Agricultural change in Lao PDR: Pragmatism in the face of adversity

by

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Dedication

DEDICATED TO THE MEMORY OF MY MOTHER

NOLA MAY ALEXANDER (nee LUFF)

WHO DEPARTED THIS LIFE

4th DECEMBER, 2004.

Disclaimer

Opinions expressed in this dissertation do not necessarily reflect the positions of any Lao Government official. Nor do they necessarily reflect those of the Government of Australia or the members of the Australian Centre for International Agricultural Research.

The research has been authorised by the Lao Government Ministry of Agriculture. However, the opinions expressed herein do not necessarily reflect the position of the Ministry, and no official endorsement by the Lao government should be inferred.

The author accepts full responsibility for the contents of this document.

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Publications arising from this research

Research reports

Alexander, K., Progress report to local government officials on research project: Swidden cultivation livelihood strategies in Xieng Ngeun District, Luang Prabang Province, LAO PDR. January – March 2005.

Conference papers and proceedings

Alexander, K., Lipscombe, N. & Millar, J. (2006). 'Whispers, voices and challenges for people in the hills of Lao PDR'. In *Voice, Identity & Reflexivity*, proceedings of the second Qualitative Research as Interpretive Practice Conference, 22-23 September, 2005 (pp. 250-254). Bathurst: Charles Sturt University

Alexander, K., Khounsy, B., Millar, J., Lipscombe, N., & Spennemann, D. H. R. (2006).Towards Sustainable Livelihoods: Project intervention in Xieng Ngeun District, Luang Prabang Province, Lao PDR. Paper presented to the *International Symposium: Towards Sustainable Livelihoods and Ecosystems in Mountainous Regions,* Chiang Mai, Thailand, March 7-9.

Alexander, K., Millar, J., Lipscombe, N., & Spennemann, D. H. R. (2006). Changes to Agricultural Production and Livelihoods in Xieng Ngeun District, Luang Prabang Province, Lao PDR. Paper presented to the *International Symposium: Towards Sustainable Livelihoods and Ecosystems in Mountainous Regions,* Chiang Mai, Thailand, March 7-9.

Alexander, K. & Khounsy, B. (2006) Agricultural Production and Marketing Systems in Xieng Ngeun District Luang Prabang Province, Lao PDR. Paper presented as a poster to the *International Symposium: Towards Sustainable Livelihoods and Ecosystems in Mountainous Regions,* Chiang Mai, Thailand, March 7-9.

Alexander, K., Spennemann, D. H. R. (2006). The legitimacy of my ethnographic gaze: Context, methodology and insights from the field, Lao PDR. Paper presented to the *2006 ACSPRI Social Science Methodology Conference,* Sydney University, Sydney, December 10-13. (peer-reviewed)

Alexander, K. & Khounsy, B. (2005). Market chain analysis and issues of agriculture production in Xieng Ngeun District, Luang Prabang. Paper presented to the *Workshop on Market Information Systems (MIS) for agriculture and forest products in Lao PDR*, Luang Prabang, July 5-6.

Alexander, K., Millar, J. & Lipscombe, N. (2004). Livestock production in the Laos landscape: A pathway out of poverty and shifting cultivation in the uplands. Paper presented to the *2004 Annual meeting of the agri-food research network Agri-food XI*, Canberra, June 9-10.

Acronyms

ACIAR	Australian Centre for International Agricultural Research
DAFEO	District Agriculture and Forestry Extension Officer
FLSP	Forages and Livestock Systems Project
IRAP	Integrated Rural Accessibility Planning
LAO PDR	Lao Peoples' Democratic Republic also known as Laos
LSUAFRP	Lao Swedish Upland Agriculture and Forestry Research Program
MAF	Ministry of Agriculture and Forestry
MCTPC	Ministry of Communication Transportation and Construction
NAFES	National Agriculture and Forestry Extension Service
NAFRI	National Agriculture and Forestry Research Institute
NGO	Non Governmental Organisation
PAFO	Provincial Agriculture and Forestry Office
SIDA	Swedish International Development Association
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation

Terminology

Throughout the thesis the term *farming system* refers to the combination of enterprises an individual uses to produce (grow, raise, gather) sufficient produce, goods, or services to enable food sufficiency and/or an income. *Changes to farming systems* are fluctuations, over time, of activities or enterprises that may lead to either an increase or decrease in productivity and benefit. For the purpose of this study, the *past* is the period of time from which a farmer was 15 years old. The *future* indicates changes anticipated in 5 years time, as greater time spans are difficult for villagers to conceptualise. Changes to farming systems may be seasonal or cumulative over several years or decades. For the purpose of this research *preferred changes to farming systems* are defined as more income, more rice, greater diversity of activities, and the use of less labour. *Poor production outcomes* are defined as less income, less rice, fewer activities, the use of more labour, and failed enterprise.

Activity refers to agricultural production including upland rice, paddy rice, crops, vegetables, livestock, fruit trees, and non timber forest products (NTFPs), off-farm income, handicrafts, and other value- adding activities. *New activities or technologies* are used as interchangeable words to prompt the Lao people to discuss aspects of agricultural production that differ from traditional practice. For the purpose of this study they include; irrigated rice, new rice varieties, introduced vegetables and fruit, varieties of fruit trees, teak, hedgerows, forages, (legume and grasses), plantation cultivation, silviculture, and livestock containment. *New technology* also includes infrastructure development and inputs such as irrigation construction and fertilisers.

