultural change, this thesis has presented the livelihoods approach and associated framework for investigating the context within which agricultural decisions are made. The previous two chapters introduced the wider context for this research and outlined the methodology used during the fieldwork in the Lao PDR. This chapter presents the findings of the livelihoods study undertaken in four villages of Xieng Ngeun District.

Results from the survey and household interviews form the backbone of this study and relate to resources and activities at the household level. This is complemented by local-level information gathered from other sources such as meetings with village leaders and from secondary sources (including existing documents and reports), which are used to describe the local context within which individual household livelihoods are constructed. The first part of the chapter concerns the assets and resources of households in the study, while the second part covers the main activities in which these households engage in pursuit of a livelihood.

7.1 Livelihood assets and resources

One of the aims of the livelihoods study was to find out if there were differences between adopters and non-adopters in terms of their assets and resources. This section identifies the differences found as well as describing in general terms the livelihood resources of the households included in the study (see Section 6.2.3). The main livelihood resources identified are: labour; livestock; land; crops and trees; forest resources and financial capital. Differences in social and physical capital were not assessed in detail but some general observations are made and it is recognised that these can be important factors influencing livelihood opportunities and outcomes. In the results that follow, unless otherwise noted, the averages and percentages given relate to each adoption group as per the 'total sample' in Table 6.2.

7.1.1 Labour

Household size

Table 7.1 shows that households ranged in size from two to thirteen people, with an average of six people (mean 6.1) per household. The non-adopters were found to have slightly below average household sizes with a mean of 5.7 and the middle 50 percent having between four and seven people, while adopters were above average with a mean of 7.0 and the middle 50 percent having between five and eight people. Stoppers were close to the average for all households. Analysis by village shows that the difference between adopters and non-adopters is greatest in Ban Silalek, where households were found to be slightly larger than in the other villages. Differences were also quite large in Ban Houay Hia and Ban Kieuw Nya, while they were comparatively small in Ban Kieuw Chaluang, also where households were found to be smaller overall (see Table 7.2).

Table 7.1 Household size by adoption group - all households

	Mean	Lower Quartile	Median	Upper Quartile
All households	6.1	5	6	7
Non-adopters	5.7	4	5	7
Stoppers	6.0	4	5.5	8
Adopters	7.0	6	7	8

Source: Field data, Jan-Feb 2005

Notes: the Lower Quartile is the value below which 25 percent of households fall. The Upper Quartile is the value below which 75 percent of households fall.

Table 7.2 Mean household size by village and adoption group

	Houay Hia	Kieuw Nya	Kieuw Chaluang	Silalek
Non-adopters	5.6	5.7	5.2	5.9
Adopters	7.4	7.3	5.8	8.1

Source: Field data, Jan-Feb 2005

Differences were also found between the households included in the interviews and those in the survey - the mean for interviewed households was 6.6, while for those surveyed it was 6.0. Only ten percent of the households interviewed had four people or less, while a quarter of those surveyed did.³³

³³This may be related to the fact that the interviews relied upon people being available for approximately two hours - potentially, smaller households may be less able to afford this time.

Full and part-time labour

Most households have a mixture of full-time and part-time farm workers. Nearly all able-bodied adults, except nursing mothers, are engaged in agricultural work as their primary activity, with the amount of labour required fluctuating seasonally. Part-time labour is often performed by children, who help out during weekends and holidays.

As Table 7.3 reveals, differences in the total full-time equivalent labour of adopting and non-adopting households were found to be very small - the mean for the non-adopting group was 2.5 and for adopters it was 2.7. The adopters tend to have more part-time labour - 82 percent of adopters have part-time labour, whereas only 56 percent of non-adopters do. The difference between labour endowments of adopters and non-adopters is most apparent in Ban Kieuw Nya, where the adopters have a mean of 2.4 full-time and 1.5 part-time and the non-adopters have a mean of 1.9 full-time and 0.9 part-time. The average labour ratio for all villages - calculated by the number of equivalent full-time farm workers divided by the number of people in the household - was found to be slightly lower for adopters, at 0.4:1 than for non-adopters, at 0.5:1. Adopters were also found to have slightly fewer children under 12 - it may be that they have more older children (and hence part-time labour available), but this is not clear from the data.

Table 7.3 Average labour endowments of adopter and non-adopter households

	Mean full-time-equivalent labour	Households with part-time labour (%)	Labour Ratio (workers:HH size)
Adopters	2.4	82	0.42:1
Non-adopters	2.2	56	0.47:1

Source: Field data, Jan-Feb 2005

Hiring, selling and exchanging labour

In addition to the labour provided by people within the household, many households participate in the hiring or selling of labour, largely within their own villages. Of the 30 households interviewed, eight sell their labour at some time during the year for cash or rice. In Ban Houay Hia, half of all households included in the survey and interviews had labouring mentioned as a source of income (survey data for the other three

In this way the interviews may have indirectly selected those with larger households and possibly more labour. It may be that the issue of labour (presented as a constraining factor in forage adoption in Section 8.2.2) is even more common among the general population than it is among those who were interviewed.

villages was inconclusive in this respect). Nearly half of those interviewed (from all villages) reported hiring labour - also paying either cash or rice, depending usually on what the labourer wants. Hiring labour seems to be especially common in Silalek, where it was reported by half of the households. In addition, nearly all households interviewed reported that they participate in some form of labour exchange, usually with relatives or others in the village on a reciprocal basis.

Human capital is an essential resource for these households, whose livelihoods are based on a very labour-intensive form of agriculture. In summary, it was found that adopters have bigger households, with slightly more labour, slightly fewer young children but slightly lower ratios of workers to 'mouths to feed'. Hiring and selling labour is also common and contributes to the human capital available to the households. The ability to hire labour is of course dependent on the availability of other resources within each household.

7.1.2 Livestock

Nearly all households have some mix of livestock, although it is common to have only a few small animals and one or two dozen poultry. Table 7.4 presents a summary of holdings by livestock type, showing how common each type of livestock is and how many of each type are held by the majority of households. Poultry are the most commonly held livestock (held by 89 percent of households in the research), followed by pigs (81 percent). Goats are relatively new for many households but are proving very popular in some villages, and are held by 36 percent of all households. Cattle, which are important as a form of savings as well as a symbol of wealth, are held by just over half of all those included in the research, seven percent having only one cow. Buffaloes are much less common and are held by only seven percent of households, almost all in Ban Silalek. They are traditionally important but have been replaced by cattle in recent years, except where they are used as draught power for the preparation of paddy rice. Five percent of all households covered by the research have no livestock at all. However, as the research included adopters (nearly one third of the total but only 18 percent of the population), the real figure is probably higher than this.

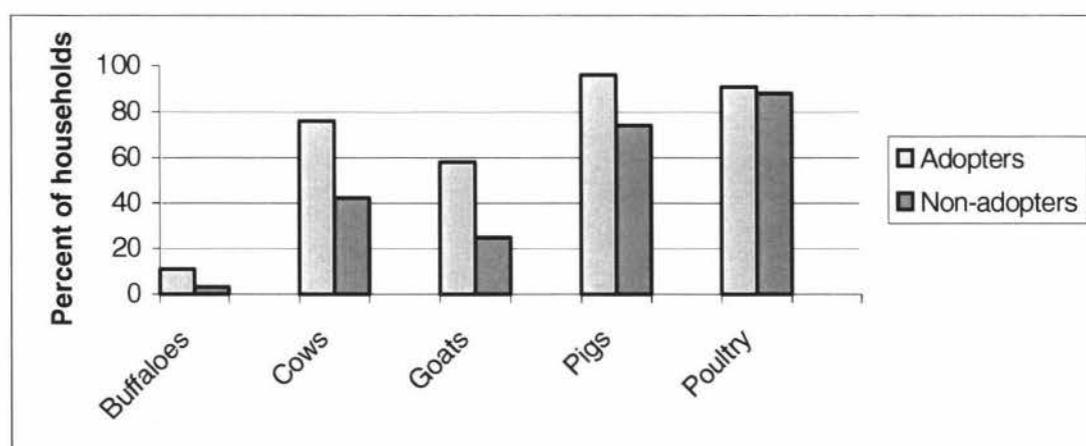
Table 7.4 Holdings of different types of livestock - summary

	Percentage of households with holdings of livestock type			Upper quartile of livestock holdings (75% have x or less)		
	All	Adopters	Non-adopters	All	Adopters	Non-adopters
Poultry	89	91	88	30	50	30
Pigs	81	96	74	8	10	5
Goats	36	58	25	3	7	0
Cattle	53	76	42	4	6	2
Buffaloes	7	11	3	0	0	0

Source: Field data, Jan-Feb 2005.

The distribution of livestock holdings by adoption group is shown in Figures 7.1 and 7.2. As Figure 7.1 shows, households adopting forages have substantially more livestock than households not adopting them. This was found to be the case with all types of livestock, but particularly cattle, goats and pigs.

Figure 7.1 Livestock holdings of adopters and non-adopters

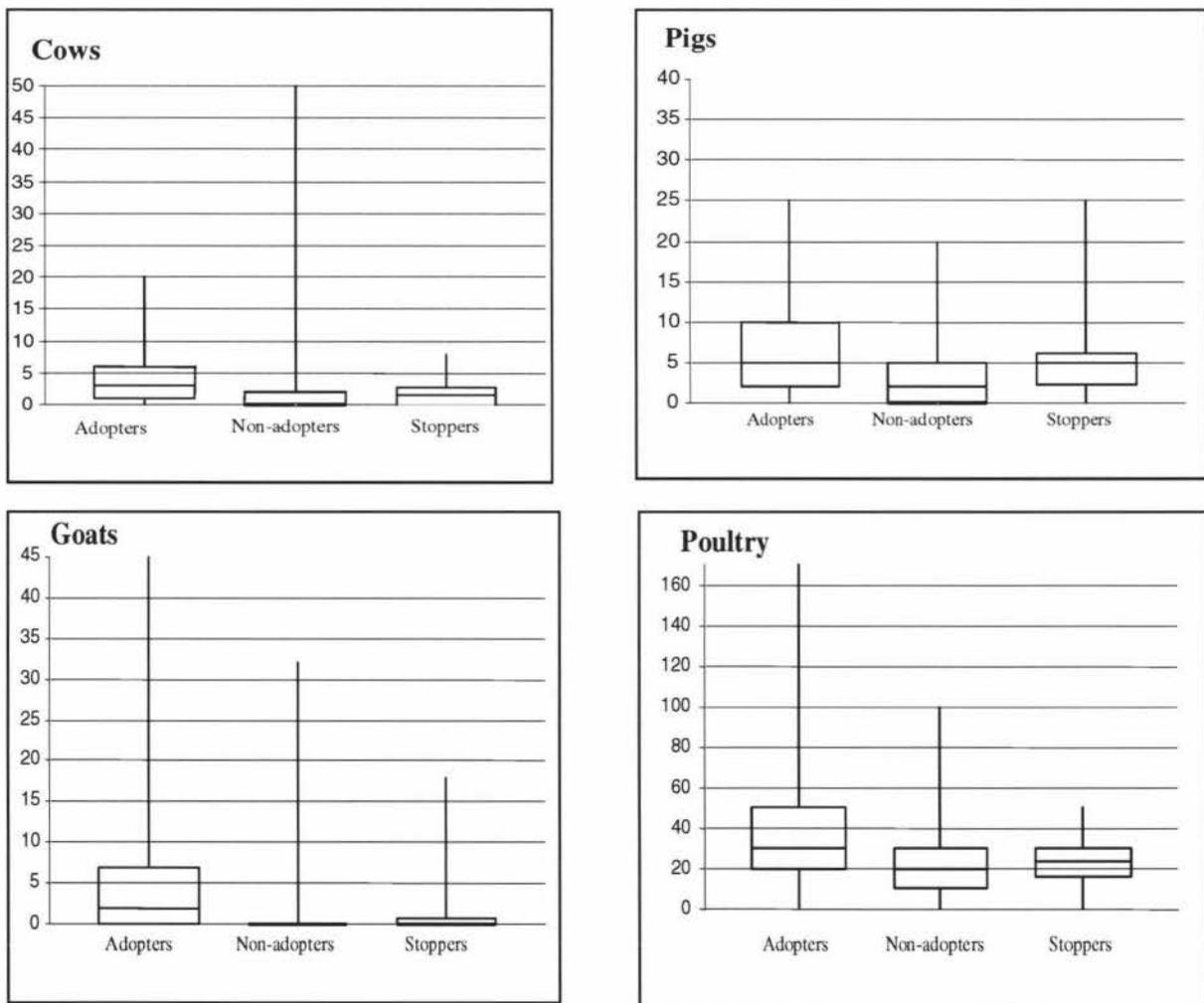


Source: Field data, Jan-Feb 2005

The data shown in the box plots (Figure 7.2) is taken from a list of each household's holdings of each type of livestock. The upper limit of the vertical lines represent the maximum number of animals held by any household in that group, while the lower limit represents the minimum - in all cases this is zero, meaning that in each group there is at least one household with no animals of that type. The upper and lower vertical lines themselves represent the top and bottom 25 percent of households. The box in between these lines represents the values between which the middle 50 percent of the households fall - the portion from the middle to upper lines represents 25 percent, as

does the portion from the middle to lower lines. The horizontal line in the middle is the median - half the values for households are above the median and half are below. Where there is only half of the box showing (e.g. cattle owned by non-adopters) this means that the median is zero - that is, at least half of the non-adopter households had no cows. Similarly, less than half of the stopper households and less than 25 percent of non-adopting households had goats. The box plots reveal that it is not only the averages that are different but that the differences are apparent across the majority of households in each adoption group. Although the household with the largest number of cattle is a non-adopting household, this is an anomaly and all other measures as represented by the boxes above show the adopters having larger numbers.

Figure 7.2 Box plots showing distribution of livestock holdings



Source: Field data, Jan-Feb 2005

Table 7.5. Total livestock holdings of households with few livestock

Households with...	Non-adopters Cumulative % (n=78)	Adopters Cumulative % (n=42)	All households Cumulative % (n=127)
1. No livestock at all	6.8	2.2	4.9
2. No livestock other than poultry	17	2.2	13
3. Only poultry, one or less pigs and/or goats	27	2.2	19
4. No cattle or buffaloes, 5 or less pigs and/or goats	49	4.4	33
5. 3 or less buffaloes and/or cattle, 10 or less pigs and/or goats	67	42	59

Source: Field data, Jan-Feb 2005.

If only the original survey data is used (i.e. excluding those 16 households interviewed but not included in the survey, making the data possibly more representative of the total population), the percentages for the above groups are slightly higher, particularly for non-adopters in category number five (77 percent). Otherwise, each category is higher by one to two percent for the non-adopters, and by less than one percent for the adopters. This suggests that the proportion of households in these villages with few livestock may be even greater than the above figures show, and that the difference between adopters and non-adopters may also be greater.

When households' total livestock holdings are compared, the proportion of households with few livestock overall is much greater among non-adopters, as Table 7.5 reveals. It was found that, among the non-adopters, 17 percent have only poultry or no livestock at all, while only one adopter (2.2 percent) falls into this category. When households with up to five of each of pigs and goats but no large livestock (cattle and buffaloes) are included, they represent nearly half of the non-adopters, while only one more adopter (a total of less than five percent) falls into this category. No adopters fall into categories two and three (only poultry or poultry plus one pig and/or goat). Finally, two-thirds of non-adopters but only 42 percent of adopters were found to have three or less buffaloes and/or cows and ten or less pigs and/or goats.

Livestock numbers were also analysed by village and the results are displayed in Tables 7.6 and 7.7. Table 7.6 shows the differences between adopters and non-adopters in each village using a 'livestock index', which is a measure of the total livestock holdings of each household calculated on the basis of information available.

The table includes both mean and median figures. The mean takes into account the total livestock held by all households in the group, and is thus strongly influenced by the sometimes large holdings of individual households. The median on the other hand gives a better idea of the level at which households in the mid-range of their group fall.

Table 7.6 Livestock Index* for households by village and adoption group

	Houay Hia		K. Nya		K. Chaluang		Silalek		Total	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Non-adopters	15	8	34	12	14	13	40	20	27	11.5
Adopters	71	70	67	43	44	36	88	58	65	44.5
Overall	28	12.5	56	41	31	27	48	30	40	24.5
Difference ⁺	373%	62	97%	31	214%	23	120%	38	150%	33

Source: Field data, Jan-Feb 2005

* Livestock Index calculated by allocation of values to each animal as follows: Buffalo = 10, Cow = 8, Pig = 1.5, Goat = 1, Poultry = 0.1 (Fish ponds not included)

+ Difference between non-adopters and adopters (i.e. adopters have 150% more than non-adopters)

The results in Tables 7.6 and 7.7 indicate that the adopters have, on average, a lot more livestock than the non-adopters. As Table 7.7 shows, differences were found to be greatest in Ban Houay Hia, especially for cattle, but there are also quite substantial differences in numbers for pigs and goats. In Ban Kieuw Chaluang there are also considerable differences between adopters and non-adopters for goats and cattle, but also pigs (for goats, the difference between means is particularly high because a few households have large numbers of goats). In Ban Kieuw Nya, there are differences in numbers for pigs, goats, poultry and, to a lesser extent, cattle. In Ban Silalek, there are very large differences in numbers for buffaloes, poultry and cattle. There is only a small difference for pigs and goats.

In summary, adopters clearly have substantially more livestock than non-adopters. This is the case over all types of livestock, both in terms of the percentage of households who hold each type of livestock and the numbers of animals held. The main differences are in cattle, which are a very important form of capital and which are also difficult for cash-poor households to obtain. Of the four villages studied, Ban Houay Hia has the biggest differences between adopters and non-adopters. In the interviews, not enough livestock (to make forages worthwhile) was cited by about 38 percent of non-adopters and stoppers as a reason for not using / stopping forages.

Table 7.7 Average livestock holdings by livestock type, village and adoption group

Cattle	Houay Hia		Kieuw Nya		K. Chaluang		Silalek		Total	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Non-adopters	0.9	0	2.1	0	1.1	1	3.2	0	2	0
Adopters	5.9	4	3.4	0	3.7	3	5.6	3	4.4	3
Difference	555%	3	62%	0	236%	2	75%	3	120%	3

Pigs	Houay Hia		Kieuw Nya		K. Chaluang		Silalek		Total	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Non-adopters	1.9	1	7.6	8	2	2	5.1	4	3.7	2
Adopters	7	3	12.6	10	4.2	3	5.6	6	7.7	5
Difference	268%	2	66%	2	110%	1	10%	2	108%	3

Goats	Houay Hia		Kieuw Nya		K. Chaluang		Silalek		Total	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Non-adopters	2.9	0	3.6	0	0.3	0	0.7	0	1.8	0
Adopters	9.3	5	4.3	0.5	4.3	1	0.9	0	5	2
Difference	220%	5	19%	0.5	1333%	1	29%	0	178%	2

Poultry	Houay Hia		Kieuw Nya		K. Chaluang		Silalek		Total	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Non-adopters	25	20	14	20	21	19	20	20	22	20
Adopters	43	30	30	28	24	30	64	50	37	30
Difference	72%	10	114%	8	14%	11	220%	30	68%	10

Buffaloes	Houay Hia		Kieuw Nya		K. Chaluang		Silalek		Total	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Non-adopters	0	0	0	0	0	0	0.29	0	0.1	0
Adopters	0	0	(1 has 6)		(1 has 3)		2.9	0	0.6	0
Difference									500%	0

Source: Field data, Jan-Feb 2005

7.1.3 Land

Most households have around three to four upland plots of one hectare or less each, which are now mostly used on a rotational basis. In some cases these plots are on flat land, but most are on hillsides with considerable slope. Such land is not irrigated and therefore relies on rainfall for the establishment of crops. Most households have now had land allocated to them, although only those in Ban Silalek have been given official title (H. Sodorak, pers. comm., 18 Feb, 2005). While allocation provides some security

tenure, it means that households are also restricted to these plots and can no longer clear other portions of land when the soil becomes exhausted, like they did in the past. The resulting increase in cropping intensity and reduction in fallows have placed pressure on the land, as discussed in Section 5.3.2. Of those who stipulated how far away their fields were from the village, the majority were between 30 minutes and one hour walk away. However, quite a few plots are more than two hours walk away. This increases the labour requirements for using such land.

In addition to upland fields, some households have access to small plots of land near their houses that are used for permanent vegetable or fruit gardens. Only one village in the study, Ban Silalek, has paddy land. Some of this is on flat land and some has been constructed on sloping lands. According to the headman of this village, only 22 households (14 percent) have paddy, ten of which are represented in the study. According to the survey results, the adopters have more paddy than the non-adopters. Of those surveyed, four of the six adopters and six of the 32 non-adopters have paddy land.

There does appear to be some divergence in the size of land holdings, with some households having as many as five plots of upland and although not interviewed, it is reported that a few households have no land at all (Headman, Ban Kieuw Nya). Of those interviewed, the average reported an agricultural land holding is three and a half hectares for non-adopters and four and a half hectares for adopters.

7.1.4 Crops and trees

For most households the main crop grown is upland rice. Households tend to cultivate half to one hectare of upland rice each year, largely for household consumption. If a household can produce more than its subsistence needs, surplus rice may be sold or used as payment for labour. Some farmers reported rice yields decreasing over time and others who have reduced or stopped growing upland rice mentioned that in the past they had to work very hard and did not get much in return. However, rice remains a hugely important component of most people's livelihoods and culture, as discussed in Section 5.3.2.

Maize is the next most abundant crop and is grown by nearly every household, some of which are now favouring it over rice. Maize fulfills a variety of livelihood needs including household subsistence (it is sometimes eaten as a substitute for rice when

there is not enough), cash income, and feed for livestock. It is usually grown in upland fields with rice and/or other crops.

Cassava and sweet potato are also relatively common and can be used as pig feed as well as household consumption. Job's tears (a cereal crop), sesame and soy are all grown primarily as cash crops. For some households, Job's tears are the main source of income. However a few of those interviewed mentioned that they sometimes do not grow well and some have stopped growing them in favour of other cash crops. Soy beans appear to be less popular than other cash crops at present, but are being grown by many households in Ban Kieuw Nya and Ban Silalek. Cucumber, pumpkin, chilli and eggplant are grown primarily for household consumption but can also be sold if necessary. Other crops mentioned include peanuts, taro, ginger, gourd, sugarcane and lotus.

Trees and palms

Fruit trees are common but are not grown by all households. Banana palms seem to be the most common but many other fruits are grown, such as pineapple, jackfruit, mango, tamarind, large gourd, coconut, orange and lemon. A few households mentioned selling fruit but it was reported as primarily for household consumption.

The growing of teak trees has been encouraged by the government and small areas have been planted by half of the households interviewed. Although no exact data was gathered, it seems that most households have between 50 and 300 trees, or less than one hectare. The ages of the trees ranged from less than a year to more than 20 years, most being between four and ten years. They can be harvested after a few years but are better left to grow for 10-20 years for higher economic returns. Teak plantations function as a form of savings for households growing them.