Method refers to the tools used for this scientific investigation.
Methodology refers to the theoretical analysis of the methods appropriate to this field of study. This is reflected in the particular combination of approaches, data collection methods and techniques.
Approach refers to the method used or steps taken in setting about the research tasks.
Collaborative learning and development refers to finding ways to improve the effectiveness of international actors by gathering and analyzing the experience of international efforts in supporting sustainable development.
Convenience sampling refers to the selection of units from the population based on availability and/or accessibility.
Purposive sampling is a non random sampling approach, purposive in nature with a specific plan in mind, commonly used in qualitative research.

Abstract

Rural development in the uplands of Lao Peoples' Democratic Republic (Lao PDR) has presented many challenges for farmers and their communities. Lao government policy is directed at reducing the production of upland rice and providing sustainable alternative livelihoods for upland farmers. This thesis has examined current agricultural systems in Xieng Ngeun District, in Luang Prabang Province, Lao PDR and the economic and agrarian transition occurring at individual, community, and regional levels. The research investigated the effect of land and forest allocation policy and the implementation of swidden cultivation stabilisation measures by governmental and international organisations.

The enquiry was guided by four key questions that related to (1) change from swidden to other farming systems; (2) consequences of land use change; (3) integration of new activities into farming systems; and (4) the effect of the emerging market economy. A mixed method approach integrated was used that combined qualitative (dominant) and quantitative (less dominant) data collection techniques.

Rural development and agricultural production involved a dynamic interaction of farmers, families, headmen, committee members, District Agriculture and Forestry Extension Officers (DAFEO), government officials, traders, foreign consultants, and occasionally tourists. Land and forest allocation policy and shifting cultivation stabilisation require intensification of land use but there is limited support for farmers adapting to a constrained resource environment. Farmers continued to rely on swidden cultivation of upland rice although there has been a reported decrease in overall production with a slight increase in paddy rice production. Farmers anticipated growing less upland rice in the future and changing production to crops and livestock. Smallholder farmers cultivating marginal lands had few 'realistic' alternatives to the current agricultural production of upland rice. Rotational farming practice caused shortened fallows, weeds and pests, soil infertility, disease, increasing labour demands, and decreased yields. Productivity was further influenced by deforestation, rain events, and land and soil degradation. Farmers struggled to provide their basic needs of food and income and to gain adequate return to their labour investments. Farmers were affected by issues of governance, land degradation, social welfare, and access to infrastructure.

Government policies and economic factors played an important role in the uptake of new technologies and changes to farming systems. Farmers differed in their preferences for new activities and technologies, and in their preparedness to adopt. Agricultural production decisions

were modified when farmers were confident and prepared to trial recommended activities. In view of available resources, most farmers tried to balance risk through crop and livestock diversity. Farmers primarily showed an interest in the conceptually familiar, i.e., new crops, plantations, and livestock production. They were more interested in crops that gave immediate returns and had multiple purposes, were easy to plant and grew in a wide range of soils, were adapted to the local conditions, and easily sold at market. Farmers sought new opportunities to raise livestock by growing forages for cut and carry livestock feed, and livestock management techniques with vaccination and the use of livestock pens. While there was a keen interest in livestock production, disease continued to be a major deterrent to increased production. Farmers were encouraged to trial activities and/or technologies with guaranteed market prices, market stability, and/or contractual production agreements. New market opportunities and access to credit further facilitated the adoption of new technology.

Uptake of new technologies and activities promoted by the Lao government and international organisations was largely dependant on advice, support, and information from extension officers and personnel specific to projects. The extension service was expected to provide knowledge of current market systems and give appropriate and timely advice to farmers. At present there appears to be insufficient and unsubstantiated market information for staff to extend to farmers. Knowledge, skills, and training are required for district staff in the short term. Ongoing training and information on agriculture and livestock techniques and market information is required in the longer term. Provision of tailored technical interventions by the government and project organisations remain critical to the establishment of suitable agricultural alternatives. Although projects have provided a range of agricultural products to trial, most of these projects have been initiated recently and are of limited duration. The sustainability, appropriateness, and permanence of many of these options remain questionable.

The current market system is subject to a transitional economy where free market forces are constrained by governance with trading restrictions. The control of marketing and trade by the government, and by traders, impacts on market economics, free trade, and market maturity. This situation significantly limits changes to farming systems and livelihoods. Access to credit, market opportunities, market information, and market systems, as well as improved extension, are all required to facilitate agricultural change of cropping and livestock. With investment into rural livelihood systems, the preferred options of upland cash cropping and increased livestock production become more viable.

The thesis has contributed to the theory of intensification of land use; where low population densities and risk aversion are propelling diversification rather than intensification strategies. Government land use policy may be inappropriate and negatively affecting some farmers' ability to generate sustainable livelihoods now and in the future. There are numerous agricultural production changes occurring in response to governmental policy and the implementation of infrastructural and agricultural projects by NGOs. The sustainability and longevity of these changes are contestable.