Mulberry trees are very common and grow naturally in fallow fields and forests. It was reported that the market for mulberry bark (used to make paper) has been improving over recent years, and nearly all households collect and sell it, with many farmers planting the trees on their own land. Similarly, rattan, both natural and planted, is collected and sold by most households. These non-timber forest products provide important income, particularly for poorer households who lack livestock and other sources of income.

7.1.5 Forest access and other non-timber forest products

Most households have access to forests for resources such as mushrooms, bamboo shoots and other wild vegetables, and small animals and birds. However, much of the land surrounding villages in this area has been cleared of mature forest and some of what remains has recently been classed as conservation or protection forest, meaning it cannot be used to harvest resources. Therefore, in order to access these resources, people often have to walk one or two hours, or even more for certain resources such as wild animals. Some interviewees mentioned that they can no longer get animals from the forests as they are too far away, and two said they do not go to the forests at all - one due to a lack of labour and the other due to the lack of animals. Most such forest products are collected primarily for household consumption.

7.1.6 Financial Capital

Income

Sources of income were included in the survey but in some cases there was ambiguity in the answers given and not all questions were answered fully, so it is likely that sources of income are under-reported. The figures contained in the following description should, therefore, be regarded as minimums.

Sales of livestock and cash crops are the major sources of income for most households. Livestock is in many cases the biggest overall earner, and for those with many animals this income can be quite substantial. For the majority, however, they may sell only a few chickens and a pig or two per year, with perhaps a cow every few years for those who have them. Crops may provide more regular income, but are susceptible to failure and to market demand. Some households have very little cash income, with one interviewee reporting that his household's only source of income was from selling his labour to other households in the village. Others receive payment for their labour in the form of rice rather than cash.

Sources of income were found to vary between the villages studied. This may be linked to factors such as land type and availability, market access and opportunities offered by projects and traders. In Ban Kieuw Nya, the village at the highest elevation and with what appeared to be marked differences in wealth between households (the majority being quite poor), most households have some crops for sale. All of the non-adopting households - except one with a shop - and most of the adopters mentioned

crops as primary or secondary income. The main crops for sale are Job's tears, soy and maize. Livestock was the primary income of just over half of those households covered by the research. Compared with non-adopters, adopters were only slightly more focused on livestock as their main source of income at the time of adoption.

In Ban Kieuw Chaluang, the only village not on a road, cash crops are much less prevalent and livestock is the main source of income for 80 percent of the households in the research. About 27 percent reported rice as an income source. About 23 percent - mostly adopters and stoppers - did not report having any cash crops (excluding rice), but most of these households sell mulberry and rattan (as do the others) and all but one of them sell livestock.

Ban Silalek was the only partially lowland village in the study, the only with paddy rice, and one where cash crops seem to be prominent. Just over a third (36 percent) of households in the research had cash crops (excluding rice) as the major source of income, another third had livestock as the main source, and seven percent reported rice as the major source. The main source was unclear for some households in the survey. As with other villages, most have both crops and livestock as income, with only one household reporting livestock only. It was possible to gather more detailed information on the crops grown in Ban Silalek. Job's tears is the main cash crop, providing the largest source of income for nearly a third of households in the research, and at least some income for two thirds, including all seven of the adopters. Other crops for sale are maize, more prevalent among the non-adopters and providing income for about 40 percent of all households; soybeans, a source of income for about a quarter of households in the research, all of which were non-adopters; rice, sold by 17 percent of all, including most of the adopters; rattan and/or mulberry, mentioned by half of all households; sesame, less than a fifth of all households but including over half of the adopters. In summary, as sources of income in Ban Silalek, adopters have more Job's tears, sesame and rice, and less maize and soy.

In all villages studied, the sale of rattan and mulberry contributes to the income of most households. In some villages labouring is common, particularly in Ban Houay Hia where over half of all households in the study report selling their labour for income. A few of those in this village also reported non-farm sources of income such as teaching and other government jobs, selling handicrafts, milling rice, sawing wood, working as a doctor, and running a small shop.

Credit and savings

Of those farmers who were asked (19 households), about half said that they could borrow money from others in their village such as relatives or a moneylender if they needed to, but that they usually do not or never have. Six farmers said they could not borrow, (but this may not include borrowing from relatives) - some mentioning high interest and lack of collateral. Four said that they have borrowed from the bank (two adopters and two non-adopters).

Livestock and teak can function as a form of savings, but it is not clear how many people actually view these resources as primarily providing this function. Of the 20 households who were asked, half said that they do not have any savings (only one had adopted forages). However, most of these households have at least some livestock that could be converted to cash if necessary. Seven farmers said that they have cash savings, either at home or in the bank. Of these, three were adopters (one third of all adopters), three non-adopters (19 percent of all non-adopters), and one a 'stopper' (20 percent of all stoppers). The fact that adopters have both more livestock and more savings may well be related, as livestock are the main source of cash income for those who have them, and cash is necessary to buy livestock.

7.1.7 Physical Capital

Physical capital was not specifically covered in the survey or interviews, but some observations were made about the general situation of these villages in relation to infrastructure and equipment. Three of the villages are situated on roads - two of which are on the main highway, which is paved and has frequent traffic, including public transport, passing by. Roads are important for access to markets and services. The other village, Ban Kieuw Chaluang, is about a 40-minute walk from this road and the track is passable by motorcycle (although there may be no motorcycles in the village). Farmers in this village mentioned that traders come to buy their crops once a year for each crop. It was not ascertained whether traders come to the other villages more regularly or not.

Most households do not have easy access to water, excepting Ban Silalek where the well is situated within the village, and a few households in Ban Houay Hia that have a tap nearby. All villages have communal wells a relatively short distance (less than ten minutes walk) from most houses. Three of the four villages have electricity, but not all houses are connected. Ban Kieuw Chaluang does not have electricity at all. Water

and electricity may impact on the amount of labour needed for non-agricultural activities. Most households do not have access to a toilet, which may impact on the health of their members and consequent ability to work.

Agricultural tasks are generally carried out with the aid of simple tools such as digging sticks, hoes and knives - newer types of agricultural equipment such as machinery are rare. Those who have paddy rice probably use different equipment but the details are unknown, except for one farmer who said his household had a tractor. Another said that lack of equipment was one reason holding back change. A few households have equipment such as a saw or a rice mill that can be used for income generation.

7.1.8 Social Capital

As with physical capital, it was not possible to explore the topic of social capital in any depth, but it was possible to make some observations relating to social capital. Most households have family members in the same village, which usually means they can call on them for help. Labour exchange tends to take place among extended families or with others in the village though it was not ascertained how this is negotiated. A few households interviewed had relationships with people outside their village but on the whole most people do not seem to have meaningful connections with the world outside of their village, except where government officers and development projects and traders come to them.

Many of those interviewed had some position of leadership within their village, such as headman, deputy, committee member, leaders of various groups, or those with special responsibilities such as student discipline, 'soldier' and postman. This may mean that some of the interviewees have more social capital than the average household in these villages. It was not clear how relevant these leadership positions are to their livelihoods, but presumably they bring some influence and increase social capital, with the possibility of this affecting their access to resources such as land.

In terms of social obligation and entitlements, some households mentioned borrowing rice from others and one had borrowed livestock from another household, looking after it until it reproduced and keeping its offspring. In this way it seems that there are mechanisms by which poorer households can receive assistance from others.

7.2 Livelihood activities

In the villages studied, households and their livelihood strategies are relatively homogeneous in that most people are farmers, growing similar crops and raising livestock. There is, however, disparity in the amounts of crops and livestock, and the household's degree of dependence on different combinations of these. Nearly every household engages in a combination of the following: growing crops, mostly for consumption but some for cash income; raising livestock, mostly for sale but some for consumption; growing long and/or short-term tree crops for sale; collection of wild resources including those from forests and rivers for consumption and sale; and off-farm activities such as labouring, and small enterprises.

This section looks at each of these activities, briefly describing what they are, how they are undertaken and how they contribute to household livelihoods. Issues relating to the ability of households with different resource endowments to undertake the activities and the types of resources required are touched on, as are common problems and constraints, and general trends relating to the activities.

7.2.1 Cultivation of food crops

The cultivation of food crops such as rice, maize, tubers and other vegetables forms the basis of the traditional livelihood strategies of the people in the villages studied. Typically this is carried out in a pattern of cyclical or rotational shifting cultivation - while in the past people could clear and cultivate new land when they needed to, today restrictions have been placed on land that can be used for agriculture and most households have had land strictly allocated to them (see Section 5.3.1). This has meant that the same piece of land is returned to more and more frequently, with fallow periods and often yields declining. The majority of households now have three to four plots of land and reported growing crops for one to three years, using one or two plots per year and keeping one or two plots fallow each year. Fallow periods are reported to last between one and four years in most cases.

As mentioned earlier (Section 7.1.4), rice is still the most common crop and is grown every year, mostly for household consumption. Poor households in particular tend to focus on growing enough rice for their family - it is what they are familiar with, as well as being seen as essential to their survival. However, upland rice appears to be becoming more and more marginal in terms of its returns to labour - some farmers mentioned that it takes a lot of effort but they do not get much back. Long fallows,

requiring sufficient land, are needed for good returns to upland rice (de Rouw et al., 2005: 140). Without these, weed problems can become severe, requiring more and more labour to keep them under control (ibid; Roder et al., 1997: 113; see also Section 2.4.1). Even though the returns to labour may not be high, growing rice remains important for partly cultural reasons. As one farmer explained, 'I want to keep growing the rice because when the season of eating new rice comes I can eat it ... I want to eat it, like other people'. When asked if it was possible to buy rice to do this, he replied 'Yes, I can, but its not like if I have my own, and I do not want to bother others by asking for it' (Tao Song, Ban Houay Hia³⁴).

Many farmers, however, are reducing their upland rice in favour of cash crops, the returns from which can be used to purchase rice and other essentials. A few farmers are reported to have stopped cultivating upland rice altogether over recent years, and many farmers reported a general shift away from subsistence to cash crops. Many households in the study also grew vegetables and/or fruit trees, either incorporated into their upland fields or by themselves in small permanent gardens. These may be for consumption or for sale.

Both labour and land are essential resources for crop cultivation. As discussed in Section 7.1.3 above, not all households have equal access to increasingly scarce land resources. It is difficult, however, to get a detailed and accurate picture of land-use and this study was unable to do so as I relied upon the reported holdings and usage as elicited in interviews. This was further complicated by the possibilities that farmers do not know the size of their plots in terms of Western measurement, and that they may cultivate land that is not officially allocated to them. The quality of land cultivated is an important factor - most households only have access to sloping land which cannot be irrigated and rapidly loses fertility after one or two years of cropping. With shortened fallows and increasing cropping intensity this problem is exacerbated and weeds become a problem too. The availability of labour also limits how much can be grown on the land that a household has access to and is sometimes the major limiting factor in terms of how much land a household can cultivate. Households with insufficient labour are sometimes unable to weed completely, resulting in poor harvests.

³⁴ Names of all farmers have been changed.

7.2.2 Livestock raising

The raising of livestock is also a traditional activity, but usually on a very small scale. Some animals, such as buffaloes, were in the past kept mainly for sacrifice and as a store of wealth - functioning as a source of emergency cash, to be converted when needed (Simana, 1998: 81-89). Now livestock numbers are growing and are increasingly bred for sale. Cattle are replacing buffaloes, and goats have been introduced. Livestock are the major way in which households build up their financial capital.

As mentioned in Section 5.4, most large livestock are traditionally allowed to roam freely, finding their food in the surrounding forests. This is a 'low maintenance' system of livestock raising, requiring little in the way of labour and fencing. However, animals are commonly unable to get enough quality feed and labour must be spent finding extra for them if they are to be sold for a good price. Free grazing of cattle and goats continues to be the preferred method, even with adopters who tend to grow forages as a supplementary feed for their animals. Pigs and chickens must be fed cut and sometimes cooked food, which often takes a lot of labour to prepare. Problems associated with raising livestock include disease (particularly in pigs and chickens), lack of feed, and conflict with crop cultivation (livestock sometimes breaking fences and eating crops belong to other households).

Intensifying livestock production usually requires cash to purchase animals. It may also necessitate the modification of management practices and improved feed resources, which may mean increased labour inputs, at least initially (Millar et al., 2005: 22). Households with limited labour resources may find themselves faced with trade-offs between starting up more intensive livestock raising and maintaining crop production. Crops may be less risky, but livestock can offer higher returns. Crops, especially rice, provide essential staple food for the household, while livestock brings the cash income needed for clothes, schooling and other outlays. For poor households, who lack the necessary start-up capital, it seems that it is very difficult to increase their livestock beyond a few pigs and chickens. Often they are sold to pay for children's education or other necessities and emergencies. Investing in livestock can also be risky, with very high mortality rates especially among pigs and chickens. This is another factor that may be discouraging poorer households to increase reliance on this activity.

The overall impression from interviews with non-adopters was that livestock are seen as a short to medium term investment rather than a long-term source of income flows. Nearly every farmer interviewed said they would like to increase their livestock. Livestock-raising is clearly seen as a desirable livelihood activity, but it is apparent that many households simply lack the resources, and possibly the support, to get started.

7.2.3 Collection of wild resources

The collection of wild resources from forests, streams and fallow plots has always been an important component of upland livelihood strategies in the Lao PDR (see Section 5.3.2). Such resources can provide an essential source of protein for the poor, and help in smoothing consumption during times of scarcity (Foppes and Ketphanh, 2005: 183; Raintree and Soydara, 2000: 9). Most resources are collected for household consumption, but some can also be sold. This livelihood strategy requires first of all the existence of the resources themselves, secondly access to these resources, and finally the means to harvest them - that is, labour. Access has declined with the introduction of land-use zoning, as mentioned in Section 5.3.1, and the literature suggests that the resources themselves are also declining, due to over harvesting (Raintree and Soydara, 2000). Some villagers did mention that there were fewer wild animals than before. In summary, the collection of wild resources is a supplementary livelihood strategy, but one which is important for food security and income, particularly for poor households.

7.2.4 Tree and palm crops

Some households are engaged in the production of tree crops. This usually constitutes a small part of the household's overall livelihood strategy, but can be an important source of income for some households. Short- to medium-term crops include rattan and mulberry. Both of these are found growing naturally in forests and fallow fields, but farmers are increasingly planting and managing them as well (Vantomme et al., 2002: 104; household interviews). Nearly all households interviewed mentioned rattan and/or mulberry as part of their livelihood, and seven of them said it was their first or second biggest source of income. Mulberry is planted by half and rattan by about one fifth of those interviewed. Both of these also grow naturally in fallow fields and can be found in other places. About a quarter of households interviewed said they harvest rattan and mulberry from the forest.

The major long-term tree crop being grown is teak. Teak production has become more popular over the last 15 or so years (Hansen et al., 1997). Planting teak can be a very profitable investment for the future - the trees can be sold to traders after about 15 years, but are better left for 20 or 30 years. Unfortunately, most farmers find it difficult to wait that long, and it is reported that the primary reason for planting them may in fact be to sell the plantation after just a few years (ibid). Farmers' intentions regarding how long they would keep their teak plantations were not ascertained, although one interviewee with only a few trees said they intended to use the trees as building materials rather than sell them. Another farmer said his trees were only a few years old but that he would sell them if he could not get enough income from other sources to support his children's' education. As the trees grow best when well managed, labour has been identified as an important limiting factor to their potential (ibid).

7.2.5 Off-farm activities

Opportunities other than the own-farm activities described above are limited. Poorer farmers mentioned labouring work for others in their village, but none of those interviewed specifically mentioned working outside of the village. Labouring work is paid for in cash and/or rice, and so can contribute to both subsistence and cash needs of households. In Ban Houay Hia labouring is quite common, mostly amongst those with few livestock - probably the poorer households. The extent of labouring in other villages could not be ascertained from the data, except that it does take place in all four villages studied. A few households undertake other activities including government jobs, selling handicrafts, working as a doctor, and running a small shop. Other activities including milling rice and sawing wood are not strictly off-farm but are activities that require specialist equipment. These activities all require different kinds of resources and, as each one seems to be quite rare, no further information was gathered about them.

7.3 Livelihood outcomes

The outcomes of these livelihood activities can be seen as the household's overall situation - in terms of food security, level of income, the ability to save, the ability to work and vulnerability to shocks and stresses such as seasonality. Outcomes may also relate to environmental sustainability in terms of the state of land, water and forest resources, maintenance of biodiversity, etc. They also include less tangible outcomes such as peoples' overall sense of well-being or poverty, their capacity to participate in

and contribute to society in a meaningful way, and their ability to make choices and plan for the future.

Understanding all of these potential outcomes (and people's objectives regarding their desired outcomes) is a potentially huge task that would require a substantial amount of time on the part of both researcher and farmers. Therefore the study aimed to get a general understanding of some of the main outcomes that relate to households' agricultural decisions. Rice security and livestock numbers have been identified as the main indicators of well-being or poverty in the Lao PDR (ADB, 2001: 44). Livestock numbers have already been discussed in this chapter (Section 7.1.2) and it was found that there were substantial differences between adopters and non-adopters in this indicator.

Rice security was included in the household surveys. Although there were some questions about the consistency of the interpretations of the question (whether it referred to growing enough or having enough to eat), data did show adopters to be less rice insecure than non-adopters. As revealed in Table 7.8, a number of non-adopters experienced rice shortages of six months or more (the longest being 12 months), while only one adopter (three percent) experienced shortages of this length. The mean number of rice-insecure months was found to be 1.3 for adopters and 2.4 for non-adopters. It was also noted that those experiencing shortages of more than six months also had very few livestock, suggesting that, as expected, there is a relationship between livestock holdings and rice security (those with more livestock being more able to purchase rice for their household).

Table 7.8 Rice insecurity in the survey results

	Mean no. mths rice insecure	Insecure 3 mths or more	Insecure 6 mths or more	Rice secure
Adopters	1.3 months	25%	3%	53%
Non-adopters	2.4 months	36 %	14%	41%

Source: Field data, Jan-Feb 2005

Those farmers interviewed were asked specifically whether they grow enough rice to eat, whether they can buy enough, and whether they can sell rice. Table 7.9 shows that nearly a third of the non-adopters do not have enough rice to eat every year, while just over half either grow enough or get enough to eat by buying rice. Only 12.5 percent were able to sell rice. The adopters were more likely to buy or sell rice, with all

saying they could get enough to eat every year, 11 percent from growing and 44 percent from buying rice. Rice was sold by 44 percent of adopters.

Table 7.9 Rice insecurity in the interviewed households

	Not enough to eat - % HHS	Grow enough to eat - % HHS	Buy enough to eat - % HHS	Enough to sell - % HHS
Adopters	31	25	31	12.5
Non-adopters	0	11	44	44

Source: Field data, Jan-Feb 2005

As the above data shows, there are differences between adopters and non-adopters in the major indicators of well-being - livestock ownership and rice security. These are likely to be linked in two ways - households who are unable to grow or buy enough to eat are consequently likely to be unable to invest in livestock, and those without livestock generally have less income and so are less able to purchase rice.

Rice insecurity is a seasonal issue - most households experience rice shortages during the rainy season, before the new rice is harvested. They often have to resort to coping strategies during this time - the case of Tao Sao Hok in the following chapter (Box 8.5), for example, is illustrative of this situation - they have to borrow rice during the late rainy season and repay it at harvest time, with the consequence that the remaining rice is unlikely to be sufficient for the following year, thus continuing the cycle of insecurity and debt. Others are forced to sell their labour while still attending to their own crops, which makes life difficult and potentially has an impact on the harvest they can get from their own crops. Other issues associated with seasonality involve lack of access during the rainy season (particularly for villages further from the main road); livestock dying during the dry season due to disease and lack of feed; and periods of intense workload, particularly during the early and late wet season when most crops must be planted and weeded. These seasonality issues form part of the vulnerability context for households - they affect the amount of risk involved in different activities at different times of the year, and increase the vulnerability of households who struggle to produce enough each year.

7.4 Conclusion

As this chapter has shown, the livelihoods of these households in the Xieng Ngeun District are diverse and dynamic. They rely on multiple activities that vary from year to year, as well as at different times of the year. The results have revealed that many

households are changing their livelihood strategies, becoming more commercially-oriented by growing more cash crops and reducing the amount of upland rice grown. Rice seems to be becoming more marginal as reduced fallow periods have meant falling yields and increased labour requirements. However, rice is still an important part of these households' livelihoods, for partly social and cultural reasons. Many are unable to produce enough for the whole year - some are able to buy rice with income from other sources, while others have to mortgage the forthcoming rice crop in order to have enough to eat during the late rainy season.

Raising livestock is also an increasingly important activity for some households. They contribute to livelihoods in many ways - they act as savings and a ready source of cash, they provide regular income and act as collateral for credit, and they are also a source of food. For all of these reasons, livestock are important for households' overall wealth and well-being. Substantial differences were found in the number of livestock owned. In comparing the adopters and the non-adopters, the former were found to have a lot more livestock than the latter, especially cows - even at the time they started growing forages. Many non-adopters had very few livestock.

Apart from livestock, a number of assets and resources have been found to be important to the ability of these households to engage in various activities. Labour is a vital resource and, although it may be compensated for by those with the means to hire labour, most households are reliant on their own labour for much of their agricultural work. Lack of labour may therefore constrain the activities that a household is able to engage in. Land is another important resource, access to which has been reduced through land-allocation, resulting in increasing pressure and declining productivity. Differences between adopters and non-adopters in labour and land were small compared to the difference in livestock numbers. The adopters were found to have bigger households overall, although total labour differences were small, and they also appear to have more land than the non-adopters.

Each village was found to be slightly different in terms of the overall situation and the major differences between adopters and non-adopters. In Ban Houay Hia, adopters had substantially more of all types of livestock, were more rice secure, grew more crops overall, and had much larger households than the non-adopters. In Ban Kiew Chaluang there were differences in livestock numbers, amount of upland rice grown and number of people per household (adopters having more of all of these). In Ban Silalek the main difference was again in livestock numbers, but adopters also had more

crops (including more cash crops), more paddy rice, and much larger households. In Ban Kieuw Nya the main difference was that adopters had larger households and more total labour, as well as being more focused on livestock (rather than rice or cash crops). They had more livestock overall but the difference was not as great as in the other villages.

The main objective of this thesis is to discover how household livelihoods are contributing to agricultural decisions. This chapter has described the basic livelihood situation of households in four villages in Xieng Ngeun District, Lao PDR. It has found that livelihoods are changing, but in different ways for different households. Many households are diversifying into cash crops, while others get most of their income from livestock. Still others are struggling just to produce enough rice for their households. In comparing households who have adopted forages and those who have not, the research found that there were considerable differences between these two groups, particularly in the number of livestock they own. In the next chapter, household livelihoods will be explored further, from the perspective of the farmers themselves, in order to find out whether the issues and differences that arose in this chapter are reflected in farmers' views of their situation, and whether they are influencing household decisions regarding the adoption of forages.

Chapter 8 Farmer Perceptions and Forage Adoption

Chapter Seven discussed the livelihood situation of households in this study, describing their situation as a whole and highlighting differences between households adopting FLSP forages and those not adopting them. While the focus so far has been on the quantitative dimensions of household livelihoods, based on information from both the survey and interviews, this chapter takes a more qualitative approach, focusing on the richer and deeper interview data. It looks at issues surrounding change, aiming to better understand farmers and their situations. The focus is largely on farmers' perceptions, starting with Section 8.1 looking at the problems they face, their views of change, their goals, plans, and perceptions of the livelihood opportunities available to them.

Section 8.2 then turns to what can be considered the crux of this thesis - farmers' decisions regarding potential changes to their farming systems, these being the basis of household livelihoods in the uplands of Lao PDR. These decisions are looked at using the case of forages as an example of one livelihood opportunity. The focus is again on non-adopters of forages and the reasons why they are apparently not taking advantage of this new opportunity being offered by the FLSP project, starting with the stated reasons of the farmers themselves. These, together with other comments made during the interviews and the suggestions of others (adopters and extension workers) form a collection of factors considered to be influencing the non-adoption of forages. These factors are considered in the context of the livelihoods of those households interviewed, in order to establish whether and to what extent there is a relationship between the reasons for non-adoption and the characteristics of the households who share those reasons.

A number of household case studies are included throughout this chapter to illustrate various points, providing more understanding of the context within which decisions are made. These case studies not only exemplify the particular points where they are referred to in the text, but also serve to bring together all of the issues discussed in the results, illustrating the 'big picture' of livelihoods and change, from farmers' points of view.

8.1 Farmer perceptions of current livelihoods

Having talked about their livelihoods in terms of the activities they pursue and the assets or resources upon which these are based, the interviewees were asked about

their perceptions of their livelihoods in terms of any problems they have, any changes or trends over recent years, and what forces and factors have been influencing such changes. These were sometimes difficult issues to talk about and not all farmers were willing to do so. In addition, due to time constraints in the interview sessions, some farmers were not asked some of these questions. The next three sections outline the main issues brought up by those who did talk about them. The following two sections then consider how these farmers view the future of their livelihoods, focusing on their long-term livelihood goals, their short to medium-term plans, and the opportunities or alternatives they see as available to them. The section concludes with a general assessment of non-adopters' views of livestock as a livelihood option.

8.1.1 Problems in the farming / livelihood system

All farmers were asked about the problems they face (or faced at the time of adoption in the case of adopters) in relation to their farming and/or livelihood system. Most non-adopters were initially reluctant to answer this and a few of them said that they do not have any problems (this may be related to the cultural and political context in which they live). In some cases they were prompted regarding different aspects of their livelihoods. As the prompting used was not the same for every household it is possible that answers differed in accordance. However, some households were quite willing to talk about the issues they face, many of which were repeated by several farmers.

The most common issues were those relating to livestock production, although within this general category were a wide variety of specific problems. Livestock disease and feed shortages were mentioned by eight and six households (out of a total of 29) respectively. Other problems concerning livestock included those related to them wandering (getting lost or taking a lot of labour to bring home); being stolen or killed; dying (of unspecified causes); taking a lot of labour to feed; and eating crops. If all of these livestock-related problems are put together, they affect at least 17 (more than half) of the households interviewed. However, it is possible that their replies were influenced by the fact that the research was associated with the livestock project and extension workers were sometimes present.

Crops were the second most common group of problems, thirteen farmers mentioning pests, weeds, or lack of rain. When other crop-related issues are included - such as low rice yields, some crops such as Job's tears performing badly, and crops being eaten by livestock - the total number of households is 15, slightly less than the number

mentioning livestock problems. Some households mentioned more than one crop-related issue. The next most common problem was that of labour - 12 farmers saying that this was an issue for their households. Not having enough rice or food in general was mentioned by four households, as were land shortages and restrictions. Other problems mentioned included fencing, lack of tools for agricultural tasks and theft of money (each mentioned by only one household).

In terms of which groups of households mentioned which problems, it was found that the adopters were over-represented compared with non-adopters in all of the major issues - those relating to crops, livestock and labour. For example, all of the adopters mentioned problems with livestock disease before they started using forages (most of them said that they still have this problem), while only three of sixteen non-adopters (all of whom have some livestock) mentioned this same problem. Three non-adopters and one stopper were the only ones to mention not having enough rice and livestock eating crops. One stopper and three non-adopters did not mention any problems at all. One possible reason for this is that adopters were asked about their problems at the time of adoption - which in most cases was between one and four years ago. It may have been easier for them to talk about problems of the past rather than the present, so it is difficult to make comparisons between them and non-adopters. They have also participated in Problem Diagnosis sessions with DAFOs, and some may have been interviewed for case studies in which DAFOs asked about their original problems and the benefits of forages. They may thus be both more aware of their problems and more sensitised to talking about them.

Analysis of problems by village reveals that crop-related problems, particularly pests, are an issue in Ban Silalek, where they were mentioned by six of the eight households interviewed. In Ban Kieuw Chaluang, labour was mentioned by the same ratio of households, with four mentioning crop and rice-related problems. In Ban Houay Hia, five of the eight interviewed mentioned labour, and four said livestock-related issues were a problem for them (although none of them mentioned livestock disease). The two non-adopters from Ban Kieuw Nya said they did not have any problems, but one wanted to borrow money to buy more livestock.

8.1.2 Change over time

Farmers were also asked about changes that have taken place over the last ten years. Again, they sometimes seemed reluctant to answer which could suggest that they either could not think of any changes or did not feel comfortable talking about trends that may be negative (particularly if those trends are seen to be related to the actions of the government). Overall, six farmers were unequivocally positive about the way things have changed, saying things like “my livelihood is improving”, “things are getting better”, “I work less now”, and “there are more opportunities to make money”. However, others suggested or stated outright that things were generally getting worse. At least seven farmers fell into this category, mostly commenting on things like there being less land, not being able to move as they could before, and it being more difficult to get enough food and money now - as one farmer explained, his household has less rice than they used to “because the land is too small, and we are getting old and we do not have enough labour [to clear the land] ... so we get less than before”.

The most commonly mentioned change was that there are now more crops being grown. This includes growing new crops and increasing the amount of existing crops. Just over half of all farmers brought this up, some saying that they are selling more than they did before (this is probably the case for most households, although they did not all bring it up). The next most frequently mentioned change was less positive - that of the decreasing area and quality of land available. Eleven farmers talked about this change to their livelihoods, eight specifically referring to the government's programme of land allocation. Another trend identified was that they are now growing less upland rice. A few said that yields are decreasing, and others said that the area planted has decreased. Increasing livestock numbers was mentioned by seven farmers, and two mentioned changing the type of livestock (both referring to changing from buffaloes to cattle). Changes in food security seem to be affecting households in different ways - three farmers said that they now have enough to eat whereas they did not before, while another three said they used to have enough and now do not. Other changes mentioned were: a shift from production for household consumption only, to production for the market as well; working more or less than before; and changes relating to household demographics, such as having young children.

8.1.3 Factors influencing change and current livelihood situation

Reasons for the changes that have been taking place were also elicited from most of the farmers interviewed. Most, particularly the non-adopters, said that the government

was the main driving force for change,. Some sort of compulsion from the government (mostly in terms of telling farmers to stop growing rice and change to cash crops) was talked about by some interviewees, while others phrased it more in terms of the government helping farmers by advising them how to improve their livelihood. Land allocation was clearly a major way in which the government was limiting land-use, five farmers specifically mentioning this. Two cited other land-related issues (less land and lower yields) as factors influencing farmers to change their livelihood strategies. Other more positive factors stated by farmers as influencing change were: observing others and working hard; improving markets including traders coming and better roads; projects and/or companies bringing new crops; new technology; higher prices for livestock; and household demographics. The various answers given by farmers in response to the questions about change suggest that households are both experiencing and interpreting change in different ways. These views regarding change may be an influencing factor in their decisions regarding technologies and opportunities that come from 'outside' (see Section 8.2.1).

8.1.4 Goals and plans for the future

Non-adopters and stoppers were asked what their livelihood goals for the future were, and then asked if they had any actual plans for the next year or two. These questions were asked in order to gain a sense of their priorities and to see how these might be affecting their decisions regarding potential changes, such as adopting forages. A summary of their responses is given in Table 8.1. Out of a total of 21 farmers (16 non-adopters and five stoppers), two farmers did not seem to have any plans or goals, and seven had goals but no actual plans to make these happen. A further two said they planned to continue what they are doing now, but would try to increase their crops and/or livestock, leaving less than half who do have plans to make some kind of change. Money was mentioned as a constraint to doing anything different by four farmers.

When asked about their goals, farmers generally talked in terms of the assets or activities they would like to have or do, rather than the expected livelihood outcomes such as having more money, enough food to eat, good health, etc. A few were persuaded to talk about these sorts of things, but had to be prompted for them, with the potential risk of this influencing their responses. The things they mentioned were generally related to income-generation, such as cash crops and livestock, so it seems fair to say that having an income is the major livelihood outcome they seem to be

striving for. However, it is also possible that these answers are shaped by what they have been told (by the government and possibly others) is good for them - that is, giving what they see as the 'right' answer. Unfortunately the research was unable to delve any further into this issue so it is not possible to tell whether this is the case or not. The following analysis is based on what the farmers interviewed actually said, but the above point should be borne in mind.

Livestock was the most frequently mentioned goal, with 16 farmers saying that they would like to increase (one or two using words like 'have' or 'raise'; that is, not *necessarily* increase) their livestock. By contrast, crops were mentioned by only eight farmers - all but one of whom identified both crops and livestock as goals. Other goals included having teak, buying more land and decreasing upland rice, and more general 'outcome' type goals such as supporting children's' education, building houses, having enough rice, having enough money, and having a motorbike.

In terms of farmers' actual plans for the next year or two, the pattern is more even, with slightly more farmers mentioning crops than livestock. Of the eleven farmers who had any kind of plans, only seven said that they would try to increase their livestock numbers (far less than the 16 who cited livestock as a goal). Some said they would try to buy more livestock, others either hoping to increase numbers by breeding or not specifying how they planned to increase them, and one simply saying that he would continue to raise livestock. Of those who specified which type of livestock they wanted to raise, pigs were the most common, although one said he would try everything *except* pigs because they take too much labour to feed. Cattle and poultry were next, and one farmer said he would like to have buffalo after first increasing poultry and pigs.

Crops were mentioned in the plans of eight farmers, most saying they would try to increase them and/or try new ones, but two only saying that they would continue to grow their existing crops. Maize was the most common crop mentioned, followed by cassava. Also mentioned were soy, rubber trees and teak. Many of these are new varieties or entirely new crops for these farmers, such as a new large variety of maize from Viet Nam, soy from Thailand, and rubber trees from China.

One farmer planned to sell his labour so that he could get cash in order to build fences for livestock and fruit trees. Two said that their plans included reducing or stopping Job's tears as they were not growing well. Four farmers cited lack of money as a reason for being unable to reach their goals and for their lack of plans. When plans are

looked at by village, more farmers in Ban Silalek had plans (four out of six) than those in Ban Kieuw Nya (none of the three), the other villages falling in-between these ratios.

Table 8.1 Livelihood goals and plans of non-adopters and stoppers

Number of farmers (out of total 21)	Livestock only	Livestock and crops	Crops only	Other (not crops or livestock)	None
Goal	9	7	1	2	2
Plan	2	5	3	1	10

Source: Fieldwork data, Jan-Feb 2005

Having and increasing livestock is clearly a very common goal, but only half of those who would like to have more livestock actually have a plan to do something about this in the short term. Of the eight households with few livestock, only two reported that they have some sort of plan to increase them. In contrast, seven of the eight farmers who said growing or increasing crops was a goal also had a plan to do this over the next few years.

Of the three adopters who said what their plans were before they started using forages, only one said that they were planning to increase their livestock (together with increasing crops and reducing shifting cultivation). The other two said they planned to increase crops only, and reduce upland rice, respectively. None of them had plans to change the management of their livestock before starting to work with the FLSP.

8.1.5 Alternatives/opportunities available

Non-adopters and stoppers were also asked for their views on what alternatives and opportunities were available to them. Most of them mentioned both crops and livestock, two saying crops only, one saying livestock only, and four saying that there were no alternatives or opportunities available to them. Most of those who said crops were a possibility were referring to new cash crops. Of the six households having few livestock, one cited both crops and livestock, one said livestock only, two said crops only and two said there were no opportunities. Among those with medium to large livestock numbers, there was a fairly even spread between crops and livestock, most of them mentioning them both.

Other opportunities mentioned included mulberry and/or rattan and rubber trees. One said that soy and a new variety of maize were an option for some, but not for his household due to constraints - land for soy and money to buy the maize seeds.

Another farmer said that if he can get enough income first, he would reduce rice and grow forages for his livestock instead. In terms of the differences between farmers from different villages, those from Ban Houay Hia saw less opportunities available than those from other villages, only two of the five mentioning livestock and two saying nothing was available to them.

Because this research is addressing the issue of change within the context of a livestock project, an assessment has been made of the views of non-adopters regarding livestock as a livelihood option, taking into account both the comments made in response to the questions about goals and plans, and any other comments they made during the interview process. It was found that, among all 16 non-adopters of forages, all but one saw livestock as something they would like to increase, four of them seeing livestock as the only or the preferred option for their household. However, as mentioned above, five of those farmers wanting to increase their livestock do not have any actual plans to do so. The case study of Tao Hok (Box 8.1) provides an illustration of a non-adopter who has goals to increase both livestock and crops but who does not have any concrete plans to do so. He hopes to increase his livestock naturally from the animals he already has, but intends to focus his energies on crops in the short term.

8.1.6 Expectations of using forages

Non-adopters were asked what they would expect from forages, if they were to use them, and what resources or inputs would be required. Two-thirds of them mentioned impacts related to improved livestock growth, saying they expected forages would make their animals grow quickly, get fat, and be healthier. Impacts related to the sale of livestock were also mentioned - being able to sell them faster, easier, or for more money. Only two farmers said they expected their livestock numbers to increase, and one said he expected his livelihood would improve.

In terms of the impacts of forages on labour, mixed messages were received. About a third of the farmers said they expected forages to save labour, but they also mentioned labour as a resource required for the growing and using of forages (mentioned by a total of 11, or about two-thirds of farmers interviewed). Nine farmers (more than half) said or suggested that they thought forages would take more labour than what they are doing now. Two farmers who at one point said they thought forages would save labour

later said they thought it would take more (one of them stated this outright and the other implied this, as labour was their main reason for not using forages).

Box 8.1 Tao Hok - a non-adopter focused on crops

Tao Hok was born in Ban Kieuw Chaluang and is now married with two young children. He and his wife work full-time on the farm, with nobody else to help. They have four upland plots, inherited from his parents. Each year one plot is used and the other three are left fallow (each plot is fallow for three years). The main crop grown is maize, which is both eaten and sold. They also grow rice for household consumption, sesame for sale, and sweet potato for their animals. They have mulberry trees, and rattan sometimes grows naturally - both are harvested for sale, and also grow naturally in the fallow fields. They go to the forest to get vegetables for household consumption, but cannot get wild animals.

The family has three cattle, two pigs, 50 chickens and one fish pond. These are mostly kept for sale, but the family sometimes eat a chicken or pig when there is not enough other food. They have had the cattle since they were married (six years) but the cow does not reproduce well. The cattle graze freely in the forest, while the pigs are fed maize, sweet potato and rice bran. The chickens have been increasing over the last few years. Tao Hok says livestock is the most important activity for the household - rice is not important because it is only for consumption, and you can buy rice if you have income (quote?). Some years there is enough rice, other years they have to buy some. The household gets regular (annual or biannual) income from maize, mulberry, rattan and chickens, and occasional (every two to three years) income from other livestock. Cattle remain the biggest overall source of income, followed by pigs, chickens and sesame. The main expenses are buying meat (from the market) and medicine.

During July and August - the rainy season - things are difficult because there is usually a shortage of rice and the family cannot travel to the market easily to sell livestock. Prices are lower in the village so they tend not to sell at this time. The main change in the household's livelihood over recent years has been a shift away from subsistence rice production to cash crops and other income-earning activities. Rice can now be bought with this income. Tao Hok says his household's main problem is that the cattle stay in the forest for five or six days at a time and it is difficult to go out and bring them home.

In the future Tao Hok hopes to increase the amount of cash crops grown by trying new ones. He says crops are a good activity to focus on because traders come to the village to buy them. Tao Hok does not have any specific plans for the next few years, but said he would try to find more land to grow new crops on. He would also like to increase his livestock numbers, but will just wait for them to breed and increase naturally, focusing on increasing their crops first.

Tao Hok heard about forages in 2001, from other farmers. However, he does not really know anything about them, nor does he expect anything from them for his own household. He is aware of who in his village is growing them, but not of any impacts they are getting, and does not know if they would help his livestock production or not. When asked, he says he has thought about planting forages, but has not done so "because I have to keep making the fence. That's the problem". He says it is quite difficult to get wood as it is very far away. His household does not have enough labour, as they have small children and need to take care of them. They especially have problems when they get sick.

Source: Fieldwork interviews, Feb 2005

8.2 *Reasons for not adopting forages*

The various reasons for not using forages, ascertained during interviews with non-adopters, have been grouped into six categories. The four main factors (those occurring most often) are: farmer attitudes towards the forages; perceived lack of labour; lack of awareness of the forages; and having too few livestock to make it worthwhile. The other two reasons, perhaps less important overall but important to some households, related to fencing and land.

The suggestions of people other than non-adopters were also sought as to why they thought people do not try forages. Some adopters were asked this during interviews, and their responses focused largely on issues relating to people's attitudes towards trying new things and being involved in projects such as this. Discussions were held with the government extension workers responsible for implementing the project in the four villages under study. They were asked to discuss what they saw as the characteristics of adopters and non-adopters and the main reasons people do not adopt forages. Their conclusions were different from those of the adopters interviewed in that they centered more on issues relating to the livelihood focus of households and their level of resources. However, they too identified farmers' attitudes and character as factors relating to adoption.

These reasons are discussed below, each of them being explained firstly in terms of what the non-adopters said during interviews - both their cited main reasons for not adopting and other comments made suggesting possible contributing factors - and secondly from the point of view of the adopters and extension workers. Each factor is then considered in terms of their relationship with other factors and the characteristics of the households identifying them, in order to assess the level of congruence between livelihoods and reasons for non adoption.

8.2.1 Attitude

People's attitudes were found to be an important factor in the non-adoption of forages, being brought up by many non-adopters themselves, as well as by adopters and extension workers, although in different ways. Nearly half of the non-adopters interviewed cited attitude-related reasons for not adopting. The two main types of reasons related to not being interested and wanting to wait and see other households receive positive impacts first. Of those who were not interested, some seemed to be happy with the traditional way of feeding livestock, saying their animals get enough

already or that the traditional way is easier. For example, one farmer with very few livestock (having had eight pigs recently die) commented that “even if we increase our animals, we will continue to look after them in the same way [as before]... we will just let them eat anywhere” (Tao Sao Sam, Ban Kieuw Chaluang). In addition to the seven farmers who cited these attitude-related factors as main reasons they did not adopt, another six also made comments suggesting that lack of interest in forages or livestock in general could be a factor in their decisions too.

When asked, some adopters had a lot to say about non-adopters and why they do not try forages. Many were of the opinion that non-adopters “do not want to feed the animals because they are lazy ... they have enough labour, but they do not want to do it” (Tao Sao Song, Ban Kieuw Chaluang). Others said that people just ignore the project, thinking that they cannot get anything from it; that it is a waste of time. As one village headman said, “They think [if they adopt] they will have to work for nothing, get tired for nothing... they plant upland rice and they have enough. They see us planting forages and think we are not getting anything different [/better]. They like the traditional ways.” It was also suggested that people do not like to change or to try new things, that they “follow their parents’ character” (ibid). Others thought that many non-adopters are focused on the cultivation of upland rice, thinking short-term rather than long-term, being concerned primarily with getting enough food for their household. According to Tao Sao Song, other people think, “grow grass instead of growing rice? Rice is better than grass”. Another adopter said that “people do not care about the future. They just want to know if they work in the morning will they get money in the afternoon” (Tao Sip Song, Ban Kieuw Nya). Also mentioned were negative views of government-related projects - one adopter said that people have had bad experiences such as being forced to buy maize which they later sold back at a low price.

The extension workers also identified issues relating to the character and attitudes of farmers. They contrasted different types of farmers - those who are hardworking against those who are lazy, those who want to change their farming system away from shifting cultivation and those who do not, and those who are not afraid to take risks against those who are or who do not like to try new things, preferring to wait for other farmers to do it first. Not surprisingly, they said that the former group of characteristics tended to describe the adopters, while non-adopters were more like the second group.

How do these attitude-related reasons relate to other household characteristics? Let us consider firstly those non-adopters who said they are not really interested in

forages, looking at them in the context of their responses to other questions. Why are they not interested? Do they have other shared characteristics, or are they all quite different? Firstly, lack of livestock does not seem to be a significant characteristic of this group - while some of them have only a few livestock, others have quite a lot - so this is not necessarily the reason they are not interested. However, they may lack labour, most having less than 2.3 full-time-equivalent farm workers in the household and five of the seven mentioning labour as a possible contributing factor. Most have to buy rice at least sometimes and do not have savings. In terms of their perceptions and plans regarding livestock, most of them do see livestock as an opportunity for their household, but do not have any short-term plans to increase them. At least some of them say that they currently have enough feed for their livestock. There is some link with awareness, many of them saying they have heard of forages but do not really know much or seem confused about them, but this is not the case for all of them. Other contributing factors common to those citing attitude as a main reason were lack of land, fencing issues and lack of livestock.

Secondly, who are the three farmers who said that they have not adopted because they want to wait for others to try them first? They all purport to be lacking in awareness of forages, saying they do not know enough or do not trust the project. However, answers to other questions suggest that they do have a reasonable understanding of forages and their possible benefits. They are all from Ban Silalek and have average or large livestock holdings with livestock as the main source of income for two of them. All hire labour rather than sell it, can get credit if they need it (from the bank), and do not need to buy rice (two of them having paddy fields). These factors suggest that these three farmers are not poor (in comparison with others), and there are few if any livelihood-related reasons for not adopting. Although they all mention having livestock as a goal, none of them have actual plans to increase their livestock. It may therefore be that they are just not particularly interested in improving livestock production.

Thirdly, both extension workers and adopters thought that the character and attitude of non-adopters in general, not just concerning forages, was quite an important factor. The reality is very hard to judge from interviews with the non-adopters themselves. Certainly some responded to questions in such a way that suggests they may lack interest in either forages and/or intensifying their livestock production. However, more personal factors such as being lazy and not wanting to work hard, being afraid to take risks, not wanting to change and try new things were obviously not mentioned by the

non-adopters themselves. Overall impressions from the interviews were that some of these factors, particularly those relating to not wanting to change and take risks, may well be true for some non-adopters, but probably not for all of them.