Chapter 1

Introduction

1.1 Research problem

Economic development in Lao People's Democratic Republic (PDR) has been facilitated mainly by the World Bank and the Asian Development Bank using the play of market forces, encouraged by direct foreign investment (Stuart-Fox 2004). Agricultural policies initiated by the Lao government are aimed at enhancing economic development through the implementation of land tenure and land allocation. These policies are designed to promote productivity, specialisation, and the commercialisation of subsistence agriculture (GOL 2003). National economic development and government policy on the availability of land for land allocation and resettlement programs play a major role in determining agricultural production. Rural development in the uplands of Lao PDR has been guided by Lao government agricultural policy with the assistance of international donor agencies.

The uplands of Lao PDR sustain a diverse range of ethnic populations, in remote geographical locations surrounded by rich biodiversity and linked ecosystems. Poverty prevails, as described by the Asian Development Bank Participatory Poverty Assessment report (ADB 2001b). Consequently, the government has attempted to assist with agricultural stabilisation to improve upland livelihoods (NAFRI 2004b). Government policy and institutional reforms have been supported through collaborative planning and program implementation with international agencies. Ongoing research and development is needed to coordinate the application of technical options and evaluate outcomes of development for those continuing to live in poverty (NAFRI 2004b).

The government's policy of stabilising agriculture concentrates on decreasing the practice of swidden cultivation and actively promoting alternative farming system activities. Government departments and international donor organisations are working cooperatively to improve livelihoods for resource-poor farmers. To date, research into how farmers are modifying their farming systems in response to government pressure has not been well documented.

Members of international aid agencies and government representatives debated many of the farming system issues at the workshop on Poverty Reduction and Shifting Cultivation

Stabilisation in the Uplands of Lao PDR, in Luang Prabang, Lao PDR in 2004 (NAFRI 2004a). Although much is known about swidden cultivation practices and development project activities, there is scant information on individual farmer responses to government directives limiting access to agricultural land and influencing changes to farming practice. Farmer opinions of new activities and/or technologies introduced by various international development projects have not been documented or readily available (NAFRI 2004a). Agricultural development and changes in production are occurring, yet farmer opinions do not necessarily inform the research and development process nor are farmers involved in the evaluation of research projects or able to comment on government/non governmental organisation (NGOs) initiatives. Information on the demographics of farmers responding to and embracing new technology is not readily available, nor the reasons for their responses to development initiatives.

Collation of information on farmer opinions, experiences and advice on farming systems is of interest to the international aid agencies. Several agencies assist the Lao government to deliver crop and livestock technologies to upland farmers. By determining the potential and conditions for farmers to adopt new technologies and ultimately change their farming practice, international projects can then provide assistance to targeted groups.

This thesis explored the circumstances faced by resource-poor farmers in the uplands of Lao PDR. The research provided an opportunity for these farmers to reflect on their own experiences and to voice their opinions on development (or lack of) and changes occurring to them as individuals in their villages, as well as their proximal social networks and communities.

1.2 Research questions and aim

The study aimed to determine the extent of agricultural change occurring in Xieng Ngeun District in response to government and non-government programs. The study also sought to determine constraints faced by farmers when attempting to modify their farming systems in response to government policy directives and to determine the support required to facilitate agricultural change. Four research questions were the focus of the study:

1. To what extent are farmers modifying their farming systems from a reliance on swidden cultivation of upland rice?
2. What are the consequences of land use change for farmers?
3. How are farmers integrating new activities and/or new technologies into their farming systems?
4. How is agricultural production influenced by the emerging market economy?

These questions are dealt with in Chapters Five, Six, Seven and Eight respectively.

1.3 Research purpose

The purpose of the research was to investigate the effect of land and forest allocation policy and the implementation of swidden cultivation stabilisation measures by governmental and international organisations. The research sought to determine the response of upland farmers pressured to intensify land use. These farmers lived in a constrained resource environment and had little support to change existing practices and attain suitable livelihood alternatives. This study presents findings and data as constructive messages for policy makers and practitioners. The study also provides a model for Lao researchers involved in farming systems research that engages with the consequences of government policy without overstepping acceptable critique.

1.4 Swidden cultivation

Swidden cultivation agriculture is known by several terms, such as shifting cultivation or slash and burn agriculture, and has been a major land use system throughout the world, largely in subtropical and tropical areas (Boserup 1965; Brady 1996; Conklin 1961; Rasul & Thapa 2003; Roder 1997; Warner 1991). Swidden cultivation is perceived to be an environmentally suitable land use when the fallow period is sufficiently long to regenerate both the soil capacity and vegetation (Brady 1996; Rasul & Thapa 2003). Although population pressures on swidden cultivation have led to the degradation of forests and watersheds, it is highly adaptive and can be the only sustainable cultivation method for agricultural conditions of poor soils, steep gradients, and heavy rainfalls (Collins, Sayer, and Whitmore 1991).

Government development policy has primarily focused on rural economic reform and the reduction of swidden cultivation, using land policy directed at land allocation, land use planning, and the land titling (land ownership by obtaining a title to the land) (Vandergeest 2003b). The intention was to encourage long term investment in land with permanent agricultural practices, and also to protect primary forests from slash and burn activities by allowing cultivation only in secondary fallowed forests (Roder 2001, Vandergeest 2003b). Another component of government policy has been the amalgamation of many smaller villages and the relocation of villages closer to the road in order to access electricity, water supplies, and health and education facilities (GOL 2003). This has concentrated populations and increased requirements for arable land. Without options for paddy rice cultivation, there is increased pressure on available land for rotational crops and continued swidden cultivation of upland rice (Vandergeest 2003a). Conflicts over access to natural resources erupt when villages are confronted by migration and resettlement. In order for the government and international donor

organisations to further assist and improve livelihoods for resource-poor farmers, research and evaluation of the current situation faced by farmers is crucial.

1.5 Methodology

Comprehensive details of the methodology are described in Chapter Five. Qualitative and quantitative methodology using a 'dominant-less dominant design' were used to investigate the research questions (Creswell 1994). The dominant method used qualitative techniques to collect data and the less-dominant method used quantitative methods. Methodological triangulation allowed access to a wider variety of information, increased validity and reliability, and was used to overcome deficiencies of single-method studies (Burgess 1984).

1.6 Study site location

The study site was located in uplands of northern Lao PDR in Xieng Ngeun District, Luang Prabang Province as shown in Figure 1. Xieng Ngeun town, port, and marketplace are situated approximately 22km from Luang Prabang city, on the Nam Khan River and on Route 13, the main road to Vientiane.

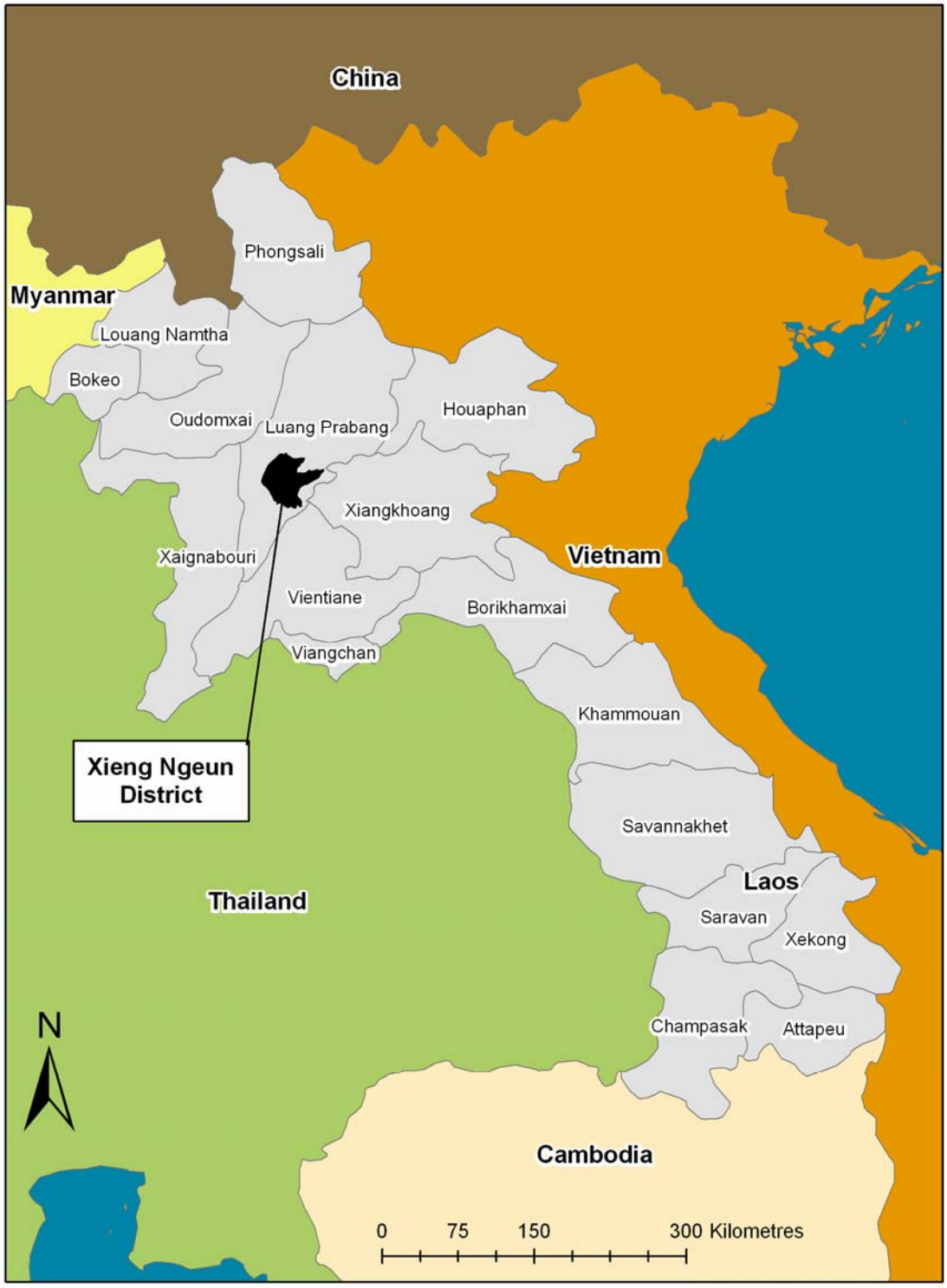

Figure 1 Map of Lao PDR showing study district of Xieng Ngeun

Source: http://www.cdc.gov/epiinfo/asia.htm 16/11/05. International Steering Committee for Global Mapping (ISCGM)

The main land use activities are represented in Figure 2. Secondary forests and bush prevail on this landscape with mixed crops in areas close to the road and rivers. Grasslands and mixed and open forests lie at higher elevations in the southern areas of the district.