8.2.2 Labour

Labour was the second most common factor mentioned by farmers as a reason for not adopting forages. Four farmers said they do not have enough labour and two said that forages were not worth the labour - both responses suggesting that they believe forages are going to take more labour than what they are currently using on livestock-related activities. Many of those farmers who did not identify labour as a main reason for not adopting did mention labour as a resource requirement of forages – suggesting that they also believe forages will use more labour, which may be a factor in their decisions too. As one farmer explained, forages “need a lot of labour [especially at planting time]. We have to catch up with [work according to] the season, so we would have to hire a lot of labour to do that [plant forages]”. The extension workers also said that non-adopters tended to lack resources such as labour, perhaps having to regularly sell their labour to make ends meet or having to walk a long way to their fields. When the adopters were asked why others do not adopt, labour was not one of the main things they talked about. However, when prompted as to whether they thought livelihood-related issues such as labour were important, most agreed that they were.

Interestingly, those who identified labour as a main reason for not using forages are not from small households, each coming from households between five and nine people. However, most of them do lack labour, having 2.3 or less full-time-equivalent farm workers (that is, two full-time and one part-time) and many dependants (some adopters were also found to have only a little labour, but proportionately not as many as non-adopters). Their livestock numbers vary, some having very few and others having a lot, with livestock as the main income for most. Some of them have livestock as a goal for their future, half seeing it as an opportunity for their household, but none of them have plans for the short-term involving livestock (all three of the farmers with no agricultural goals or plans identified labour as the or a main reason they have not adopted forages). This suggests that there may be a relationship between lack of labour and lack of plans, and possibly also between farmer attitudes and perceived lack of labour.

These farmers are all aware of forages, most of them expecting that they would help animals to grow better and sell for a better price. Some of them do not know very much or are a little confused about what they are and how to use them. One farmer (who gets a little stylo from his son in another village) said that he thought forages would save time, but also said that they would require labour (for fencing and to prepare the land) and that he did not have enough labour because he is getting older - suggesting that maybe he is not convinced that it will save time. Attitude (lack of interest) was either a declared or possible contributing factor for nearly all of those who said labour was a main reason for not adopting. Other contributing factors common to those citing labour were awareness (common to three farmers), fence and livestock (both common to two). Box 8.2 provides an illustration of a non-adopter, Tao Sip Sam, for whom labour is an issue affecting the adoption of forages.

In addition to those who are not trying forages because of the labour perceived to be involved, some farmers who have tried them are stopping for labour reasons too. Three of the five stoppers interviewed mentioned labour as being either the main, or one, reason why they stopped. One of these farmers planted forages³⁵ in his upland field, which is about 40 minutes walk from the village. He said it took more labour than expected, and that they had to hire people to work for them, because one person was not enough. They have now gone back to the old way of feeding them. He says it would be easy if he had forages near the house like some other people do.

Another farmer listed by the project as a stopper said his main problem was the fence, which fell down in 2003. Other animals came and ate his forages and the pigs even dug up most of the seeds and ate them too, so not much grew in 2004. His household did not have enough labour to fix the fence, so the same thing happened in 2004. He says there is still some seed in the ground now (start of 2005), but he does not know if they will be able to build a new fence this year or not. The problem is getting wood for the fence, which takes a lot of labour. He says if he is able to build a new fence, he will expand his forage plot.

³⁵ This farmer, from Ban Kieuw Nya, planted stylo for his 25 pigs. He has now returned to feeding them the local cassava and rice bran.

Box 8.2 Tao Sip Sam - a non-adopter with labour and attitude as reasons for not adopting

Tao Sip Sam has been living in Ban Kieuw Nya for twenty years, and says that his household's livelihood has been getting better for most of that time, because he is patient and hardworking, and because the government has been planning for him - telling him what he should do. There are nine people in his household - himself, his wife, their 25 year old son and his wife and four young children, and his ten year old adopted son. Only two people are able to work full-time on the farm, but they sometimes exchange labour with others in the village. [They have reduced the amount of upland rice they grow since 1990 because they lack labour (to prepare the land and weed) and also because yields have been decreasing.]

The household has three upland fields, each about half a hectare and 25 minutes walk from the village. Each year they grow all their crops on one field and leave the other two fallow. Sometimes one field will be cropped for up to three years, so the other plots can be fallow for four to six years. However, if they do this, the yields are not so good during the second and third years. The crops they grow are rice, maize, Job's tears, cassava, eggplant, soy and chilli. Usually only Job's tears are sold, but they sometimes sell other crops so that they can buy rice if they do not have enough from the sale of livestock and Job's tears. They also have a small plot of land for banana trees and another with teak trees. They go to the forest to collect rattan and mulberry for sale and other items such as bamboo shoots and mushrooms for consumption. The family has quite a lot of livestock - six cattle, 25 goats, 10 pigs and 20 chickens. All are kept near the house, the cattle returning from the forest at night. The pigs are fed maize, cassava and rice bran, while the cattle and goats free graze in the forest. Tao Sip Sam says the livestock have enough to eat, but sometimes they wander and eat other people's crops, which can be a problem.

They are able to borrow from the government bank, but the interest is very high. Apart from that, they cannot borrow from any other source. When asked about problems in the household's livelihood, Tao Sip Sam said they did not have any, but he would like to borrow money if someone could lend it to him. He said that although they sometimes do not have enough to eat, this is not a big problem. His goals are to continue raising animals (particularly pigs and goats) and planting crops. He would like to help his son start raising animals too, which is why he wants to borrow money. He does not have any plans for the next year or two - he does not know what else he could do, so will continue with what he is doing now. He says the government has been telling them to stop growing upland rice and replace it with other crops. They have been told this for many years, every year. That is why he wants to increase his livestock and crops. However, he says he will stop growing Job's tears sometime in the future, because they do not grow well.

Tao Sip Sam has heard about the FLSP forages, and after some initial confusion about what they were, said he has been to the FLSP meeting and knows what they are for and how to use them. His expectations, if he were to use forages, would be that he could sell his animals faster and make more money. He also mentioned that if he was not so old, he would save more money, but because he is, he gives all his money to his children. He thinks that growing and using forages would take more time (rather than save time) and, although "it will take only a little time, ... [he has] many other things to do". He does not think he has enough labour or land to do it. When asked what the main thing stopping him from planting forages was, he said that "I already have a lot of work to do, because I plant corn, Job's tears... I am getting old and can only work for a short time, and then I have to take a rest".

Source: Fieldwork interviews, Feb 2005

8.2.3 Awareness

A lack of awareness, in varying degrees, of FLSP forages and the opportunities they present emerged as another significant factor in non-adoption. Of the five farmers whose stated reasons come under this category, two said that they did not know about the project at all, two said they did not know enough or did not understand what forages are and how to use them, and one was more of a misunderstanding of the project when it first came to his village. This farmer thought that the people in his village were being experimented on, that the forages had not been tested before, and was afraid they his animals might not eat them or may even die. He was one of the farmers who said he wanted to wait and make sure forages would work first. Responses to questions about forages suggest that low levels of awareness or understanding may be a factor for another six farmers. The issue of awareness was also raised by adopters, some of whom thought that non-adopters do not understand the project, either because they do not go to meetings and just 'do not think about it', or because they do not understand the use of forages.

Nearly all of those who cited awareness-related reasons are from one village, Ban Silalek. These people are not the poorest, as they have average to large livestock and land holdings, do not need to buy rice, and most have access to credit. However, attitude may be a contributing factor to their lack of awareness or understanding of forages. All of them have goals involving livestock, but most do not have any plans to do anything about this. They would like to increase their livestock numbers, but are not solely focused on livestock, preferring to concentrate on crops and livestock together. Almost all of them have heard about forages (one says he has not heard at all but has seen something), but say they do not know enough. Other factors identified as contributing to their not adopting include attitude (4), labour (3), land (2), and fence (1). Box 8.3, the case study of Tao Sip Jed, a non-adopter from Ban Silalek, illustrates the importance and impact of awareness, as well as attitude, in forage adoption. Although Tao Jip Sed wants to increase his livestock, he knows very little about forages and thinks his livestock currently have enough to eat.

Box 8.3 Tao Sip Jed - a non-adopter for whom awareness and attitude are factors

Tao Sip Jed moved to Ban Silalek from a neighbouring district as a child. His family has grown upland rice all his life, and he says things have not changed much and no development projects have helped his family. He says the government has been telling people they must stop growing upland rice and plant crops and raise animals instead, and the population has also been increasing - these factors have meant there is not enough land for upland rice. When asked what has changed in the household's livelihood over the years, Tao Sip Jed said that they now have livestock, whereas they did not before.

In his household live himself, his wife and their five children, aged between five and twelve years old. The parents both work full-time on the farm and they hire labour every year during the rainy season, paying rice if they have enough. They also participate in labour exchange with other households. The family has four plots of land - each year using two and keeping two fallow. One is a small garden plot (about 0.3 ha) with permanent or semi-permanent fruit trees. In the other cultivated plot they grow rice, maize, cassava, chilli, eggplant and cucumber, mostly for household consumption. The family tried growing Job's tears for a few years but has now stopped. This and the two fallow plots are about one hectare each, and are all 20-30 minutes walk from the village. Rattan and mulberry grow naturally in the fallow plots and are harvested for sale. Wild resources such as bamboo shoots, mushrooms and rats are collected from the forest for household consumption, and rattan and mulberry are also collected for sale. Livestock is an important part of their livelihood. They have five cattle, seven pigs and 20 chickens, the latter two being kept near the river (also where their fields are) and the cattle being allowed to roam, grazing in the forest. They have only had the cattle for two years so have not been able to sell any yet. They have had pigs for about five years and feed them fed maize, rice bran and cassava.

The household's main income used to be from Job's tears but is now from pigs, supplemented by the sale of mulberry and rattan. Major expenses tend to be medicines (one of the family has asthma), clothes, soap and other small items. They do not have access to credit, nor do they have any savings. August and September can be difficult - when they have to work hard, do not have enough money and sometimes not enough rice. It is also difficult to sell livestock at this time. November and December are also busy months due to the harvesting work that has to be done. Tao Sip Jed says that his main problems are livestock dying and pests (mice and insects) destroying the rice and he does not think anything can be done about these problems. His goals for the future are to continue growing crops, especially maize and cassava, and to increase the household's livestock numbers. He says he plans to buy more pigs and cattle from the market, and try the new maize from Viet Nam. He would also like to have fish ponds but says they do not have enough land for this.

Tao Sip Jed has heard about forages but did not go to the FLSP meeting. He says he does not really know what they are, and has not seen them. He thinks they might be for livestock, but has no idea about the possible benefits of using them. He thinks his livestock have enough to eat at the moment. If he increases their numbers, he would keep them where they are now and would try and plant cassava and maize for them first. If that was not enough, he says he would consider using forages.

Source: Fieldwork interviews, Feb 2005

8.2.4 Livestock

Five of the sixteen non-adopters said that having too few livestock was one of the reasons they had not tried forages, some saying it was not necessary or not worthwhile. Two of these five also mentioned labour as another reason for not adopting, and the other three mentioned labour as a resource requirement for forages, suggesting that this may also be a contributing factor. One farmer said that he was not really interested, and three others made comments which suggested that their attitude towards livestock and forages may also be a factor. Livestock seemed to be the main reason for four of the five who mentioned it, although one of these four said that this was the reason they did not try forages in the past, and that his household now has enough livestock and plans to use forages this year.³⁶ Three of the five farmers who stopped growing forages last year said they did so because they did not have enough livestock and decided it was not worth keeping forages for so few animals. One of these farmers is Tao Haa, whose story is told in Box 8.4. His family planted forages in 1997 and were able to increase their livestock over the next few years. However, their pigs all died and they had to sell their cows to pay for their son's education. They were not able to continue building up the livestock they already had; rather, they had to draw on them for cash. They decided to stop growing forages when they had only one cow left. Although the forages had made the cows fat, they knew the last one would have to be sold too so they decided it was not worth maintaining the forages.

Box 8.4 Tao Haa - a stopper's story

Tao Haa is a Kasak farmer from Ban Kieuw Chaluang. The village is approximately 40 minutes walk from the road, and was one of the villages involved in the FSP project (the precursor to FLSP) so has had some history with farmers trying new forage options. Haa's household consists of eight people - himself, his wife, and their six children. The oldest child, a boy, is 17 and studies in Luang Prabang. He only comes home for holidays, and helps on the farm during summer (the busiest time). The next boy is 16 and is mentally disabled so stays home and helps on the farm. The next three children (10-13 yrs old) all study in the neighbouring village but live at home and one helps in weekends and summer. The youngest is eight and goes to the village school. In total two people work full-time on the farm and three help out part-time.

Continued on following page

³⁶ This could not be confirmed with extension workers, but others who said they planned to plant this year were unlikely to, according to the extension workers.

Tao Haa (continued from previous page)

The household's livelihood is based on the cultivation of upland fields - they grow rice, maize and other crops such as sweet potato, pumpkin, large gourd, and sesame. Income is from rattan and mulberry (both of which grow naturally in the forest and on upland fields but are sometimes also planted on fallow fields), labouring (cutting wood) for others in the village and livestock. At present they have 28 chickens but have had other livestock in the past. They have been allocated three upland plots for crop cultivation, about one hectare each, not far from the village. Each year one plot is cultivated and the other two are fallow. This year they have been allocated another three plots for the purposes of planting mulberry and rattan.

Tao Haa first planted forages in 1997, with the FSP project. At that time the household's situation was largely the same in terms of crops and land-use, but the children were younger and his wife was only able to work part-time on the farm. Haa himself had stopped his full-time teaching job the year before because he and other family members were sick. Haa said he planted forages because he needed income and had decided to try to increase his livestock numbers. He tried to get credit from the bank for this purpose but was unable to. At that time they had three cattle and five pigs, as well as chickens. He planted stylo, bryzantha, guinea and napier grass.

After eating forages, the sow became strong and fat, but all the pigs died from disease before their numbers could increase. He bought more but they also died before they could be sold. When they have money, they buy pigs, but they always die. Right now they do not have any but are waiting to get money again. Haa said pigs are risky but he has not yet given up trying, later saying that he will try one more time but if it does not work, he will give up. He also said if he does get pigs again, he will feed them local feed (maize, etc), rather than forages. They continued letting the cattle roam and find food in the forest in the wet season, feeding them FLSP forages when they came back to the village (every few days). The cattle stayed near the house and ate forages in the dry season and when calving. Their numbers increased (peaking at 13) for a few years, but since about 1998 the family have needed to sell one every year to pay for their oldest son's education. More had to be sold for the other children's school needs, etc. The family was able to sell the cattle for a good price for the first two to three years. In 2001 they sold six of the cattle so only had one left. They knew that they would need to sell it in 2004 for their son's study, so Haa discussed things with his wife, saying, 'Why do we have these forages?'. The cow was still fat and they knew it would be sold in 2004 so decided it was not worth keeping forages. Apparently the cow was still fat when they sold it.

Tao Haa also said that they had some problems with the forages - they were not fenced, and other animals kept coming and eating them. They had two forage plots - one in the village's crop-growing (upland) area, and the other on flat land. The upland area was safe from roaming cattle, but the animals are kept far away from this in the rainy season (according to the village system) and so this made things difficult. Another issue was that the land for crops and the land for forest (where the livestock is kept) alternate every few years, so any forages that are still being grown in this crop area are eaten by livestock when they move there. Therefore forage plots have to be moved every three years or so. Later, the village headman said there were problems with this crop-area/livestock-area system and that they were planning to change it soon. Haa says he would like to have more cattle, but each year they only had one calf which had to be sold for his son's education. He says they do not have enough income to buy more.

Source: Fieldwork interviews, Feb 2005

Other households in Ban Kieuw Chaluang also planted forages with the hope of gaining access to credit to buy livestock. Some of these households did not have livestock (or had very few), and when they failed to get any credit, they stopped growing forages.

The extension workers also identified livestock as a main factor in adoption of forages, in terms of both numbers held and the extent to which households are focused on livestock as a livelihood strategy. They said that, in general, those households who adopt forages already rely on livestock for a large part of their livelihood. They also 'love' or 'believe in' livestock as a strategy, and may have knowledge and skills relating to livestock production. The non-adopters, on the other hand, tend not to have as many livestock to begin with and their main focus may be on other activities such as rice, cash crop production or non-farm enterprises. They are often not interested in intensifying livestock production, and are content with local feeding strategies, while the adopters generally have a problem with local feed and are motivated to solve that problem.

Those farmers who cited livestock numbers as the reason for not adopting forages do (or in one case, did) in fact have very few livestock. Some of them get their main income from livestock, but the amount would be relatively small compared to those with many livestock. They do not have access to credit (except from relatives), probably because of their lack of collateral such as livestock. Most of them do not have savings, although one said he has some cash kept for emergencies and another has planted teak trees which may later be harvested for sale. Nearly all of them have livestock as a goal but do not have any actual plans to increase them over the next year or two. Some of them see livestock as the best or only opportunity for their household's future, but others do not mention livestock as an opportunity at all, suggesting that while they would like to have more livestock, they do not see it as something their household is able to do at present. Only one household who has been identified as having few livestock did not mention this as a reason for not adopting forages.

The extension workers said that non-adopters in general had less livestock, and were not as focused on livestock as a livelihood activity as adopters were. Of those non-adopters interviewed, some did have a lot of livestock; however, they were selected for interview *because* they had livestock (with the underlying assumption that those with very few or no livestock were likely to not be adopting for that reason, and with the aim of finding out why households with livestock were not adopting). The suggestion that

adopters are already specialising in livestock production for their livelihoods, while non-adopters may be focusing on crops or other activities, does bear out to some extent, but not for all households. It was found that most non-adopters do see having livestock as a goal for their future, but they tend to be more focused on crops when it comes to their actual plans for the next year or two. As far as the opportunities or alternatives available to their households go, less than half of them saw livestock as the main opportunity and some only mentioned crops. For the present, most non-adopters have livestock as their main income source, while crops were the primary source for a few.

It is very difficult to gauge factors like people's 'love of' or 'belief in' livestock, factors the extension workers also mentioned. Similarly, their knowledge of livestock-raising was not covered in the interviews. However, their general levels of interest in livestock raising was apparent to some extent and it can be said that the suggestion of the extension workers that non-adopters are less interested and more content with local feed can be said to be true for some, but not all, of those interviewed. It is likely that for some, the interest is there but the means to do something about it is lacking.

8.2.5 Other livelihood resources and characteristics

Issues relating to household wealth and access to resources were identified by the extension workers as factors that may be related to forage adoption. They said that non-adopters tended to lack productive resources such as labour (see Section 8.2.2 above) and land, they tend to not have enough money, and face regular rice shortages, leading them to focus their energies on producing enough rice for the household. They said that adopters on the whole tend not to have these problems, or at least not as commonly or to the same extent. When adopters were prompted as to whether they thought issues such as land and labour were important, most agreed that they were.

Apart from labour, land was the only such factor specifically raised as an issue by both extension workers and non-adopters. The former suggested that adopters have land available, and may have land near the village, while non-adopters have less land or it is far away. Only one non-adopter cited a lack of land as a major constraint, saying that it is very difficult to rent land for long-term crops such as forages, although another also mentioned that land needs to be available at the time forages must be planted. Two farmers who have stopped using forages mentioned land as a factor (see Section 8.2.2 and Box 8.4).

The issue of land was mentioned by only a few non-adopters, but some of them do seem to lack land, while the adopters do not. The one farmer mentioned above who said that land was a main reason he was not using forages is in fact short of land, apparently only having 0.8 hectares. His household is also short of labour. While livestock is important to this farmer, and he says that using forages would be easier, he also said that he is currently happy with the traditional way of raising livestock. Having money was another factor suggested by the extension workers, who said that some non-adopters are poor and lacking in cash. This is difficult to gauge from the interviews but non-adopters do have proportionately less livestock, savings and access to credit, which are most likely all related and determine households' overall levels of wealth and well-being.

The interviews found that many more non-adopters experience regular rice shortages than do adopters, who are either self-sufficient in rice or can use the income from livestock or other sources to buy rice to eat. Some adopters are able to sell rice, while only a few non-adopters can and one appears to do this out of necessity (at harvest time) rather than choice. Whether the non-adopters interviewed are largely focused on growing enough rice for their household, and whether this is steering them away from other activities (such as forages) is difficult to tell, but it seems that this is likely to be the case for at least some of them. An example of a household lacking in important livelihood resources as well as in rice sufficiency is Tao Sao Hok, whose situation is described in Box 8.5. This couple has four young grandchildren living with them and lack labour for many activities. Tao Sao Hok says that in addition they do not have enough land, and they are unable to grow enough rice for the household. Every year they must borrow rice and repay it at harvest time. They have a few livestock, but their income is mostly from cash crops - it appears that they do not get enough income to support all the household's needs.

Box 8.5 Tao Sao Hok - a non-adopter lacking in rice and livelihood resources

Tao Sao Hok was born in Ban Houay Hia. His household consists of himself, his wife and four of their grandchildren, aged between eight and thirteen. He and his wife both work full-time on their farm and the eight-year-old grandson helps out in weekends. They are unable to hire labour but they do participate in labour exchange with others in the village. Tao Sao Hok said that in the past his family's livelihood was focused solely on growing upland rice, but they could not get enough and he says they were very poor. Since that time a lot has changed in his village, but not so much for his household. When asked what things have led to change, he said they used to cultivate fields wherever they wanted to, but now they cannot. The land quality and yields are lower, and they have been told by the government that they must plant crops such as maize. He says that while development projects have helped others in his village, none have helped him. However, his family now raises goats and pigs, and grows cash crops.

Continued on following page

Tao Sao Hok (Continued from previous page)

The household has three upland plots, totalling about three and a half hectares, which have been allocated to them for a long time. They also have two small areas they use for gardens, and last year rented a small piece of land from a friend. Each year they use only one upland plot, leaving the other two fallow. Each plot is used for one to two years, so fallows can be between two and four years long. The main crops grown on the upland plot are Job's tears, maize and rice. The biggest harvest is from Job's tears, a cereal crop grown solely for sale. Rice does not grow well so they do not get much of it, and maize is both eaten and fed to the pigs. Other crops grown include pumpkin (for consumption and sale), cassava, chilli and eggplant (all for consumption only). The two small garden areas have fruit trees and bamboo - most of which is for household consumption, some for sale. There are also about 300 teak trees there, planted about six years ago, and mulberry and rattan grows naturally and can be harvested. This year Tao Sao Hok would like to plant soy beans in his own upland plot rather than on his friend's land. Nothing is harvested from the upland plots while they are fallow.

The family has two pigs, two goats and about 30 chickens. All are kept near the house most of the time, the pigs and chickens being fed maize and rice products and the goats finding their food in the forest. The family no longer gets food for themselves from the forest because they do not have enough labour. Their major source of income is from the sale of Job's tears, other crops providing only a little. Their main expense is rice, followed by other foodstuffs and children's schooling costs. They do not have access to credit, nor do they have any savings. Tao Sao Hok says life is particularly difficult during the months of August and September, when they must work a lot and do not have enough rice to eat. At this time they have to borrow rice from others in the village, mix it with maize to eat and pay back the rice at harvest time. This is the household's main problem - lack of rice. Other problems include other people's animals breaking his fence and eating their crops, as well as a lack of both labour and land.

Tao Sao Hok's main livelihood goal is to support his grandchildren's education. However, apart from trying a new type of maize from Viet Nam, he can not see any opportunities for his household. If they do not have enough money, Tao Sao Hok said they will sell the teak trees next year, even though they are only a few years old and would sell for a much higher price if left to mature. He said if he gets more goats and pigs, he will sell them. He has heard of forages and understands that they can make cattle and goats grow quickly and get fat but he did not attend the meeting held in his village when the project started, and is not aware of the impacts other farmers are getting. He agreed that forages could help his household, but said that he is not able or does not want to try them, because they lack labour, wood to make a fence, and money (to buy wood and to pay for labour). Overall, labour is the main reason he has not tried using forages, although it seems that a lack of other resources as well as a lack of interest and awareness may also be contributing factors.

Source: Fieldwork interviews, Feb 2005

8.2.6 Fencing-related issues

Difficulties surrounding the issue of fencing were reported to be a major factor for two of the non-adopters interviewed, but were also mentioned by another four. Fencing was identified as a necessary component of growing forages by over half of the non-adopters interviewed - many of them said that getting wood was a problem. The two farmers who said fencing was the main factor stopping them from using forages also mention labour as a factor (as did three of the four who mentioned fencing) and do have little labour in their households. They have average livestock numbers, with livestock as their main source of income. Their cattle free graze in the forest, and apparently get enough food this way. Both of them have goals involving livestock, and would like to increase them, but one said he would focus on increasing his crops first as they are easier and less risky than livestock. This farmer also said he is not interested in using forages, although he has heard of them. The other seemed to know a lot more about forages, but one of his reasons was that he does not have many livestock, and he said he would focus on both crops and livestock together, not one or the other.

Three of the six farmers who mentioned fencing (including the two above) are from the same village, Ban Kieuw Chaluang. They say that it is difficult to get wood as the forest they can use is very far away, and others in the village also said there is a rule that if households want to join FLSP they must keep their animals together with others and contribute to maintenance of the communal fence. This was confirmed by the village headman who said the system currently in place was deterring many farmers from growing forages. Fencing was also an issue for two of the five stoppers interviewed (see Box 8.4 and Section 8.2.2 for information on these two farmers).

8.3 Conclusion

This chapter has presented the findings of the interviews with farmers and the discussion with extension workers. It has focused on the way farmers view their livelihood situations and the options available to them. The results have shown the diversity of farmers' situations - not only between adopters and non-adopters, but also within the group of non-adopters themselves. They have different problems and have different experiences of and attitudes towards change. They have different goals, plans and opportunities. Some are clearly focused on livestock, while others would like

to be but do not appear to be in a position to actively pursue this livelihood strategy due to a lack of resources.

The reasons that the non-adopters have not tried forages are also diverse. For some, it is simply that they do not have enough livestock to make it worthwhile. Others think that forages will take more labour than their current feeding strategy and do not think they have enough labour to allocate to what they see as an extra task. Many of them believe their livestock get enough food already and so do not see a need for forages, or think their existing methods are easier. Some farmers wanted to wait for others to try forages first, to see whether it is worth doing. Many others were found to lack awareness of forages, saying they did not know enough about them, two being completely unaware of them. Issues relating to fencing and lack of land were also given by some farmers as the reason they had not planted forages.

Many adopters thought that other farmers' attitudes were the main reason they had not tried forages. They thought non-adopters tended to be lazy and not interested in trying new things, or that they were simply focused on the short-term goal of growing enough food for their household. Similarly, the extension workers thought many non-adopters are afraid to take risks and prefer to wait for others to try new things first. They also thought that farmers' livelihood focus and overall level of resources were important factors in adoption.

These results show that each household is different and that there are many reasons behind farmers' decisions not to adopt forages. Some of these appear to be directly related to households' livelihood situations, while others relate more to farmers' perceptions of their situation, as well as of change in general. The technology itself and the extension process used to disseminate it to farmers also clearly play a role in farmers' awareness and perceptions of the technology.

Chapter 9 A Livelihoods Approach to Agricultural Change in the Lao Uplands

The previous two chapters described livelihoods in the study communities, highlighting differences between households who have adopted FLSP forage technologies and those who have not, and looking at the major reasons for not planting forages. The study found differences in many aspects of livelihoods, and raised a number of other issues that are common to most households in the study villages that may be affecting forage technology adoption. It also found farmers' perceptions and awareness of the technology to be important. Some of these factors are explicitly recognised in the livelihoods framework (Figure 4.1), while others are less obvious yet still relate to people's livelihood situations.

This chapter returns to the main question of the thesis as presented in Chapter One:

- How do the livelihoods of shifting cultivators shape the decisions they make regarding potential changes to their farming systems?

The following secondary questions are used to structure the discussion:

- What are the conventionally recognised livelihood factors that contribute to farmers' decisions?
- What other factors are involved?

9.1 Core livelihood factors

9.1.1 Household assets and resources

As suggested in Chapter Three, agricultural innovations often require an investment of resources, the nature of which can affect some farmers' capacity to adopt them (Place and Dewees, 1999: 331; Roder, 2004: 117). In this way, differential adoption rates may in part be explained by unequal access to resources (Potter, 2001: 314-315). In addition to the specific resources required, the overall level of resources may influence a household's livelihood security and hence their capacity to bear risks (Scott, 1976: 20-22; Stone, 2001: 172). As Tomich et al. (1995: 21) suggest, even small changes can have significant impacts on livelihoods that are close to subsistence level. According to this line of argument, we could expect that wealthier households are more likely to adopt new technologies and resource-poor households to hold back or, as Raintree (2000) puts it, to display 'conservative' behaviour. The livelihoods framework

provided a tool with which to examine household assets and resources, the relationships between them, and the factors that may be affecting access to them in the study communities. This section discusses what appear to be the major assets and resources related to the adoption of forages and how these might be contributing to differential adoption decisions. Like Cramb et al., (2004: 270), the research found these to be correlated with the adoption of forages, providing both the incentive and the capacity to adopt.

Livestock

The most salient asset-related factor in the differential adoption of forages was how much livestock households had. This factor is specific to forage technologies, as it is the activity that the technology targets. Thus it would make sense that those households already specialising in this activity would be more likely to try forages. Indeed, on average, adopters were found to have substantially more of all types of livestock than non-adopters. Many of the non-adopting households were found to have very few livestock, about half of them having only poultry and a few pigs or goats. Most adopters, on the other hand, had not only poultry and several pigs and/or goats, but also cows (see Section 7.1.2).

Livestock ownership is not *necessarily* essential to adopt forages, as it may be possible to sell the forages to farmers who do have livestock (Millar et al., 2005: 23). However, the research did not uncover any cases of farmers without livestock having done this. The few households reported to have planted forages without owning any livestock (other than poultry) did so with the expectation that they would get credit from the bank to buy some, and when this did not happen, they stopped growing the forages. The research also found that a number of farmers stopped growing forages because their livestock either died or were sold. Thus it seems that livestock ownership provides the necessary incentive to adopt forages, and so could in practice be seen as a prerequisite, with the more livestock a household owns, the greater the incentive to grow forages.

Another way in which livestock ownership may be impacting on forage adoption is in its contribution to overall household wealth and livelihood security. Households with a lot of livestock are generally able to meet all of their consumption needs, by purchasing rice when necessary with the income earned from livestock sales. They may thus have more secure livelihoods than those who rely almost completely on their own production and who are presently struggling to produce enough from year to year (not all

households with few livestock are in this situation, but in some villages they appear to be the majority). The issue of livelihood security and its relationship to technology adoption is discussed in Section 9.1.3, but it should be noted here that the ownership of livestock may in this way contribute not only to the incentive to adopt forages, but also to the households' capacity to adopt. These findings are in line with those of Cramb et al. (2004: 270), who suggested that livestock were the key asset in forage adoption for these reasons.

If, as this research suggests, forages are indeed more suited to those who already have a lot of livestock, it would be fair to say that this technology can only be expected to be adopted by a minority of farmers, unless prior (or simultaneous) intervention enabling poorer households to increase their livestock numbers takes place.

A related issue concerns the question of why some farmers have large number of livestock while others have very few. The research suggested that many farmers find it very difficult to start raising livestock, or to increase their numbers from only a few, due to the initial cash investment required. However, this does not altogether discount the possibility that there is a relationship between farmer attitudes towards risk and innovation and livestock ownership. For instance, farmers who are particularly innovative may as a result be more successful in other areas of their livelihood, enabling them to produce a surplus and subsequently invest in livestock. The research did not specifically address this issue, but the findings do suggest attitude to be one factor in forage adoption and that there may be differences in farmers' willingness to try new things (Section 9.2.2), of which venturing into increased livestock production may be one example.

Labour

Cairns and Garrity (1999: 45-6) suggested that the labour requirements of innovations may be more important than researchers and extensionists realise. Others, too, recognise the often critical and constraining nature of labour time and its strategic allocation by resource-poor smallholders (Momsen, 1988; Tomich et al., 1995: 21). The relevance of household demographics in determining labour availability at different times is also seen as related to their ability to tolerate risk, make investments and adopt innovations (Chayanov, 1926; Elson, 1997; Scott, 1976; Shanin, 1972).

The research findings, however, were less than straightforward in this regard. Firstly, forages are advertised as a way to save labour on looking after livestock (see Section

5.4). In talking to farmers who have used forages, however, they did not all find this to be the case, and some farmers reported stopping due to a lack of labour. Lack of labour was also frequently given as a reason for farmers not trying forages (Section 8.2.2). In comparing the human resources of adopters and non-adopters, the adopters were found to have bigger households, but only in one village were they found to have more total labour. This raises the issue of why labour is *perceived* to be a major issue, yet the results show it is not a major differentiating factor between adopters and non-adopters.

There may be several reasons for this apparent paradox. One is the initial investment that is required in planting forages, while the potential labour-saving benefits accrue at a later stage. For some farmers this may involve a trade-off between short-term consumption needs (needing to plant enough rice for a sufficient harvest later in the year) and long-term gains, in terms of both labour savings and, eventually, increased income from livestock production. This is related to problems of seasonality - forages need to be planted at the same time as rice and other crops which may affect their ability to fit with existing livelihood strategies. Another issue concerns the labour requirements of associated activities, particularly fencing. Many farmers mentioned that forages must be fenced; otherwise they will be eaten by other people's livestock. They also said that it is very difficult to get wood to build the fence, because the forest they are able to use is far away. In at least one village, farmers with forages in the communal area must contribute to the building and maintenance of the fence, which was cited as a constraining factor by a number of farmers. This raises the question of whether these fencing issues may have been overlooked by the project in terms of the total labour investment required. Finally, it may be that there are other 'hidden' factors relating to labour that the research did not discover, such as the effects of age and health on the amount of labour able to be performed (households were asked how many full-time and part-time farm workers they had but not how many hours they were able to work), or the type of work they do and the amount of labour required for existing activities.

It thus appears that labour certainly has the potential to be a constraining factor for most households, but that some are able to overcome this. These may be households with greater livelihood security and the ability to allocate labour resources away from subsistence crops, such as those with more livestock, for example. Better-off households with the ability to hire labour may also be able to overcome this constraint. Again, having large numbers of livestock may be related as these households tend to

have more income. In summary, although forages are supposed to save labour, their initial or 'hidden' labour requirements such as planting and fencing seem to be a barrier for many households.

Financial capital

Some authors have suggested that a lack of capital may inhibit investment, particularly where credit is not available (which is often the case for smallholders) (Cramb, 2005: 73; Place and Dewees, 1999: 327-328). Others have similarly suggested a relationship between wealth (or income) and innovation (Ellis, 1993: 96). Due to its relationship with livestock ownership (they are a form of savings and also a source of income), financial capital is therefore very relevant to the adoption of forages. While it is not required for forages *per se*, it is a major factor in the ability to accumulate livestock. This is particularly so for those starting out with very few livestock or none at all. Livestock must be purchased with cash, and it can be very difficult to increase their numbers by breeding alone, due to the high mortality rates of most livestock.

In the study, the analysis of financial capital comprised three main components - income, savings and access to credit. These were not analysed in detail, but adopters were found to be more likely to have savings and access to credit than non-adopters - largely because of their higher livestock numbers. Financial capital has a strong relationship with other livelihood assets and with households' overall wealth. There is thus something of a 'virtuous' cycle involving livestock and other forms of financial capital; once a household has livestock, they have a ready source of income and can therefore save for more livestock. Having livestock also increases households' access to credit, with which more livestock can be purchased. However, it is difficult for households to enter this virtuous cycle. They either need to produce a surplus (for example from cash crops or paddy production), or to inherit livestock, or to be given access to credit. Lack of credit currently seems to be an issue for poor households. This is something that could potentially be provided by the project, to enable more households to start raising or increase their livestock. This would then give them the ability to take advantage of opportunity offered by forages.

Land

Land, although required to plant forages, was not raised as a major issue in relation to forages (except by one farmer). However, it may be indirectly related in a number of ways. Although it was not able to be verified, adopters appear to have more land overall than non-adopters. In the one village with some paddy land, adopters were over-

represented among those with access to paddy. The amount, quality and distance of land available can have implications for labour requirements, food security and overall wealth - poor or frequently cropped land may have more weeds, requiring more labour and producing less (Section 2.3), with long walking distances also increasing labour inputs. In this way land may be indirectly related to the ability to purchase livestock, as well as the ability to invest in forages, in terms of the investment of labour, particularly if farmers are not sure of the returns. Additionally, some forages need to be cut and fed twice daily - this can pose severe constraints for households who do not have any land near their house, as the farmer who stopped using forages explained (Section 8.2.2).

Forests

Within each village, farmers apparently have equal access to forest areas (for the collection of wood and other forest products), although where these are some distance from the village, labour becomes a constraining factor for many households. Some farmers mentioned that it is very difficult to get wood with which to build a fence, as mentioned in under labour above. Some households are able to substitute financial capital for labour, paying others to go and get the wood for them, but many cannot afford to do this. The availability of natural grazing land - fallow plots and forest areas (Section 9.1.2) - is also a forest-related factor, but rather than being a constraint, this may serve as either an incentive or a disincentive (depending on its availability) to grow forages. In summary, forest access may be an important factor due to the need for fencing, which constitutes a constraint for most farmers.

9.1.2 Livelihood activities and strategies

The overall mix of activities undertaken by a household makes up their livelihood strategy. Existing livelihood strategies in the study communities tend to be focused on meeting household consumption needs; either directly, through the production of upland rice and other subsistence crops, or indirectly, through the production of cash crops, livestock or both. While livestock was found to be a major part of some households' overall livelihood strategies (particularly the adopters), for many this is more of a supplementary activity that to some extent takes care of itself (cattle at least being much less labour intensive than crop cultivation). Some farmers believe their animals get sufficient food the *thamasat* (natural) way, and thus do not see a need for managed forages, which are seen to require more work (this is related to farmer perceptions, discussed below in Section 9.2.2).

It also seems that for many households, livestock are kept primarily as a form of security or savings, to be converted to cash as and when required, rather than as a permanent and reliable source of income. This may be partly due to the difficulty of maintaining and increasing livestock, particularly for the poor. The story of Tao Haa's household, who grew forages but sold all of their cattle over a period to pay for their son's education and whose pigs all died, provides an example of how easily livestock numbers can diminish, even when starting out with reasonable numbers and using forages (Box 8.4). In cases like this, however, it must be recognised that the sale of livestock is still a choice - households constantly make decisions about where to invest their resources. Tao Haa's household obviously decided that their son's education was their priority. Other households, like Tao Hok's for example, are focused on increasing cash crops rather than livestock (possibly because they are used to just allowing livestock to breed by themselves) (Box 8.1).

The results also found that while many farmers wanted to have more livestock in the future, their actual plans more often involved crops. This suggests that, while livestock are perhaps preferable, crops are seen as more achievable. This may be because experience tells them that increasing livestock is very difficult, and because livestock are so susceptible to disease and therefore mortality. In summary, the activity focus of households is important to their decisions, as are their priorities and perceptions of the activity concerned (in this case, livestock).

9.1.3 Livelihood outcomes

The outcomes of existing livelihood strategies shape the resources available for future strategies. For example, households that are food secure and able to produce a surplus are able to invest that surplus into productive assets or activities, such as livestock, and/or they may be able to allocate some of their labour away from food crop production into more intensive livestock management involving forages. Conversely, households that are struggling to produce enough are likely to continue to focus on activities contributing to household subsistence in the short term rather than making long-term investments such as livestock and taking risks such as growing forages. The research found rice security to be an issue for many households, and although farmers did not generally say this was why they had not adopted forages, it seemed that many are focused on getting enough rice, firstly by growing it themselves and secondly by obtaining it from others (for example Tao Sao Hok's household, Box 8.5).

People's priorities in terms of the outcomes they are seeking can also be expected to be related to technology adoption. In terms of farmers' expressed goals - particularly increasing livestock numbers - these seemed to be compatible with the technology's intended benefits. However, it may be that having enough rice to eat is a higher immediate priority for many households, and thus the focus of their livelihood activities. This is the only component of the framework that explicitly incorporates people's perceptions (although this is not immediately obvious and only appears in DFID's explanatory notes on the framework). The issue of farmer perceptions is returned to in Section 9.2.2.

In summary, household food and livelihood security affects their priorities, as well as their ability to invest and take risks, as well as their ability to purchase and therefore raise livestock.

9.1.4 Institutional and organisational context

The institutional and organisational context influences people's access to resources and their ability to follow different livelihood strategies. The impact is largely at the community level rather than that of the individual household, and so these factors are unlikely to contribute directly to differential adoption between households. They are, nonetheless, relevant to technology adoption and overall decisions regarding change in livelihood strategies. In the case study communities (as in much of the Lao uplands) one of the most significant institutional factors is land and forest allocation, which is responsible for households being limited to three to four plots of land, as well as to only the designated 'production' forest areas for wood and other natural forest products. The resulting impacts of this on household livelihoods (in terms of land, labour, food security and possibly overall wealth) is that many households are increasingly turning to cash generating activities, such as livestock production - which may or may not be intensified through the use of managed forages. In this way, institutional factors have increased the incentive to adopt technologies aimed at increasing production. However, they may have simultaneously reduced the capacity to make investments and take risks.

Village-level institutions also play a part in regulating land-use - in Ban Kiew Chaluang, for example, there is a designated crop area and other areas for livestock. This system has reportedly constrained livestock production in general and the been a disincentive for the adoption of forages in particular due to the extra work involved in

building and maintaining fences, moving plots every three years or so, and transporting the forages from the crop area to their livestock.

Organisations that affect in some way the livelihood strategies of households in the study include the government, in particular the district extension service which advises farmers on what to grow (including forages, as the project is implemented by this organisation). Many farmers mentioned the government when asked about the reasons for changes in their livelihoods, commenting that the government has long been advising them to stop growing upland rice, produce more cash crops and raise livestock, and even forcing them to buy seeds (the produce of which was later bought back at a disappointingly low price). Other development organisations also offer advice and alternatives, and private companies sell seeds to and buy crops from farmers.

In summary, institutions and organisations are important as they place limits on what is possible, encourage or discourage change (and certain activities), and ultimately impact on households' overall livelihood situation.

9.1.5 Vulnerability context

The 'vulnerability context' of trends, shocks and seasonality also impacts on household decisions. Firstly, trends such as increasing population, decreasing availability of land and subsequently shorter fallow periods, declining yields and increased weeding requirements have contributed to the situation described above (Section 9.1.4), in which farmers are induced to look for new ways to maintain their livelihoods. Although farmers seemed reluctant to talk about these negative 'push' factors for change, some did mention that it is more difficult to find land now, and a few reported that things were generally getting harder. Along with these negative trends are changes that are providing new opportunities for farmers to diversify their production. Better market access has led to increasing commercialisation, (both of the agricultural economy in general and for individual households), with farmers now able to produce a range of cash crops (not all of which have proven to be successful) and to cultivate and sell various NTFPs. Livestock production is now one of many income-generating options available to farmers, and thus forages are not the only way of increasing cash income. Shocks and seasonality are factors that increase households' vulnerability to food or livelihood insecurity. The most vulnerable households must therefore bear these in mind when constructing their livelihood strategies. For example, households close to subsistence level may be more affected by shocks such as sickness (reducing the

availability of labour) or drought (which may seriously affect yields) and may thus have to resort to coping strategies such as selling their livestock in order to survive. Vulnerability to such shocks may thus be one reason why many households struggle to build up their livestock numbers.

Seasonality also tends to have a more pronounced effect on poor households, the most difficult time being the months before harvest when there is not enough rice to eat and there is a lot of work to be done. Some farmers have to sell their labour to others as well as work in their own fields in order to get enough rice until the harvest. Market access is also affected by seasonality, as some villages are difficult to get to in the rainy season. The start of the rainy season is one of the busiest times of year, when rice and other crops are planted. Forage crops also have to be planted at this time, which may explain why a number of farmers perceived labour to be a constraint to forage adoption (see Section 9.1.1). It is also possible that forages fail to provide sufficient feed at the time of year when it is most needed - they grow mostly during the rainy season, when there may be sufficient natural food in the forest. The dry season is the time of greatest need, but some farmers mentioned that their forages died off in the dry season too.

The factors that make households vulnerable and livelihoods difficult may be barriers to technology adoption. Risk is an important factor in this regard, with farmers' subjective assessments of both the risks they already face (their existing vulnerabilities), and of the risks involved in adopting new technologies, affecting their ability and/or willingness to make investments or take such risks. Many farmers in the study had chosen to 'wait and see', possibly for this reason.

9.2 Factors that need to be included in the livelihoods framework

The above sections discussed those issues that are explicitly included in the sustainable livelihoods framework. However, the research also identified livelihood-related issues that do not receive explicit attention in the framework but that are critical to understanding the decisions farmers make regarding their farming systems and overall livelihoods. These issues relate to the technology on offer, and farmers' *perceptions* of their livelihoods and of the technology's overall congruence with their livelihoods.

9.2.1 The technology available

The literature on technology adoption suggested that the characteristics of the technology itself are important in farmers' decisions regarding its adoption (Roder, 2004; Rogers, 1962; Tully, 1968). The present study found several areas, discussed above, where the technology may not fit well with farmers' livelihoods, in terms of the incentive and capacity for its adoption. Again, livestock provides the clearest example of this - to farmers with very few livestock, forages may appear irrelevant to their situation. Farmers' perceptions in this regard are particularly important - the technology must be seen as necessary or beneficial to their livelihoods and able to be incorporated without compromising their food or general livelihood security (see Section 9.2.2).

Lack of awareness of forages was found to be another issue possibly contributing to low rates of adoption. Although only two of the sixteen non-adopters interviewed seemed to be completely unaware of the FLSP project, many others had heard of forages, yet were lacking in understanding of what they are and how to use them. Most of those stating a lack of awareness or understanding as a reason for not adopting were from one village, suggesting that the problem may lie with the extension process or with social mechanisms in the village. These farmers seem to have potential for using forages as they are not lacking in resources, but probably need to be better informed and perhaps convinced of the benefits of forages. Such problems are relatively easy to rectify and the AIRP project is currently researching ways to make the extension process more effective. It was not clear from the research what other factors might be contributing to this lack of awareness or understanding, but lack of interest is likely to be a related issue (see Section 9.2.2), although it might be a result of literacy and other educational factors (which were not investigated), lack of labour resulting in farmers being too busy to attend meetings, or possibly issues such as social exclusion.