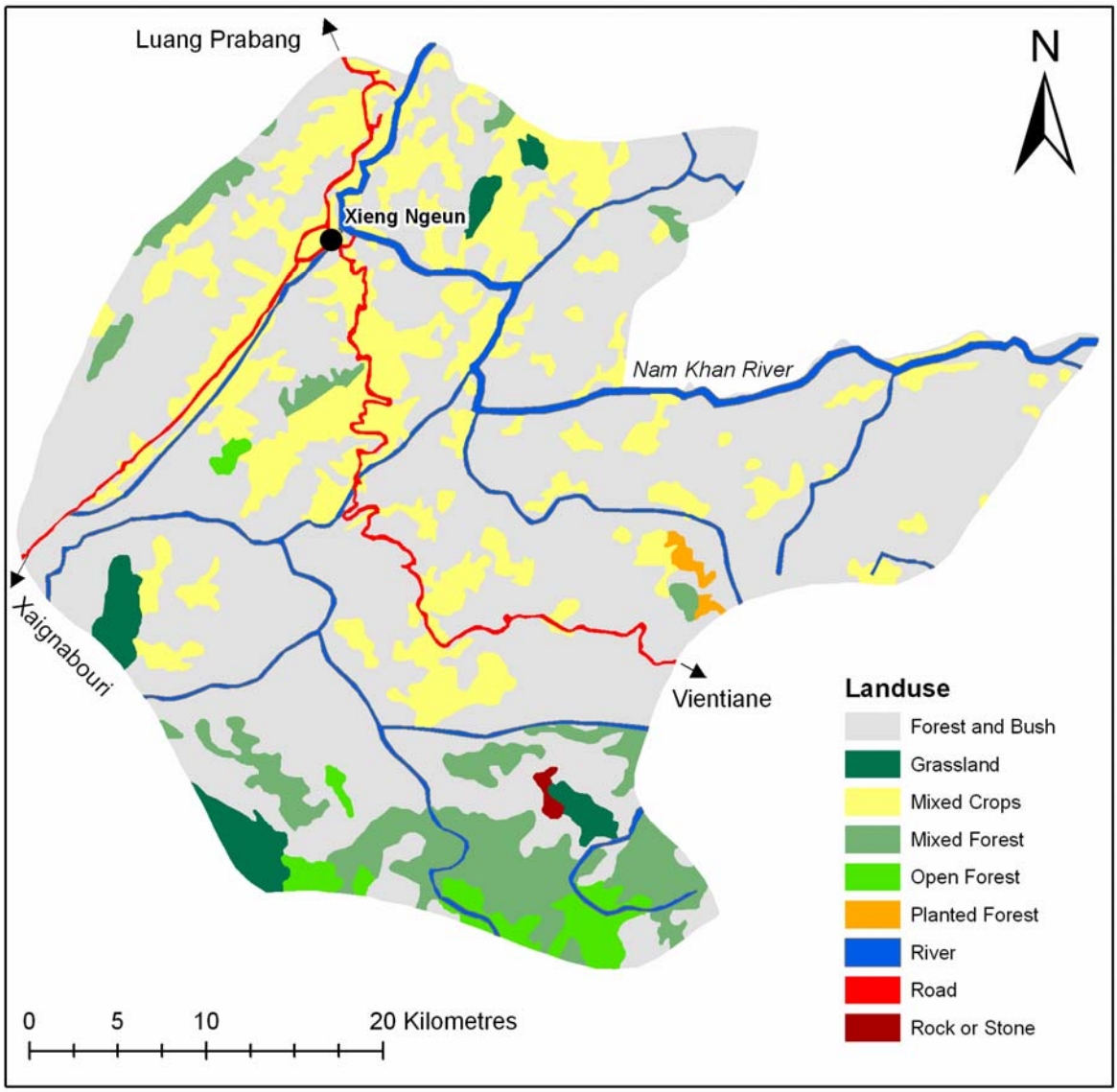

Figure 2 Land use in Xieng Ngeun District- the study area for the research

Source: Chief of Luang Prabang Provincial Forestry Section February 2005 (SSLCC 2000)

Luang Prabang Province experiences a tropical, wet-dry monsoon climate and has considerable temporal variation in rainfall. Ninety percent of the average annual rainfall of 1,400 mm falls during the hot and humid April to October rainy season (Lestrelin, Giordano, & Keohavang 2005 p. 5). During November to March the dry season is cold and mostly dry.

The surface area of Xieng Ngeun District is 1611 km^2 (McDonald, S. 2006, pers. comm., 2nd May, International Steering Committee for Global Mapping (ISCGM) using 3D analyst in ArcGIS). The population of Xieng Ngeun District is 32,667 according to a national census conducted in February 2005 (Government Census February 2005). Hence the population concentration is approximately 20 persons/km^2, reflecting the average value of 22 persons/km^2

cited by Vandergeest (2003b p.53). The three main ethnic groups Lao Loum, Lao Theung and Lao Soung have been found to cultivate in all geographical zones, Table 1 outlines population statistics for Xieng Ngeun District.