One further related issue that deserves attention here is that farmers who are completely unaware of forages are not in fact making a decision not to adopt them. This means that such issues are not technically within the scope of the research question, which concerns how livelihoods shape people's decisions. However, awareness is an important factor from a project point of view, in that it is contributing to low levels of adoption.

9.2.2 Perceptions

As has already been suggested, farmers' perceptions were found to be a particularly important factor in their adoption decisions. Firstly, the way farmers perceive their current livelihood situation, in terms of their problems and the various opportunities available, may be more important than their apparent situation as perceived by outsiders. Farmers may not always see things in the same way that outside agricultural experts do, and they face issues that outsiders are often not aware of. For instance, not all farmers see lack of livestock feed as a major problem, or this may be just one of many problems they are facing. They often have to prioritise their problems, which may mean for example trading off short-term consumption needs against long-term livelihood security.

Perceptions of various opportunities depend on the resources that are available to the household. When confronted with a variety of options, farmers must weigh up which are best suited to their needs and capabilities, as well as to their interests, preferences and livelihood goals. Most farmers in this study seemed to be focused on income-generating activities such as having livestock or cash crops - a goal to which forages would appear to contribute. An interesting finding, however, was that while most farmers wanted to have more livestock in the future, their actual plans for the next year or so did not reflect this - less than half of the farmers with livestock-related goals had plans to do something about this (Section 8.1.4). Further, of the eight households with few livestock, only two said that they have some sort of plan to increase them. Conversely, crops were a much less common goal but more often featured in farmers' short to medium term plans. Nearly half of all farmers did not have any plans to do anything different (from what they are doing now), suggesting either that they are quite happy with their current livelihoods or that they do not really see any viable options for their household. Overall these results suggest that crops, although not as desirable as livestock, appear to be a more achievable activity for many households. This perception may affect their level of interest in forages - if they are focused on crops in the short-term, they may not want to invest in livestock-related technologies which take time for benefits to accrue.

Farmers' views of different livelihood options may also be shaped by their views of existing activities in terms of both their role and inherent risks. For example, it seems that most of the farmers in the study communities are used to livestock being a low-input, supplementary livelihood activity that are purchased when the opportunity arises

(which is not very often), increase by themselves (generally rather slowly) and are sold whenever circumstances dictate necessary. This contrasts rather strongly with the kind of controlled, management-intensive, strategic livestock production that can be made possible by the adoption of forages and associated management practices.

The risks involved in activities such as livestock production are also likely to influence farmers' decisions regarding the allocation of resources. Livestock is a risky activity because of their high susceptibility to disease and other causes of mortality. Although this does not deter farmers from wanting to have more livestock, it is possibly a factor in their investment decisions. Planting and managing forages requires some investment of labour (at least initially), the returns to which are perhaps less certain than other activities, particularly those they are already familiar with. In the extreme, farmers may be sceptical of forages and of the projects that offer them, like the farmer from Ban Silalek who thought they were being experimented on and was concerned his animals might die if they ate forages (Section 8.2.3). Households' ability to tolerate such risks must also be taken into account; as mentioned above (Section 9.1.3), those whose livelihoods are already insecure may not be able to afford to take any risks with their food security at all.

In talking to farmers and extension workers about the possible reasons why many do not adopt forages, it became apparent that there were some factors that were not covered by the existing livelihoods framework, and would not conventionally be considered 'livelihoods reasons'. These were more 'personal' or individual factors that could in theory exist independently of farmers' livelihood situation. Thus if they were the main reasons for non-adoption, it could be argued that livelihoods do not really matter that much. However, upon looking more closely, it can be seen that these factors too are strongly influenced by people's overall livelihood situation and may not be so independent after all. The following two paragraphs discuss these issues in terms of their contribution to decisions not to adopt forages.

Issues that were loosely grouped as relating to farmers' attitudes towards forages - and possibly towards change in general - were found to be the most common reason for not adopting FLSP forages. As a whole they were mentioned by both non-adopters and adopters, as well as by extension workers, although each group tended to raise different attitude-related reasons. The non-adopters indicated that they either were not interested in forages because they were happy with the traditional way of feeding or for other reasons, or they wanted to wait for other farmers to try it first and assess its

benefits on the basis of their results. The extension workers suggested that some people 'love' or 'believe in' livestock production, while others simply do not. They also mentioned more personality reasons, suggesting that some people just do not like to change, they do not like to work hard or take risks, or they just continue doing what their family has always done. They said that many farmers think short-term rather than long-term - they are concerned about getting enough rice for their family so they just concentrate on growing upland rice like they have always done. While the research does not draw any conclusions regarding these personality issues, it is quite possible that they do exist and may be important factors in technology adoption and wider issues of agricultural change.

Another issue raised by some of the adopters and extension workers was that some farmers would only participate in projects like this if they thought they could get money directly, but not if they had to do extra work for which they may or may not receive a monetary return (Section 8.2.1). This may in part be related to their understanding of the technology, as discussed below. It could also be related to their experiences with and perceptions of projects or outsiders in general. For example, projects that simply give money may create an expectation that they should be able to get money without working for it. Another way that other projects (or the government) may be influencing farmers' decisions is through bad experiences such as the maize project that appeared to have had financial costs rather than gains (Section 8.2.1). Such experiences create suspicion of outsiders and make people wary of the new things they bring. Farmers holding back and waiting for others to try things first may be partly due to these attitudes and experiences.

Finally, farmers' perceptions of the technology on offer can greatly influence their adoption decisions (Rogers, 1962; Tully, 1968). Of particular importance are their expectations regarding the required inputs and likely returns. For forage technologies, a major issue in this regard seems to be labour - whether using forages will ultimately save or require more labour (see Section 9.1.1). Many non-adopters seemed to be rather unclear on this point, and comments made by those who have tried forages were also mixed. This is possibly due to some of the issues discussed in Section 9.1.1 regarding the amount and timing of labour inputs and the possible 'hidden' labour costs (such as fencing), but the point that needs to be made here is that farmers' perceptions of the overall labour requirements seems to be a major factor in decisions not to plant forages.

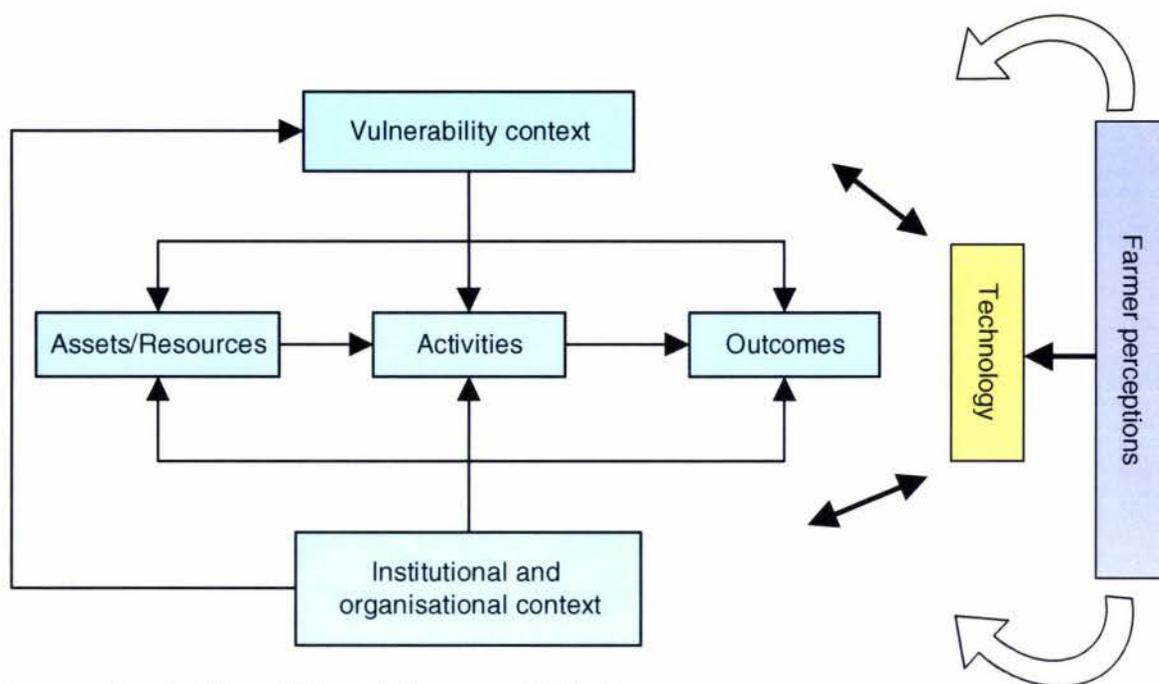
Apart from these labour issues, farmers' expectations regarding whether and to what extent their livestock will benefit from forages, whether their use will ultimately increase their income and improve their livelihoods, and, no less importantly, when these benefits can be expected to accrue, undoubtedly have an impact on their decisions. Not seeing a need for forages is clearly related to farmers' livelihoods - it may be that their focus is on activities other than livestock, that they do not have enough livestock to make forages worthwhile, or that their livestock simply have enough food already. 'Love' or 'belief in' livestock could be related to their family's traditional livelihood strategies or to their personal experiences with livestock. The tendency to innovate or follow others may be related to other livelihood issues such as vulnerability to risk.

In summary, farmers' perceptions were found to be a major factor in their agricultural decisions - for some, perhaps even more important than their asset status. Perceptions affect decisions in many different ways, and are themselves influenced by a variety of factors. Perceptions of the technology on offer may potentially be modified by the provision of information, through for example the extension methods used to disseminate the technology to farmers. These methods are currently under investigation (Millar et al., 2005).

9.3 Conclusion

This chapter has discussed the findings of the present research in the light of the literature on both livelihoods and agricultural change. It has shown that a wide range of factors are involved in the complex process of household agricultural decision-making. The livelihoods approach both guided the identification and structured the analysis of these factors, many of which were also noted in the agricultural change literature. Each of the five components of the livelihoods framework was found to be influential in farmers' agricultural decisions. However, two important factors that are addressed to some extent in the agricultural change literature are somewhat overlooked by the livelihoods framework. In tailoring this framework to the study of household agricultural decisions, it is argued that the incorporation of both the technology or opportunity on offer and farmers' perceptions as separate components of the framework will enhance its usefulness and guide the identification of pertinent factors. Figure 9.1 below illustrates how such a framework might be constructed.

Figure 9.1 A livelihoods framework for assessing household-level agricultural change



Source: Adapted from Ellis and Freeman, 2005: 4

As can be seen in the diagram, the relationships between the various components of the framework are complex. Although the framework is necessarily simplified, it suggests certain linkages that may be worthy of investigation. In addition to the linkages explored in Chapter Four, the above framework includes both technology and perceptions as separate factors. These not only influence and are influenced by the various components of people's livelihoods, but are important to farmers' decision-making processes in other ways. How well new technology fits in with their existing livelihood situation is especially pertinent, as are farmers' perceptions of their livelihoods and of the technology.

Chapter 10 Conclusion

This thesis has explored the issue of shifting cultivation and change in the Lao PDR from a livelihoods perspective. In particular, it has investigated how people's livelihood situations shape the decisions they make regarding opportunities to make changes to their farming systems, in the context of a livestock project offering forage technologies to farmers. The livelihoods perspective was found to be a useful approach for understanding change at the local level, although some modifications to the existing livelihoods framework are suggested. This chapter reviews the main points of the thesis and presents some conclusions regarding the importance of the livelihood context to household decisions, the application and implementation of the livelihoods framework and the situation of shifting cultivators in the Lao PDR.

Worldwide, millions of people today rely on shifting cultivation for their livelihoods (Thrupp et al., 1997: 1). For many of them, however, the future is uncertain. Outsiders have generally regarded their system of agriculture as outmoded or archaic and long overdue for replacement by more 'modern' agricultural methods that contribute more to the economy and less, ostensibly, to certain environmental problems. Many shifting cultivators have thus found themselves subject to aggressive campaigns to change or eliminate the practices they have known for generations. These efforts have tended to focus more on placing restrictions on what people can do than on providing viable alternatives. This has sometimes meant that shifting cultivation has continued but under progressively shorter fallow periods - in many cases fallows have been forcibly reduced to just a few years, a situation that is widely considered to be unsustainable. Thus, these systems are under mounting pressure, with many farmers finding it increasingly difficult to secure a sustainable livelihood from their traditional practices. In countries where shifting cultivation is widespread, this has become a major development issue.

In response to this perceived 'shifting cultivation problem', many alternatives are being developed and introduced to these farmers. In addition to opportunities that come from research and development projects, solutions are also coming from the private sector in terms of market opportunities, as well as from farmers themselves. Thus, at the same time as having their traditional livelihoods 'squeezed' by outside pressures, shifting cultivators are faced with an increasing range of options to make changes to their farming systems.

This thesis has addressed the issue of how change takes place at the local level. Such a question is pertinent for two reasons. Firstly, it concerns the future of these shifting cultivator farmers - their capacity to take advantage of the opportunities now becoming available may be crucial in determining their ability to secure a sustainable livelihood for themselves and their children. Secondly, huge amounts of money are being spent on developing and extending new technologies and other options to shifting cultivators. Understanding how farmers make decisions regarding these opportunities, and the constraints they face in taking advantage of them, may help to improve their effectiveness in supporting more farmers to secure a sustainable livelihood.

Having introduced shifting cultivation and some of the issues associated with its practice today, this thesis has discussed a range of theories that have suggested a number of environmental, economic and social factors that may be influential in determining both the causes and direction of agricultural change. These factors are all potentially of relevance in explaining change at the local level, but as an overall body of theory, the agricultural change literature was found to be somewhat reductionist and, importantly, lacking in cohesiveness. The livelihoods approach was then introduced as an alternative way of looking at change, with particular focus on a comprehensive and holistic understanding of issues at the local level (Section 4.1). This approach was chosen partly for its ability to take into account many of the factors identified in the agricultural change literature and investigate those aspects most relevant to the local situation. It highlighted the importance of understanding how a range of livelihood-related factors (household assets, livelihood activities and outcomes, and the context within which these livelihoods are constructed) interact and combine to condition the livelihood possibilities open to people. The livelihoods approach provides a cohesive framework for investigating agricultural change and so forms the basis of the study.

The issues relating to household-level agricultural change were investigated in the context of the Lao PDR where shifting cultivation, practised by an estimated one third of the population, is seen as a priority development issue (Sections 5.1 and 5.3.1). As in other parts of the world, shifting cultivation has been declared environmentally unsustainable and economically unsuitable, and the government has placed severe restrictions on land use. Alternatives are now slowly being made available to farmers and some are changing their practices accordingly. Many others, however, appear to be unable or unwilling to take advantage of these new opportunities, remaining focused on growing enough rice for their families - a business that is becoming less and less

productive. The Forages and Livestock Systems Project (FLSP) has been introducing forage technologies for livestock production to upland farmers since 2001. This research largely focused on farmers who have not tried incorporating forages into their farming systems, with the aim of finding out the reasons for this and how their livelihood situations were contributing to their decisions.

The study was carried out over three months of fieldwork in the Lao PDR, with data collection limited to approximately half of this time. A combination of qualitative and quantitative methods was used, with most of the information coming from in-depth interviews with farmers from households representing different adoption groups (those who have never tried cultivating forages, those who are currently cultivating them, and those who have tried but stopped). A total of 147 households were covered by the research, including 30 who were interviewed in depth about their livelihoods and adoption decisions.

Fieldwork in the Lao PDR involved a number of challenges. Participant selection, for example, had to be carried out through village headmen and was dependent on who was available. Many of those interviewed turned out to hold leadership positions of some sort in the village, although this in itself did not appear to affect their livelihood status. However, village-wide statistics (the reliability of which is unconfirmed) indicated that those included in the research were not representative of the poorest households in these villages. Nevertheless, based on the information collected, it can reasonably be expected that the constraints facing those who were included would be similar for poor households, and that, if anything, the differences between the situations of adopters and non-adopters would be slightly stronger than the research shows.

The overall aim of the research was to explore how change within shifting cultivation-based livelihoods takes place. This was investigated through the application of a livelihoods approach to an understanding of household agricultural decisions. The first and most important objective was to understand how livelihoods shape and influence these decisions. The case study in Xieng Ngeun District revealed that the livelihood context is indeed extremely important in shaping household decisions regarding opportunities to make changes to their farming systems. This was found to be the case across all aspects of the livelihoods framework as presented in Chapter Four and discussed below.

Access to certain assets and resources impacts on farmers' ability to take advantage of opportunities. These impacts may be direct, such as the ownership of livestock in the adoption of forage technologies, or indirect, such as poor or limited land resources requiring high labour inputs, thereby reducing the labour available for activities not contributing directly to food production. Household livelihood activities are also important to their agricultural decisions, in terms of their current activity focus and related patterns of resource allocation. For example, the study found that some farmers were focusing on cash crops for their income needs, and so livestock was not considered a high immediate priority. Many adopters, on the other hand, already had a lot of livestock at the time of adoption and so used forages to consolidate this strategy. The outcomes of existing livelihood activities, in terms of food and livelihood security, affects the ability of households to make investments and take risks, as well as shaping their priorities. In the case of forage adoption these livelihood outcomes are important to the ability to raise livestock, which requires the investment of substantial amounts of money. This is consistent with the theories and findings of many authors such as Cramb et al. (2004); Place and Dewees (1999); and Potter (2001).

Livelihoods are not only what people have, do and get, but all of the factors that influence these - that is, the wider context. The livelihoods framework identifies two areas in particular - the institutional and organisational context and the vulnerability context. Institutions and organisations place limits on what is possible, encourage, force or discourage change (and certain activities), and ultimately impact on households' overall livelihood situation and thus ability to take advantage of new opportunities. Organisations (such as extension services and the private sector) facilitate the introduction of new technologies and other opportunities. In the Lao study, private companies were selling new varieties of maize and soy to farmers and purchasing the harvest, while the FLSP project, through the district extension service, was offering different types of animal feed resources and support in using them. Extension processes and methods are important to farmers' awareness and understanding of the technologies on offer.

The factors that make households vulnerable and livelihoods difficult or risk prone may be barriers to technology adoption, especially where the technology requires some initial investment or level of resources. In this study seasonality, for example, was seen to impose constraints on labour availability particularly at the time of year when labour was needed to plant forages. Additionally, household responses to vulnerability in terms of their coping and adaptive strategies impact on their resource use decisions

(such as the sale of livestock) and ultimately affect their ability to take advantage of opportunities. Finally, risk is an important factor underlying household decisions in terms of both their existing livelihood situation and the perceived likely impacts of adopting the new technology or opportunity.

In addition to these factors that are explicitly included in the livelihoods framework, the research drew attention to a number of other factors that are also significant in agricultural decisions. In the case of technology adoption, the characteristics of the technology itself in relation to farmers' livelihood situations is important, particularly in terms of its ability to meet a recognised need, and the farmer's ability to invest the necessary resources. Farmers' awareness of the technology or opportunity was also found to be crucial. This relates not only to their awareness that the opportunity is available, but also to their understanding of its costs and benefits and how to use it. Misunderstandings and mistrust regarding the technology or its source inhibits their wide adoption, resulting for example in farmers wanting to wait for others to try it first. Most of these issues can be addressed through the extension process.

Perhaps the most significant outcome of this research was in demonstrating the importance of farmers' perceptions in local level agricultural change and in technology adoption in particular. The way farmers see each aspect of their livelihood (as discussed above) and their situation as a whole is crucial in determining their priorities and the kinds of changes they are likely to make. Their problems, goals and perceived opportunities and constraints are all part of the complex decision-making process they are constantly engaged in. Also important is their perceptions of the technology and how well it fits with their livelihood. Farmers are unlikely to be interested if they do not see the technology as necessary or beneficial to their situation (that is, if they do not have the incentive to adopt); likewise if they do not see it as possible (that is, if they do not think they have the capacity to adopt). All of these points confirm that livelihoods are indeed important and influence household agricultural decisions in many ways.

The second broad objective was partly methodological in that it concerned the actual application of a livelihoods approach to questions of agricultural change, in order to assess its usefulness and identify practical issues related to its application to such issues. The Lao study found the livelihoods approach to provide a cohesive framework for the identification of relevant issues in household agricultural decisions. As Adato and Meinzen-Dick (2002: 11) have pointed out, it allows an appreciation of the 'big picture', while drawing attention to less obvious and easily overlooked issues, and to

the complex interrelationships between the various factors involved in people's livelihoods. It allows the uncovering of indirect linkages and impacts that other approaches may be less able to identify. Another strength of the approach is its appreciation of diversity - rather than simply looking to make generalisations, it recognises that differences are important. This is particularly pertinent for understanding the differential adoption of technology. Finally, the livelihoods approach puts people at the centre of the analysis, recognising that changes take place within the context of their livelihoods and thus focusing attention on their situations rather than on the goals of outsiders.

A few years ago the team at DFID invited readers' reflection and contribution to the sustainable livelihoods approach (DFID, 1999). This thesis is in part a response to that invitation. In applying the livelihoods framework to the study of household-level agricultural change, a number of issues became apparent. These are not necessarily criticisms of the framework, rather suggestions as to how it might be modified and applied in practice to this type of question. As noted in the above discussion, farmers' perceptions are critically important to their agricultural decisions. However, existing livelihoods frameworks do not draw attention to this factor. As such, it is suggested that this be explicitly recognised in the framework through the addition of a separate component (broadly entitled 'perceptions' in Figure 9.1). This category includes farmers' perceptions of their livelihood situation, the opportunities available generally and, where responses to a specific opportunity is under investigation, farmers' perceptions of the technology or activity concerned. It may also include their attitudes towards change in general. For studies of technology adoption, it is also argued that the technology itself be included as a separate component in the framework. This is not an entirely new proposition as it was included in the framework used by Adato and Meinzen-Dick (2002) in their study on the impacts of agricultural research. This is important because it allows the analysis of how the technology concerned relates to other areas of livelihoods as represented in the framework. It is argued that the explicit inclusion of these two components makes the livelihoods framework a particularly useful heuristic device for exploring issues of agricultural change.

Finally, the research has identified some practical issues related to the application of a livelihoods approach to an understanding of local change. The framework itself makes an excellent guide as to the sorts of issues to be covered, but should not be seen as limiting or restricting the inquiry to those components it explicitly identifies. The focus should be on uncovering the pertinent issues at the local level - finding out from the

people concerned what they see as relevant and important to their livelihoods. After all, they are the ones making the decisions, so their perceptions and priorities should be at the centre of the analysis. In this way, livelihoods research may draw attention to issues not currently included in the livelihoods framework. Although these factors may initially appear to be 'non-livelihoods' factors, further analysis and reflection may lead to their incorporation, either as part of the existing framework, or indeed as additional and vital components. As Ashley and Carney (1999: 2) point out, the framework itself is less important than the *principles* of the livelihoods approach.