Table 1 Population statistics for Xieng Ngeun District (February 2005)

Ethnic groups (N=32,667)	Population	Families	Females	Males	Family members	% Population
Xieng Ngeun District	32667	5568	16129	16538	5.87	100
Lao Theung	20037	3469	9754	10283	5.78	62
Lao Loum	6841	1327	3433	3408	5.16	21
Lao Soung	5568	772	2734	2834	7.21	17

Source: Government Census February 2005

Note: Total population of 6.2 million in Lao PDR

1.7 Expected outcomes of the research

This research will provide information for government departments and non governmental organisations on the activities, significance, and scale of agricultural change occurring in farming systems operating in this upland district. The consequences of land use change will be established and also the activities, new technologies, and processes that assist farmers to improve their livelihoods. An important contribution will be to ascertain the influence of the growing market economy, and marketing information systems required to assist in production decisions.

1.8 Thesis structure

Chapter One provides an introduction to the study, outlining the contextual circumstance surrounding this research, and the research enquiry. Swidden cultivation, Lao government policy and the assistance of NGOs are briefly outlined. The research argument and research questions have been presented, and the methodologies used to answer these pertinent questions summarised. Details of the study site location in Xieng Ngeun District are presented. An outline of the remaining chapters is as follows.

Chapters Two provides an introduction to the theory and practice of international development with details of the history of international development and concepts of socio-economic development. Rural livelihoods are investigated using the sustainable livelihood framework which explores factors such as vulnerability, assets, policies, institutions, and processes. These theories identify the logic underlying Lao government policies on agricultural land use. The focus then turns to the contextual situation in Lao PRD and impact of government policy on livelihoods including household livelihood systems, and the various village strategies used to improve livelihoods in rural communities. In order to understand the context in which upland farmers make their agricultural decisions, the following section provides a brief description of the geographical, demographical, political, and historical setting.

Chapter Three explores land use intensification as a main factor influencing changes to agricultural production. Traditional forms of land use management and issues of deforestation in Southeast Asia are also examined. Land use practices are influenced by population density, government policies, and development initiatives. The implications of impacts on farmers of land tenure and land allocation policy in Lao PDR are discussed.

Chapter Four describes the challenges of research conducted in a foreign country. A mixed method approach was designed integrating qualitative and quantitative research using a 'dominant-less dominant design.' The operationalisation of the research design with qualitative and qualitative methodology is described in detail. Validity and the rigour of the research method are outlined and details of data analysis presented. In operationalising the quantitative methodology, details of the sampling methods and criteria are discussed and the process of data collection is detailed.

Chapter Five focuses on rural agricultural production and livelihoods in addressing the first research question, 'To what extent are farmers modifying their farming systems from a reliance on swidden cultivation of upland rice?' This chapter introduces research findings on current agricultural production, perceived changes to farming systems, and farmers' aspirations for future agricultural production.

Chapter Six continues to discuss the findings in terms of the second research question; 'What are the consequences of land use change for farmers?" The effect of government policy on land allocation and land use planning is explored through community viewpoints describing the problems of land allocation, village land use decisions, and attitudes to government land policy. The socio-economic and environmental factors influencing farming system decisions are then

described to understand the pertinent issues with which farmers contend. Farmers' perceived strategies to solve these concerns are also outlined.

Chapter Seven details agricultural change occurring as farmers trial new technologies and the impact of government and project assistance on their farming decisions and livelihoods. This chapter addresses the third research question, 'How are farmers integrating new activities and/or technologies into their farming systems?'

Chapter Eight details the market system, the availability of market information and marketable goods produced in Xieng Ngeun District. The effect of the monopsony market situation on farmers' decisions to diversify into cash crops and livestock is further investigated. This chapter highlights the effect of the current market system in promoting or constraining changes to farming systems. Chapter Nine addresses the fourth research question, 'How is agricultural production influenced by the emerging market economy?'

Chapter Nine provides a discussion of current agricultural systems and factors affecting farming decisions, and agricultural production. The uptake of new activities and technologies as moderated by the market economy and the need for improvements to extension services is outlined. A descriptive model of the summary of issues precipitating agricultural change is presented as a pictorial model describing the forces of political, social, economic, and environmental change.

Chapter Ten concludes by providing a reflection on the outcomes of the research and the principal theoretical and practical contributions.

Chapter 2
International development and implications for Lao PDR

2.1 Introduction

Development implies change to a person, a society, a nation, an economy, or a skill. Under-development, over-development, re-development, mal-development, post-development, or balanced development, are all terms describing the state of 'development'. Social transformation through development occurs by using ideals and concepts, power, activities, relationships, and knowledge. An understanding of existing patterns of belief, behaviour, and relationships is important for the planning of development that is to be of benefit to the community (Zivetz 1990). Traditionally, development has been viewed as economic development; it has expanded to include social, political, ideological, and environmental development. The United Nations Declaration on the Right to Development (UN General Assembly Resolution 41/128 p. 97 cited in UNDP 2001) defined development as:

> A comprehensive economic, social, cultural and political process which aims at constant improvement of the well-being of the entire population in development and in the fair distribution of benefits resulting there from.

This statement implies the need for shared, sustainable economic growth, and improvement in living standards. To achieve such development, significant structural change in production patterns and in economic and political institutions is required for the 'Right to Development' to be a global experience.