Shifting cultivation in many parts of the Lao PDR has already undergone dramatic changes, due to the restriction and allocation of agricultural land able to be used for this purpose and, in some areas, the effects of population increase. In Xieng Ngeun District, many shifting cultivation systems have gone from medium- to long-fallow rotational systems, to short-rotation systems with only a two to four year fallow. The future of these farming systems in Xieng Ngeun remains to be seen. What is apparent is that there is increasing pressure on land resources and, consequently, declining productivity. Farmers must work harder for the same return, as Boserup (1965: 30) suggested (although the causal mechanism is not necessarily population growth). However, labour is limited and commercial inputs such as fertiliser are largely unavailable, making opportunities for further intensification of upland rice production limited. Thus farmers are increasingly employing strategies of innovation, intensification and diversification, by incorporating new crops and raising livestock, so that rice can be purchased. In this way, shifting cultivation can be seen to be both flexible and diverse, as it adapts to the changing needs of society.

As this thesis has shown, the types of intensification or diversification strategies pursued differ according to households' situations - they have different objectives and capabilities, and thus assess new opportunities in different ways. Some are more able to adapt their farming systems and take advantage of new opportunities, thus strengthening their livelihood position and increasing their security and sustainability. Others, however, have fewer choices and are less able to overcome the various obstacles and constraints to innovation. If development is to benefit these farmers (who are often the poorest), it must be built on an understanding of their situation and of the constraints they face, it must seek to understand their points of view, and it must be consistent with their priorities. The livelihoods approach provides a practical way of directing attention to these issues.

Appendix

Guiding Questions for Household Interviews

A. All households

1. Possible introductory questions

- Have you always lived in this village?
- What were things like when you were a child?
 - (How about your household's livelihood at that time?)
 - Did you help your parents on the farm?
 - What has changed since then?
- Development projects in the village -- have any helped your household?

2. Household details (Human capital)

- Who lives in the household?
- How many work full-time on the farm? Part-time?
- Do you participate in any kind of labour exchange?
- Membership of social groups/networks, extended family in village (look for sources of help and also obligations to others)

3. Livelihood activities

- **farm** (hai, suan, livestock)
- **non-farm** (NTFPs, labour etc)

(ALL activities including those for HH consumption and sale)

4. What are the HH's main **livelihood assets**? (Natural capital)

- any not already covered above, e.g. land area, location, ownership, amount of different crops, livestock numbers, forest access etc.

Cover 3 & 4 with aid of map/diagram – cutout pics and large paper as follows:

To start off: What does your household spend most time on? (Probably hai?)

- Hai
- Where are your hai fields? How far from the house? How many?
 - What is on each plot right now? (Include fallow plots – anything beneficial to the household on them, planted or natural?)
 - Try to elicit ALL crops grown on the hai field throughout the year.

Possible other questions to elicit other crops and land used:

- What else do you grow for consumption?
- What do you grow for sale?
- Do you have any land (for agriculture) near the house?
- Do you have any other plots of land?>
- Do you grow anything else, including crops, fruit trees, teak, mulberry...?
- What livestock do you have, and where do you keep them?

Then ask about each – how much (area), land ownership, uses, numbers, time spent working on major activities, how much can sell etc?

5. What are the sources of cash **income**? (Financial capital)
Regular and emergency sources of cash, remittances.
6. What are the main items of **expenditure**?
Regular, emergency, stress periods.
7. Does the HH have access to **credit** from family, others in village, moneylenders, formal lending institutions?
Forms of credit e.g. cash, rice, seeds from traders/companies etc.
8. Does the HH have any **savings**?
(cash or resources that can be drawn upon for cash in the future, to build wealth)
e.g. livestock, teak other trees of long term crops.
9. How do livelihood assets, strategies and outcomes change during the year?
Seasonal Calendar ?– stress periods and coping strategies.
10. Are there any **problems** in the farming system?
In the household livelihood system as a whole?
What are they? (Rank/weight if possible)
Causes of problems, possible solutions.
11. **HH livelihood goals**
What are the goals for your family in the future? (maybe next 10 years)
What would you do, if you could do anything? (Ideally)
What do you plan to do in the near future? (Next year or two)

(do you have any plans to do anything different to now?)

12. How have HH livelihoods changed over time?

Last 5-10 years - reasons, trends

13. What are the main factors influencing current livelihood situation?

What factors are causing change in the HH livelihood?

- push factors – what is forcing change to happen?

- pull factors – what is encouraging/helping change to happen?

(e.g. new crops, markets, other opportunities, govt and other devt projects)

What is holding back change or making it difficult?

B. Extra questions for non-adopters

1. What opportunities are available to you to improve your farm/livelihood?
(What options are not available too? E.g. requiring investment/risk - What would you like to do but cannot?)
2. Which of these options do you prefer? Why?
3. Have you heard of the forage crops offered by the FLSP project? What are these options?
4. Have you attended meetings regarding this technology? Or heard from other farmers? What have you seen/heard? Do you feel clear about what it is, how to grow it, what it offers?
5. What changes to your farming systems and livelihoods would you expect from adoption of forages? (immediate & secondary, i.e. benefits and impacts). Are you aware of any impacts other farmers are getting?
6. Do you think it can address the problems identified earlier, if any? Or help in other ways?
7. What resources do you need before you can plant forages? What investments are necessary? Ongoing inputs? Trade-offs? Do you think it would be worth the investment/risk? Would it save labour or use more than now?
8. What is stopping you from planting?
9. Under what circumstances would adoption be easier/more worthwhile? Internal and external constraints.
10. Is livestock risky?

C. Questions for Stoppers

1. When did you first hear about forages? How? What?
2. When did you decide to plant forages? Why?
3. What was your expectation? Inputs (land, labour, costs etc) Outputs (for livestock, labour)
4. Please explain your first planting of forages. What, where, how much, when.
5. Any subsequent plantings? New crop, new area, expansion of first area?
6. What were the results? Did they meet your expectations?
7. Have you seen impacts other farmers are getting?
8. When did you decide to stop planting forages?
9. Were there changes in your farm/livelihood during this time? (from time started to time stopped)
10. Any other changes in circumstances?
11. What was the #1 reason you stopped? #2? Etc.
12. Do you plan to plant forages in the future?
13. What plans do you have for your farm?
14. For your livelihood (including any non-farm activities)?

Bibliography

- Adams, W. M. (1988) Irrigation and innovation: small farmers in the Sokoto Valley, Nigeria. In Hirst, J., Overton, J., Allen, B. & Byron, Y. (Eds.) *Small-Scale Agriculture*. Canberra, Commonwealth Foundation, Commonwealth Geographical Bureau and Department of Human Geography, pp.1-10.
- Adato, M. & Meinzen-Dick, R. (2002) Assessing the Impact of Agricultural Research on Poverty using the Sustainable Livelihoods Framework. Washington, D.C., IFPRI.
- Adesina, A. A. & Zinnah, M. M. (1993) Technology characteristics, farmers' perceptions and adoption decisions: A Tobit model application in Sierra Leone. *Agricultural Economics*, 9: 297-311.
- Amanor, K., Wellard, K., de Boef, W. & Bebbington, A. (1993) Introduction. In de Boef, W., Wellard, K., de Boef, W. & Bebbington, A. (Eds.) *Cultivating Knowledge: Genetic diversity, farmer experimentation and crop research*. London, Intermediate Technology Publications, Ltd. pp. 1-16.
- Angelsen, A. (1995) Shifting Cultivation and "Deforestation": A Study from Indonesia. *World Development*, 23(10): 1713-1729.
- Arce, A. (2003) Value contestations in development interventions: Community development and sustainable livelihoods approaches. *Community Development Journal*, 38(3): 199-212.
- Ashley, C. & Carney, D. (1999) *Sustainable Livelihoods: Lessons from early experience*. London, Department for International Development.
- Asian Development Bank (ADB) (2001) Participatory Poverty Assessment: Lao People's Democratic Republic. Manila, ADB.
- Babbie, E. (2001) *The Practice of Social Research*. Belmont, CA, Wadsworth/Thomson Learning.
- Baumgartner, R. & Hogger, R. (Eds.) (2004) *In Search of Sustainable Livelihood Systems: Managing Resources and Change*. New Delhi; Thousand Oaks; London, Sage Publications.
- Baumgartner, R. (2004) Rural Livelihoods in Transition: Origins and Objectives of the Rural Livelihood Research Project. In Baumgartner, R. & Hogger, R. (Eds.) *In Search of Sustainable Livelihood Systems: Managing Resources and Change*. New Delhi; Thousand Oaks; London, Sage Publications, pp. 21-33.
- Bebbington, A. (1999) Capitals and Capabilities: A Framework for Analyzing Peasant Viability, Rural Livelihoods and Poverty. *World Development*, 27(12): 2021-2044.
- Birch-Thomsen, T., Frederiksen, P. & Sano, H.-O. (2001) A Livelihood Perspective on Natural Resource Management and Environmental Change in Semi-arid Tanzania. *Economic Geography*, 77(1): 41-67.
- Boserup, E. (1965) *The conditions of agricultural growth: The economics of agrarian change under population pressure*. London, Earthscan Publications Limited.
- Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) (2005) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute.

- Bourdet, Y. (2000) *The Economics of Transition in Laos: From Socialism to ASEAN integration*. Cheltenham, Edward Elgar Publishing Ltd.
- Brady, N. C. (1996) Alternatives to slash-and-burn: a global imperative. *Agriculture, Ecosystems and Environment*, 58: 3-11.
- Brookfield, H. & Padoch, C. (1994) Appreciating Agrodiversity: A Look at the Dynamism and Diversity of Indigenous Farming Practices. *Environment*, 36(5): 8-45.
- Brookfield, H. (1972) Intensification and Disintensification in Pacific Agriculture: a theoretical approach. *Pacific Viewpoint*, 13(1): 30-48.
- Brookfield, H. (1984) Intensification Revisited. *Pacific Viewpoint*, 25(1): 15-44.
- Brookfield, H. (2001) Intensification, and alternative approaches to agricultural change. *Asia Pacific Viewpoint*, 42(2/3): 181-192.
- Burgers, P., Ketterings, Q. M. & Garrity, D. P. (2005) Fallow management strategies and issues in Southeast Asia. *Agriculture, Ecosystems and Environment*, 110: 1-13.
- Bury, J. (2004) Livelihoods in transition: transnational gold mining operations and local change in Cajamarca, Peru. *The Geographical Journal*, 170(1): 78-91.
- Cabungcal-Cabiles, M. & Penunia, M. E. A. (Eds.) (2004) *Shaping the Asian Peasant Agenda: Solidarity Building Towards Sustainable Rural Development in Asian Rural Communities*, Quezon City, Asian Partnership for the Development of Human Resources in Rural Asia (AsiaDHRRA) in partnership with Asian Farmers' Association for Sustainable Rural Development.
- Cahn, M. (2002) Sustainable Livelihoods Approach: Concept and Practice. *Contesting Development: Pathways to Better Practice: Proceedings of the Third Biennial Conference of the Aotearoa/New Zealand International Development Studies Network (DevNet)*. Palmerston North, Institute of Development Studies, Massey University.
- Cairns, M. & Garrity, D. P. (1999) Improving shifting cultivation in Southeast Asia by building on indigenous fallow management strategies. *Agroforestry Systems*, 47: 37-48.
- Capistrano, A. D. & Marten, G. G. (1986) Agriculture in Southeast Asia. In Marten, G. G. (Ed.) *Traditional Agriculture in Southeast Asia*. Boulder, Westview Press, Inc.
- Carswell, G. (1997) *Agricultural Intensification and Rural Sustainable Livelihoods: A 'Think Piece'*, Brighton, Institute of Development Studies.
- Caviglia-Harris, J. L. (2003) Sustainable Agricultural Practices in Rondônia, Brazil: Do Local Farmer Organizations Affect Adoption Rates? *Economic Development and Cultural Change*, 52(1).
- Central Intelligence Agency (CIA) (2005) *The World Factbook*. <http://www.cia.gov/cia/publications/factbook/> (retrieved 5 January 2006)
- Chambers, R. & Conway, G. R. (1992) Sustainable Rural Livelihoods: Practical Concepts for the 21st Century. *IDS Discussion Paper 296*. Brighton, Institute of Development Studies.
- Chambers, R. (1983) *Rural Development, Putting the Last First*, Essex, Longman Scientific and Technical.
- Chambers, R. (1987) *Sustainable Rural Livelihoods: A Strategy for People, Environment and Development. Commissioned Study 8*. Brighton, Institute of Development Studies.

- Chambers, R. (1997) *Whose Reality Counts? Putting the first last*. London, Intermediate Technology Publications.
- Chambers, R., Pacey, A. & Thrupp, L. A. (1989) *Farmer First: Farmer innovation and agricultural research*. London, Intermediate Technology Publications.
- Chanphengxay, M., Siphandouang, P., Phounsavath, V., Thepphavong, B., et al. (2005) On-Farm Testing of Alternative Farming Systems Technologies in Selected Villages in Luangprabang and Oudomxay: Off-Season Tomatoes and Frog Culture. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 249-258.
- Chapman, E. C., Bouahom, B. & Hansen, P. K. (Eds.) (1998) *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock: Proceedings of an International Workshop held in Vientiane, Laos 18-23 May, 1997*, Canberra, Australian Centre for International Agricultural Research.
- Chayanov, A. V. (1966) *The Theory of Peasant Economy*, Illinois, The American Economic Association.
- Chazee, L. (1993) Shifting cultivation practices in Laos: present systems and their future. In Van Gansberghe, D. & Pals, R. (Eds.) *Shifting Cultivation Systems and Rural Development in the Lao PDR: Report of the Nabong Technical Meeting, Nabong Agriculture College, Lao People's Democratic Republic, July 14-16, 1993*. LAO/92/017. Vientiane, United Nations Development Programme, United Nations Department for Development Support and Management Services, and Ministry of Agriculture and Forestry, pp. 66-97.
- Christanty, L. (1986) Shifting Cultivation and Tropical Soils: Patterns, Problems and Possible Improvements. In Marten, G. G. (Ed.) *Traditional Agriculture in Southeast Asia*. Boulder, Westview Press, Inc., pp. 226-240.
- Conklin, H. C. (1957) *Hanunoo Agriculture: A Report on an Integral System of Shifting Cultivation in the Philippines*, Rome, Food and Agriculture Organization.
- Connell, J., Millar, J., Photakoun, V. & Pathammavong, O. (2005) Strategies for Scaling Up: Technology Innovation and Agro-enterprise Development. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 361-374.
- Cramb, R. A. (2000) Processes Influencing the Successful Adoption of New Technologies by Smallholders. In Stur, W., Horne, P., Hacker, J. B. & Kerridge, P. C. (Eds.) *Working with Farmers: The Key to Adoption of Forage Technologies. Proceedings of an International Workshop held in Cagayan de Oro City, Mindanao, Philippines from 12-15 October 1999*. Canberra, Australian Centre for International Agricultural Research.
- Cramb, R. A. (2005) Farmers' strategies for managing acid upland soils in Southeast Asia: an evolutionary perspective. *Agriculture, Ecosystems and Environment*, 106: 69-87.
- Cramb, R. A., Purcell, T. & Ho, T. C. S. (2004) Participatory assessment of rural livelihoods in the Central Highlands of Vietnam. *Agricultural Systems*, 81: 255-272.

- Davies, S. (1996) *Adaptable Livelihoods: Coping with Food Insecurity in the Malian Sahel*. London, MacMillan Press.
- De Haan, L. & Zoomers, A. (2003) Development Geography at the Crossroads of Livelihood and Globalisation. *Tijdschrift voor Economische en Sociale Geografie*, 94(3): 350-362.
- De Haan, L. & Zoomers, A. (2005) Exploring the Frontier of Livelihoods Research. *Development and Change*, 36(1): 27-47.
- de Rouw, A., Kadsachac, K. & Gay, I. (2003) Four Farming Systems: a comparative test for erosion, weeds and labour input in Luang Prabang region. *Juth Pakai*, December 2003.
- de Rouw, A., Soullilad, B., Phanthavong, K. & Dupin, B. (2005) The Adaptation of Upland Rice Cropping to Ever-Shorter Fallow Periods and its Limit. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 139-147.
- Dercon, S. & Krishnan, P. (1996) Income Portfolios in Rural Ethiopia and Tanzania: Choices and Constraints. *Journal of Development Studies*, 32(6): 850-875.
- DFID (Department for International Development) (1999) *Sustainable Livelihoods Guidance Sheets* http://www.livelihoods.org/info/info_guidancesheets.html (retrieved 29 January 2005)
- Dorward, A., Poole, N., Morrison, J., Kydd, J., et al. (2003) Markets, Institutions and Technology: Missing Links in Livelihoods Analysis. *Development Policy Review*, 21(3): 319-332.
- Ducourtieux, O. (2005) Shifting Cultivation and Poverty Eradication: A Complex Issue. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, NAFRI.
- Ducourtieux, O., Laffort, J.-R. & Sacklokham, S. (2005) Land Policy and Farming Practices in Laos. *Development and Change*, 36(3): 499-526.
- Ellis, F. & Freeman, H. A. (2005) *Rural Livelihoods and Poverty Reduction Policies*. Oxon, Routledge.
- Ellis, F. (1993) *Peasant Economics: Farm households and agrarian development*. Cambridge, Cambridge University Press.
- Ellis, F. (2000) *Rural Livelihoods and Diversity in Developing Countries*. Oxford; New York, Oxford University Press.
- Elson, R. E. (1997) *The End of the Peasantry in Southeast Asia: A Social and Economic History of Peasant Livelihood, 1800-1990s*. London, Macmillan.
- Evans, G. (1990) *Lao Peasants Under Socialism*. New Haven and London, Yale University Press.
- Evans, N., Morris, C. & Winter, M. (2002) Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy. *Progress in Human Geography*, 26(3): 313-332.

- Evenson, J. P. (1993a) Approaches to slash-and-burn agriculture limitation: A review. In Van Gansberghe, D. & Pals, R. (Eds.) *Shifting Cultivation Systems and Rural Development in the Lao PDR: Report of the Nabong Technical Meeting, Nabong Agriculture College, Lao People's Democratic Republic, July 14-16, 1993. LAO/92/017*. Vientiane, United Nations Development Programme, United Nations Department for Development Support and Management Services, and Ministry of Agriculture and Forestry, pp. 33-65.
- Evenson, J. P. (1993b) Slash-and-burn agriculture: the continuing dilemma. In Van Gansberghe, D. & Pals, R. (Eds.) *Shifting Cultivation Systems and Rural Development in the Lao PDR: Report of the Nabong Technical Meeting, Nabong Agriculture College, Lao People's Democratic Republic, July 14-16, 1993. LAO/92/017*. Vientiane, United Nations Development Programme, United Nations Department for Development Support and Management Services, and Ministry of Agriculture and Forestry, pp. 22-32.
- Fahrney, K., Maniphone, S. & Boonnaphol, O. (1998) Livestock in Upland Rice Systems in Northern Laos. In Chapman, E. C., Bouahom, B. & Hansen, P. K. (Eds.) *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*. Canberra, Australian Centre for International Agricultural Research, pp. 150-155.
- Food and Agriculture Organisation (FAO) (1957) Shifting Cultivation: An appeal by FAO to governments, research centers, associations and private persons who are in a position to help. *Unasylva*, 11(1): 9-11.
- Foppes, J. & Ketphanh, S. (2005) Non-Timber Forest Products for Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of the Lao PDR. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 181-194.
- Freeman, H. A., Ellis, F. & Allison, E. (2004) Livelihoods and Rural Poverty Reduction in Kenya. *Development Policy Review*, 22(2): 147-171.
- Freeman, J. (2001) Future Directions for Shifting Cultivation. In IFAD, IDRC, CIIFAD, ICRAF and IIRR (Ed.) *Shifting Cultivation: Towards Sustainability and Resource Conservation in Asia*. Resource book produced through a participatory writeshop organized by International Fund for Agricultural Development, International Development Resource Centre, Cornell International Institute for Food, Agriculture and Development, International Centre for Research in Agroforestry and International Institute for Rural Reconstruction. Cavite, Philippines, IIRR.
- Fujisaka, S. & Escobar, G. (1997) Towards a practical classification of slash-and-burn agricultural systems. *Rural Development Forestry Network Paper*, 21c.
- Fujisaka, S., Sajise, P. E. & del Castillo, R. A. (Eds.) (1986) *Man, Agriculture and the Tropical Forest: Change and Development in the Philippine Uplands*. Bangkok, Winrock International Institute for Agricultural Development.
- Geertz, C. (1963) *Agricultural Involution: The processes of ecological change in Indonesia*. Berkely, CA., The University of California Press.
- Government of Lao PDR (GOL) (2003) National Poverty Eradication Programme (NPEP). Vientiane, GOL.
- Greenland, D. J. (1974) Evolution and development of different types of shifting cultivation. *Shifting cultivation and soil conservation in Africa: FAO Soils Bulletin*, 24.
- Gunn, G. C. (1990) *Rebellion in Laos: Peasant and Politics in a Colonial Backwater*. Boulder and Oxford, Westview Press.

- Halpern, J. M. (1964) *Economy and Society of Laos: A Brief Survey*. New Haven, Southeast Asia Studies, Yale University.
- Hansen, P. K. & Sodorak, H. (1996) *Agroforestry Research for Development in Shifting Cultivation Areas of Laos*. Lao-Swedish Forestry Programme, Luang Prabang, Lao PDR.
- Hansen, P. K. (1997) *Animal husbandry in shifting cultivation societies in Northern Laos*. Technical Report No. 10 for the Shifting Cultivation Research Sub-programme, Lao Swedish Forestry Programme, Luang Prabang.
- Hansen, P. K. (1998) Shifting Cultivation Development in Northern Laos. In Chapman, E. C., Bouahom, B. & Hansen, P. K. (Eds.) *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*. Canberra, Australian Centre for International Agricultural Research, pp. 34-42.
- Hansen, P. K., Sodorak, H. & Savathvong, S. (1997) *Teak production by shifting cultivators in Northern Lao P.D.R.* Technical Report No. 9 for the Shifting Cultivation Research Sub-programme, Lao Swedish Forestry Programme, Luang Prabang.
- Harwood, R. R. (1996) Development pathways toward sustainable systems following slash-and-burn. *Agriculture, Ecosystems and Environment*, 58: 75-86.
- Helmore, K. & Singh, N. (2001) *Sustainable Livelihoods: Building on the Wealth of the Poor*. Bloomfield, Kumarian Press, Inc.
- Henley, D. (2005) Agrarian change and diversity in the light of Brookfield, Boserup and Malthus: Historical illustrations from Sulawesi, Indonesia. *Asia Pacific Viewpoint*, 46(2): 153-172.
- Herath, G. & Jayasuriya, S. (1996) Adoption of HYV Technology in Asian Countries: The Role of Concessionary Credit Revisited. *Asian Survey*, 36(12): 1184-1200.
- Hinshelwood, E. (2003) Making friends with the sustainable livelihoods framework. *Community Development Journal*, 38(3): 243-254.
- Hogger, R. (2004) Understanding Livelihood Systems as Complex Wholes. In Baumgartner, R. & Hogger, R. (Eds.) *In Search of Sustainable Livelihood Systems: Managing Resources and Change*. New Delhi; Thousand Oaks; London, Sage Publications, pp. 35-53.
- Horne, P. (1998) Securing the Livelihoods of Farmers in Upland Areas of Lao PDR: The Role of Livestock and Opportunities for Forage Development. In Chapman, E. C., Bouahom, B. & Hansen, P. K. (Eds.) *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*. Canberra, Australian Centre for International Agricultural Research, pp. 156-162.
- House, P. (1997) Forest Farmers: A Case Study of Traditional Shifting Cultivation in Honduras. *Rural Development Forestry Network Paper*, 21a.
- Hussein, K. & Nelson, J. (1998) *Sustainable Livelihoods and Livelihood Diversification*. Brighton, Institute of Development Studies.
- IFAD, IDRC, CIIFAD, ICRAF and IIRR (Ed.) (2001) *Shifting Cultivation: Towards Sustainability and Resource Conservation in Asia*. Resource book produced through a participatory writeshop organized by International Fund for Agricultural Development, International Development Resource Centre, Cornell International Institute for Food, Agriculture and Development, International Centre for Research in Agroforestry and International Institute for Rural Reconstruction., Cavite, Philippines, IIRR.
- Johnson, D. G. & Lee, R. D. (Eds.) (1987) *Population Growth and Economic Development: Issues and Evidence*, Madison, The University of Wisconsin Press.

- Jones, S. (2002) A Framework for Understanding On-farm Environmental Degradation and Constraints to the Adoption of Soil Conservation Measures: Case Studies from Highland Tanzania and Thailand. *World Development*, 30(9): 1607-1620.
- Joy, L. J. (1969) Diagnosis, Prediction, and Policy Formulation. In Wharton, C. R., Jnr (Ed.) *Subsistence Agriculture and Economic Development*. Chicago, Aldine Publishing Company, pp. 376-381.
- Keen, F. B. (1983) Land Use. In McKinnon, J. & Bhruksasri, W. (Eds.) *Highlanders of Thailand*. Kuala Lumpur, Oxford University Press, pp. 293-306.
- Kerblay, B. (1971) Chayanov and the Theory of Peasantry as a Specific Type of Economy. In Shanin, T. (Ed.) *Peasants and Peasant Societies: Selected Readings*. Middlesex, Penguin Books, pp. 150-160.
- KRI International Corp. (2001) Master Plan Study on Integrated Agricultural Development in Lao People's Democratic Republic: Progress Report (2), Volume 1. Japan International Cooperation Agency (JICA) and Ministry of Agriculture and Forestry (MAF).
- Kumar, S. (2002) *Methods for Community Participation: A Complete Guide for Practitioners*. London, Intermediate Technology Development Group.
- Kunstadter, P. (1978) 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: Economic Development and Marginal Agriculture in Northern Thailand*. Honolulu, The University Press of Hawaii (for the East-West Center), pp. 74-133.
- Kunstadter, P., Chapman, E. C. & Sabhasri, S. (Eds.) (1978) *Farmers in the Forest: Economic Development and Marginal Agriculture in Northern Thailand*. Honolulu, The University Press of Hawaii (for the East-West Center).
- Lexayavong, K. (2004) Lao PDR Country Report. In Cabungcal-Cabiles, M. & Penunia, M. E. A. (Eds.) *Shaping the Asian Peasant Agenda: Solidarity Building Towards Sustainable Rural Development in Asian Rural Communities*. Quezon City, Asian Partnership for the Development of Human Resources in Rural Asia (AsiaDHRRRA) in partnership with Asian Farmers' Association for Sustainable Rural Development.
- Lian, F. (1988) Swidden to sawah in Sarawak: government versus farmers' expectations. In Hirst, J., Overton, J., Allen, B. & Byron, Y. (Eds.) *Small-Scale Agriculture*. Canberra, Commonwealth Foundation, Commonwealth Geographical Bureau and Department of Human Geography, pp. 47-56.
- Linquist, B., Saito, K., Keoboulapha, B., Phengchanh, S., et al. (2005) Improving Rice Based Upland Cropping Systems for the Lao PDR. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 299-314.
- Lipton, M. (1968) The Theory of the Optimising Peasant. *Journal of Development Studies*, 43: 327-351.
- Marten, G. G. & Saltman, D. M. (1986) The Human Ecology Perspective. In Marten, G. G. (Ed.) *Traditional Agriculture in Southeast Asia*. Boulder, Westview Press, Inc., pp. 20-53.
- Marten, G. G. (Ed.) (1986b) *Traditional Agriculture in Southeast Asia*, Boulder, Westview Press, Inc.

- Martin, A. & Sherington, J. (1997) Participatory Research Methods - Implementation, Effectiveness and Institutional Context. *Agricultural Systems*, 55(2): 195-216.
- Mascarenhas, J., Shah, P., Joseph, S., Jayakaran, R., et al. (1991) Participatory Rural Appraisal: Proceedings of the February 1991 Bangalore PRA Trainers Workshop. *RRA Notes*, 13.
- McAllister, K., Gabunada Jr, F. A. & Douangsavang, L. (2001) General Agricultural Systems Diagnosis With Farmers in Four Villages in Pak Ou District, Luang Prabang. Ministry of Agriculture and Forestry Lao PDR and National Agriculture and Forestry Research Institute.
- McKinnon, J. & Bhruksasri, W. (Eds.) (1983) *Highlanders of Thailand*. Kuala Lumpur, Oxford University Press.
- McKinnon, J. & Vienne, B. (Eds.) (1989) *Hill Tribes Today: Problems in Change*. Bangkok, White Lotus Co., Ltd.
- Mertz, O. (2002) The relationship between length of fallow and crop yields in shifting cultivation: a rethinking. *Agroforestry Systems*, 55: 149-159.
- Millar, J., Photakoun, V. & Connell, J. (2005) Scaling out impacts: A study of three methods for introducing forage technologies to villages in Lao PDR. *ACIAR Working Paper No. 58*. Canberra, Australian Centre for International Agricultural Research.
- Ministry of Agriculture and Forestry, Lao PDR (MAF) (1999) *The Government's Strategic Vision for the Agricultural Sector*. MAF.
- Ministry of Agriculture and Forestry, Lao PDR (MAF) (2003) *Forestry Strategy to the Year 2020, Second Draft*. MAF
- Minnegal, M. & Dwyer, P. D. (2001) Intensification, Complexity and Evolution: Insights from the Strickland-Bosavi Region. *Asia Pacific Viewpoint*, 42(2/3): 269-286.
- Momsen, J. H. (1988) The Dynamics of Small-Scale Agriculture. In Hirst, J., Overton, J., Allen, B. & Byron, Y. (Eds.) *Small-Scale Agriculture*. Canberra, Commonwealth Foundation, Commonwealth Geographical Bureau and Department of Human Geography, pp. 1-10.
- Nazarea-Sandoval, V. D. (1995) Indigenous Decision-making in Agriculture - A reflection of gender and socioeconomic status in the Philippines. In Warren, M. D., Slikkerveer, L. J. & Brokensha, D. (Eds.) *The Cultural Dimension of Development: Indigenous Knowledge Systems*. London, Intermediate Technology Publications Ltd.
- Netting, R. M. (1993) *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*. Stanford, Stanford University Press.
- North, D. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge, Cambridge University Press.
- Pandey, S., Troesch, K., Douangsavang, L., Phouynyavong, K., et al. (2005) The Role of Paddy Rice in the Lao Uplands: Food Security, Farmer Livelihoods, and Economics. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 287-298.
- Pelzer, K. J. (1948) *Pioneer Settlement in the Asiatic Tropics: studies in land utilization and agricultural colonization in Southeastern Asia*. New York, American Geographical Association.

- Pender, J. (2004) Development pathways for hillsides and highlands: some lessons from Central America and East Africa. *Food Policy*, 29: 339-367.
- Peters, M., Horne, P., Schmidt, A., Holmann, F., et al. (2001) The Role of Forages in Reducing Poverty and Degradation of Natural Resources in Tropical Production Systems. *AgRen*, Network Paper No. 117.
- Phengvichith, V. (1997) *Livestock-Based Agroforestry as an Alternative to Shifting Cultivation in Lao PDR*. PhD thesis. Bangkok, Asian Institute of Technology.
- Phimphachanhvongsod, V., Horne, P., Lefroy, R. & Phengsavanh, P. (2005) Livestock Intensification: a Pathway out of Poverty in the Uplands. In Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 129-137.
- Pholsena, V. (2002) Nation/Representation: Ethnic Classification and Mapping Nationhood in Contemporary Laos. *Asian Ethnicity*, 32: 175-197.
- Pingali, P. & Binswanger, H. P. (1987) Population Density and Agricultural Intensification: A Study of the Evolution of Technologies in Tropical Agriculture. In Johnson, D. G. & Lee, R. D. (Eds.) *Population Growth and Economic Development: Issues and Evidence*. Madison, The University of Wisconsin Press, pp. 27-56.
- Pingali, P., Bigot, Y. & Binswanger, H. P. (1987) Agricultural Mechanization and the Evolution of Farming Systems in Sub-Saharan Africa. Baltimore, The Johns Hopkins University Press.
- Place, F. & Dewees, P. (1999) Policies and incentives for the adoption of improved fallows. *Agroforestry Systems*, 47: 323-343.
- Polthanee, A. & Marten, G. G. (1986) Rainfed Cropping Systems in Northeast Thailand. In Marten, G. G. (Ed.) *Traditional Agriculture in Southeast Asia*. Boulder, Westview Press, pp. 103-131.
- Popkin, S. L. (1979) *The Rational Peasant*. Berkeley and Los Angeles, University of California Press.
- Porro, R. (2005) Palms, Pastures, and Swidden Fields: The Grounded Political Ecology of Agro-Extractive/Shifting-cultivator Peasants" in Maranhão, Brazil. *Human Ecology*, 33(1): 17-52.
- Potter (2001) Agricultural Intensification in Indonesia: Outside Pressures and Indigenous Strategies. *Asia Pacific Viewpoint*, 42(2/3): 305-324.
- Potter, L. & Lee, J. (1998) Cattle in Upland Farming Systems: Overview and Case Studies from Indonesia. In Chapman, E. C., Bouahom, B. & Hansen, P. K. (Eds.) *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock: Proceedings of an International Workshop held in Vientiane, Laos 18-23 May, 1997*. Canberra, Australian Centre for International Agricultural Research, pp. 43-52.
- Pravongviengkham, P. P. (1998a) Swidden-Based Farm Economies in Northern Laos: Diversity, Constraints and Opportunities for Livestock. *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*. Canberra, Australian Centre for International Agricultural Research, pp. 89-102.

- Pravongviengkham, P. P. (1998b) The Role of Animal Husbandry and Aquaculture in Improvements of Swidden-Based Livelihood Systems in the Lao PDR. PhD thesis. Bangkok, Asian Institute of Technology.
- Pretty, J. (1995) *Regenerating Agriculture: Policies and Practice for Sustainability and Self-Reliance*. London, Earthscan Publications, Ltd.
- Raintree, J. & Soydara, V. (?2000) Human Ecology and Rural Livelihoods in Lao PDR.
- Raintree, J. (1985) Agroforestry pathways: Land tenure, shifting cultivation and sustainable agriculture. *Unasylva*, 154: 1-16.
- Raintree, J. (2000) Catalysing innovation in culturally conservative communities. *ILEIA Newsletter*. September, 2000.
- Raintree, J. (2005) How Do We Know an Upland Solution When We See One?" in Bouahom, B., Glendinning, A., Nilsson, S. & Victor, M. (Eds.) *Poverty Reduction and Shifting Cultivation Stabilisation in the Uplands of Lao PDR: Technologies, Approaches and Methods for Improving Upland Livelihoods - Proceedings of a workshop held in Luang Prabang, 27-30 January, 2004*. Vientiane, National Agriculture and Forestry Research Institute, pp. 39-61.
- Rasul, G. & Thapa, G. B. (2003) Shifting Cultivation in the Mountains of South and Southeast Asia: Regional patterns and factors influencing the change. *Land Degradation and Development*, 14: 495-508.
- Rasul, G., Thapa, G. B. & Zoebisch, M. A. (2004) Determinants of land-use changes in the Chittagong Hill Tracts of Bangladesh. *Applied Geography*, 24: 217-240.
- Reijntjes, C. (2000) Intensification of shifting cultivation. *LEISA*, 2000.
- Reijntjes, C., Haverkort, B. & Waters-Bayer, A. (1992) *Farming for the Future*, London, MacMillan.
- Rerkasem, K. & Rerkasem, B. (1994) *Shifting Cultivation in Thailand: its current situation and dynamics in the context of highland development*. Chiang Mai, Faculty of Agriculture, Chiang Mai University.
- Rerkasem, K. (1998) Shifting Cultivation in Thailand: Land Use Changes in the Context of National Development. *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*. Canberra, Australian Centre for International Agricultural Research, pp. 54-63.
- Rigg, J. (2005b) Poverty and livelihoods after full-time farming: A South-East Asian view. *Asia Pacific Viewpoint*, 46(2): 173-184.
- Roder, W. (1997) Slash-and-burn rice systems in transition: Challenges for agricultural development in the hills of northern Laos. *Mountain Research and Development*, 17(1): 1-10.
- Roder, W. (2001) *Slash-and-Burn Rice Systems in the Hills of Northern Lao PDR: Description, Challenges and Opportunities*, Los Banos (Philippines), International Rice Research Institute.
- Roder, W. (2004) Are Mountain Farmers Slow to Adopt New Technologies? Factors influencing acceptance in Bhutan. *Mountain Research and Development*, 24(2): 114-118.
- Roder, W., Keoboulapha, B., Vannalath, K. & Phouaravanh, B. (1996) Glutinous Rice and Its Importance for Hill Farmers in Laos. *Economic Botany*, 50(4): 401-408.

- Roder, W., Leacock, W., Vienvonsith, N., Phantanousy, B., et al. (2001) Ethnic Groups and Land Use in Northern Lao PDR. In IFAD, I., CIIFAD, ICRAF and IIRR (Eds.) *Shifting Cultivation: Towards Sustainability and Resource Conservation in Asia*. pp. 124-127.
- Roder, W., Phengchanh, S. & Keoboulapha, B. (1997) Weeds in slash-and-burn rice fields in northern Laos. *Weed Research*, 37: 111-119.
- Roder, W., Phouaravanh, B., Keoboulapha, B. & Maniphone, S. (1993) Upland Agriculture: Activities by the Lao-IRRI project. In Van Gansberghe, D. & Pals, R. (Eds.) *Shifting Cultivation Systems and Rural Development in the Lao PDR: Report of the Nabong Technical Meeting, Nabong Agriculture College, Lao People's Democratic Republic, July 14-16, 1993*. LAO/92/017. Vientiane, United Nations Development Programme, United Nations Department for Development Support and Management Services, and Ministry of Agriculture and Forestry, pp. 152-169.
- Rogers, E. M. (1962) *Diffusion of Innovations*. Glencoe, Illinois, Free Press.
- Rogers, E. M. (1969) Motivations, Values, and Attitudes of Subsistence Farmers: Towards a Subculture of Peasantry. In Wharton, C. R., Jnr (Ed.) *Subsistence Agriculture and Economic Development*. Chicago, Aldine Publishing Company, pp. 111-135.
- Rostow, W. W. (1956) The Take-Off Into Self-Sustained Growth. *The Economic Journal*, 66(261): 25-48.
- Ruthenberg, H. (1980) *Farming Systems in the Tropics*. Oxford, Clarendon Press.
- Sanchez, P. A. (1999) Improved fallows come of age in the tropics. *Agroforestry Systems*, 47: 3-12.
- Sandewall, M., Ohlsson, B. & Sandewall, R. (1998) *People's options on forest land use. A research study of land use dynamics and socio-economic conditions in a historical perspective in the Upper Nam Nan Water Catchment Area, Nan District, Luang Prabang Province, Lao PDR*. Working Paper No. 2. Vientiane, Swedish University of Agricultural Sciences.
- Savada, A. M. (Ed.) (1995) *Laos: a country study*. Washington, D.C., Federal Research Division, Library of Congress.
- Schultz, T. W. (1964) *Transforming Traditional Agriculture*. New Haven, Yale University Press.
- Scoones, I. (1998) *Sustainable Rural Livelihoods: A Framework for Analysis*. IDS Working Paper 72. Brighton, IDS Publications.
- Scott, J. C. (1976) *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. New Haven, Yale University Press.
- Seidenberg, C., Mertz, O. & Kias, M. B. (2003) Fallow, labour and livelihood in shifting cultivation: implications for deforestation in northern Lao PDR. *Danish Journal of Geography*, 103(2): 71-80.
- Shanin, T. (1971) *Peasants and Peasant Societies: Selected Readings*. Middlesex, Penguin Books.
- Simana, S. (1998) *Kmhmu Livelihood: Farming the forest*. Vientiane, Ministry of Information and Culture, Institute for Cultural Research.
- Simaraks, S. (1998) Roles and Limitations of Animals in the Farming Systems of South East Asia: Field Observations and Experiences. In Chapman, E. C., Bouahom, B. & Hansen, P. K. (Eds.) *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*. Canberra, Australian Centre for International Agricultural Research.

- Smelser, N. J. (1966) Modernization of Social Relations. In Weiner, M. (Ed.) *Modernization*. New York, Basic Books.
- Souvanthong, P. (1995) *Shifting Cultivation in Lao PDR: An overview of land use and policy initiatives*. London, IIED.
- Spencer, J. E. (1966) *Shifting Cultivation in Southeastern Asia*. Berkeley and Los Angeles, University of California Press.
- Srimongkol, K. & Marten, G. G. (1986) Traditional Agriculture in Northern Thailand. In Marten, G. G. (Ed.) *Traditional Agriculture in Southeast Asia*. Boulder, Westview Press, pp. 85-102.
- Stone, G. D. (2001) Theory of the square chicken: advances in agricultural intensification theory. *Asia Pacific Viewpoint*, 42(2/3): 163-180.
- Stuart-Fox, M. (1986) *Laos: Politics, Economics and Society*. London, Frances Pinter (Publishers) Limited.
- Stur, W., Horne, P., Gabunada Jr, F. A., Phengsavanh, P., et al. (2002) Forage options for smallholder crop-animal systems in Southeast Asia: working with farmers to find solutions. *Agricultural Systems*, 71: 75-98.
- Stur, W., Horne, P., Hacker, J. B. & Kerridge, P. C. (Eds.) (2000) *Working With Farmers: The Key to Adoption of Forage Technologies: Proceedings of an International Workshop held in Caayan de Oro City, Mindanao, Philippines from 12-15 October 1999*. Canberra, Australian Centre for International Agricultural Research.
- Sutthi, C. (1989) Highland Agriculture: From Better to Worse. In McKinnon, J. & Vienne, B. (Eds.) *Hill Tribes Today: Problems in Change*. Bangkok, White Lotus Co., Ltd, pp. 107-142.
- Szott, L. T., Palm, C. A. & Buresh, R. J. (1999) Ecosystem fertility and fallow function in the humid and subhumid tropics. *Agroforestry Systems*, 47: 163-196.
- Thandee, D. (1986) Socioeconomic Factors and Small-Scale Farmers in Southeast Asia. In Marten, G. G. (Ed.) *Traditional Agriculture in Southeast Asia*. Boulder, Westview Press, Inc., pp. 159-170.
- Thrupp, L. A., Hecht, S. B., Browder, J. O., et al. (1997) *The Diversity and Dynamics of Shifting Cultivation: Myths, Realities, and Policy Implications*. Washington, DC, World Resources Institute.
- Tomich, T. P., Kilby, P. & Johnston, B. F. (1995) *Transforming Agrarian Economies: Opportunities Seized, Opportunities Missed*. Ithaca and London, Cornell University Press.
- Tully, J. (1966) Towards a Sociological Theory for Extension. *Human Relations*, 19: 391-403.
- Tully, J. (1968) Farmers' Problems of Behavioural Change. *Human Relations*, 21(4): 373-382.
- United Nations Development Programme (UNDP), Lao PDR Rural Development Programme Formulation Unit (1998) *Socioeconomic Profile of Xiengkhouang Province*, Vientiane, UNDP Lao PDR.
- United Nations Development Programme (UNDP) (2001) National Human Development Report, Lao PDR 2001: Advancing Rural Development. *Human Development Report*. UNDP. (Retrieved via the world wide web 10 November 2005)

- Vandergeest, P. (2003) Land to some tillers: development-induced displacement in Laos. *International Social Science Journal*, 55(1): 47-56.
- Vantomme, P., Markkula, A. & Leslie, R. N. (2002) *Non-Wood Forest Products in 15 Countries of Tropical Asia: An Overview*. In the series: Information and Analysis for Sustainable Forest Management: Linking National and International Efforts in South and Southeast Asia. Bangkok, Food and Agriculture Organisation.
- Vosti, S. A. & Witcover, J. (1996) Slash-and-burn agriculture - household perspectives. *Agriculture, Ecosystems and Environment*, 58: 23-38.
- Watters, R. F. (1960) The Nature of Shifting Cultivation: A Review of Recent Research. *Pacific Viewpoint*, 1: 59-99.
- Watters, R. F. (1971) *Shifting Cultivation in Latin America*, Rome, Food and Agriculture Organization.
- Weiner, M. (Ed.) (1966) *Modernization*. New York, Basic Books.
- Weitz, R. (1971) *From Peasant to Farmer: A Revolutionary Strategy for Development*. New York, Columbia University Press.
- Wharton, C. R., Jr. (Ed.) (1969) *Subsistence Agriculture and Economic Development*. Chicago, Aldine Publishing Company.
- Wolmer, W. (1997) *Crop-Livestock Integration: The Dynamics of Intensification in contrasting Agroecological Zones: A Review*. *IDS Working Paper 63*. Brighton, Institute of Development Studies.
- World Bank (2005a) *World Development Indicators Database*. August 2005. Accessed on the World Wide Web (10 November 2005) <http://devdata.worldbank.org/external/CPProfile.asp?CCODE=LAO&PTYPE=CP>
- World Bank (2005b) *Lao PDR at a glance*. Retrieved from the World Wide Web (10 November 2005) http://devdata.worldbank.org/AAG/lao_aag.pdf
- World Commission on Environment and Development (WCED) (1987) *Our Common Future*. Oxford, Oxford University Press.
- Zoomers, A. (1999) Linking Livelihood Strategies to Development: Experiences from the Bolivian Andes. Amsterdam, Royal Tropical Institute/Center for Latin American Research.

Websites:

- Centre for International Tropical Agriculture (CIAT)
<http://www.ciat.cgiar.org/asia/forages.htm>
- University of Texas Perry-Casteneda Library Map Collection
http://www.lib.utexas.edu/maps/cia05/laos_sm05.gif (retrieved 21 December 2005)
- United Nations Conference on Trade and Development (UNCTAD)
<http://www.unctad.org/Templates/WebFlyer.asp?intlItemID=2161&lang=1>
(accessed 10 November 2005)
- United Nations Development Programme (UNDP)
<http://www.undp.org/statistics/data/indicators.cfm?x=1&y=1&z=1>
(accessed 10 November 2005)