2.2 Development history

Although social and economic change continuously occurs in all societies, the recognition of 'progress' was first promoted with the demise of feudalism, and the emergence of capitalism in the period 1700-1860 (Gardner & Lewis 1996 p. 5)**.** The flux in economic and political thought led to an age of 'Enlightenment' stressing tolerance, reason, and commonsense that dominated Western thought until the late 20th century (Gardner & Lewis 1996 p. 4; Potter et al 1999). The age of imperialism (1860-1945) evoked notions of progress, the neo-classical political economy, and the classical theories of imperialism. Economic gain was the main motivation for imperial domination, tempered by a moral duty to instill change in local societies (welfarism), through

education, religion, and new political and bureaucratic systems. Table 2 outlines timelines of styles of governance, and prevailing economic and thematic approaches to international aid.

Table 2 Timeline of changing themes in international aid

DATE	THEMES OF INTERNATIONAL AID
1780-1860	Feudalism was undermined
1860-1945	Notions of progress & enlightenment as colonial discourse for economic gain and changing societies
1930-1945	Classic theories of imperialism
	Colonialism, concerned with progress, 'Enlightenment', tolerance, reason, commonsense, increased science and technology
	Political economy
	Historical materialism
1945-2000	Multilateral aid &bilateral aid through international monetary organisations (IMF, WB GATT)directed at developing a stable trading environment, with a capitalist economy using neo-liberalism theory, structural adjustment, and free trade
	Later emphasis on human development through practice, empowerment and attention to indigenous social movements
1945 after WWII	Capitalistic or socialistic models of development with the reconstruction of Europe and development of underdeveloped third world
1949-	Neo-classical economic theory for economic planning: technology, industrialisation and market economy
1966	Post –colonial era towards Modernisation
	Modernisation theory
	Dependency theory
1960-	General modernisation themes
1970's	Economic and political theories of modernisation
	Political science
	Anthropological themes of modernisation
1970-1979	Modernisation theory and Modernisation concepts
1980-1990	Economic structural adjustment policies (WB & IMF)
	Neo-Marxist theories of unequal exchange and dependency
	Welfare economics and ' basic needs' philosophy with concerns about inequity and poverty
	Post-development theory
	Government, institution building, gender training, wanting desirable political and social change
	Challenges to desirability of technological progress
	Empowerment
1989	Soviet collapse
1990's	Post –modernity and re-development of maldeveloped
1990-2006	Sustainable development
	Sustainable livelihoods framework
	Continuing donor aid with post-development. Pragmatic use and development of theories through practice.

The expansionary age of late capitalism (1945-66) embraced theories of modernisation and then neo-Marxist theories of unequal exchange and dependency (1966-80) took precedence (Gardner and Lewis 1996). In the 1990s, themes such as good governance, organisational development, and gender equity underpinned what was thought to be desirable social and political change

(Potter 1999). The 21st century continues to struggle with the concept of sustainable development, low external-input technologies and the effectiveness of poverty alleviation strategies.

2.2.1 International aid

International aid was initiated as early as 1930 to stimulate markets and boost colonial economies (Gardner & Lewis 1996). The concept of regional or country development began after World War II with the signing of the Charter of United Nations in 1945, an agreement by nations to level 1% of GNP to address rebuilding, and other programs in less developed nations (Charter of the United Nations 2004). The restructuring of underdeveloped societies was conceived by the United States and followed the breakdown in European colonial rule (Bernstein 1973; Sachs 1992). The United States aided the reconstruction of Europe, partially through access to raw materials from the colonies (Escobar 1995). Anti-colonial struggles in Asia and Africa, and nationalism in Latin America affected international development. The need for new markets spurred international development plans, with science and technology providing hopeful solutions for certain strategic problems. Fears of communism, the cold war, and perceived problems from over-population all influenced the establishment and direction of international development.

Development to solve the problems of the under-developed areas of the world is attributed to the Truman doctrine in the United States in 1949 (Escobar 1995; Esteva 1992; Sachs 1992). Esteva (1992) claims under-development had been created by previous development experiences where poor nations bore the brunt of past looting, from the process of colonisation and continued capitalist exploitation, both nationally and internationally. Policies of development became a mixture of generosity, bribery, and oppression. In defense, Gardner & Lewis (1996) claim that aid was not simply exploitive; rather it can be seen as meeting its objectives. Multilateral and bilateral aid programs from donors in fact, encouraged centralised, democratic governments with a strong bias towards free markets.

By the 1950s, the world was partitioned and described as the ‘First’ world of free industrialised nations, the ‘Second’ world of communist industrialised nations, and the ‘Third’ world of poor, non-industrialised nations (Escobar 1995). The latter consisted of countries where agricultural activities predominated, and were identified by lower per capita incomes, lower life expectancies and education, and higher rates of infant mortality. Other distinguishing features included high population growth rates, and marginal manufacturing sectors with exports from

the cultivation or extraction of natural resources (Gardner & Lewis 1996). Largely, these countries had been colonised prior to World War II and were seeking independence and development through industrialisation.

2.2.2 Capitalism and communism

Socialism and capitalism became both opposing and competing political doctrines. The vision of world order was embedded through 'development', with the United States capitalist system considered 'better than' communism (Sachs 1992). Classical political economists including Malthus, Ricardo, Say, and Smith, supported 'laissez-faire capitalism' which depended on the self-regulating free market (Rapley 2002 p. 7). However, post-war capitalism developed a regulated economy with the state playing an interventionist role to provide full employment, improved social benefits, education, housing, and health care.

In contrast, socialist countries of the communist bloc pursued Marxist philosophy with concepts of an equitable distribution of opportunity and resources and welfare driven through state-owed, centrally-controlled economies (Hettne 1995; McDonald 2005; Rapley 2002; Sofield 2003). Socialism built on the foundations of the traditional agrarian collectivism. Rapley (2002) suggested that the principle underlying socialist, central planning was for the economy to be organised to serve the people through the state. Socialist central planning was tried in Vietnam, Cambodia, Myanmar, Laos (now Lao PDR), and China. Economically, these measures were unsuccessful, flaunted by peasant resistance to agricultural collectivism, and compounded by official corruption. In the least-developed countries, poverty and the lack of resources made central planning difficult and largely ineffective (Rapley 2002).

Economic development was aimed at rapid industrialisation, with a bias towards intervention. This contrasted with the Soviet industrialisation model of state control. On the death of Stalin, attention was drawn to the imbalances of the framework, and the function of power holders with vested interests. Economic problems inherent in the Stalinist planning model included the lagging agriculture, under-developed consumer industries, and lack of flexibility. Difficulties with the administrative and production controls, and with micro-management of enterprises led to Soviet reforms in 1965 (Hettne 1995). These reforms continued until the Soviet collapse in 1989 (Hettne 1995). Laos continued to embrace Soviet doctrine and economic planning from the end of the civil war in 1975, until the soviet collapse in 1989.

2.3 Economic growth and development

'Successful' development assumes a growing economy that triggers improvements to infant mortality, malnourishment, and literacy. Social and cultural changes occur concurrently with increasing consumption, urbanisation, industrialisation, and access to technology (Gardner & Lewis 1996). Supposedly, these enhanced standards of living then 'trickle down' (Potter 1999; Tripp 2006). The riches of those at the top of the economic scale are proposed to eventually benefit the rest of society.

In practice distribution of wealth usually occurs through elitist or egalitarian differentiation (Marris 1999). A growth in GNP of a less developed country can reflect privileged elite groups, increasing power and wealth at the expense of the larger population. The United Nations 1996 Human Development Report states that one-third of the world's population (the poorest 1.6 billion) are getting poorer:

> The figures are appalling, 89 out of 174 countries are worse off than they were 10 years ago. 19 countries…have seen real per capita income sink to below the levels of 1960 (Aid Watch 1996 p. 4 in Trainer 2000).

Economic development differs from economic growth. Macroeconomic theory takes an empiricist economic position in relation to growth rates, structural economic changes, and returns on investment (Hayami 2001; Rostow 1990). Economic growth has been found to be an inappropriate and narrow measure of development as it tends to be dualistic in production and distribution, and based on the exploitation of natural resources. Economic growth does not necessarily lead to systemic changes in production structure, institutional development, or improvement in the living standards of the poor. Often economic development has resulted in exploitation of resources for the short term economic advantage of individuals and societies (Potter 1999). Ultimately, beneficial development should encourage a healthy and sustained use of the environment that supports human development, and accounts for the potential of environmental degradation, contamination, and over-exploitation of natural resources (Korten 1990).

Economic growth as a measure of development was initially seen as an increase in income per person. Development evolved from early economic development theories, and economically-based development projects, through to the basic human needs approach, and the distribution of the benefits of growth to solve social and economic problems (Escobar 1995; Esteva 1992).

Post-development theories challenge the viewpoint of previous achievements in the 1980s, and a redevelopment ethos distinguished the 1990s, redeveloping the maldeveloped or obsolete (Esteva 1992; Potter 1999). Redevelopment is a modernisation process that focuses on alleviating poverty. Development is now considered in terms of "sustainability" as defined in the following quote:

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs as defined by the Bruntland Commission (WCED 1985 p.40).

In 1992, an action plan for socially, economically, and environmentally sustainable development was initiated at the UN Conference on Environment and Development, known as Agenda 21 (Keating 1993). The principal driving forces of environmental change are considered to be a combination of population, consumption, and technology. The reduction of wasteful, inefficient consumption patterns in the developed nations, and the need to develop a global sustainable future required international cooperation. By adopting Agenda 21 (policies and programs), industrialised countries were given a greater role in the environmental clean up than the poorer nations, who often produced relatively less pollution (Keating 1993). Sustainable development is seen to be largely dependant on a global responsibility for environmental stewardship.

2.4 Modernisation

Following World War II, economic development theories of the potential for growth in developing countries was interpreted as a process of modernisation. Developing countries are expected to modernise their economies by ever increasing mass consumption and trade, following the economic mechanisms and behaviours of developed countries:

> Modernisation is the process by which historically evolved institutions are adapted to the rapidly changing functions that reflect the unprecedented increase in man's knowledge, permitting control over his environment that accompanied the scientific revolution, a worldwide transformation affecting all human relationships (Black 1972 p. 237).

Modernisation strategies use development economics aimed at sustained economic development for low-income economies to reduce poverty, and create wealth (Hayami 2001). Development

economics requires an understanding of the expansions in economic variables, such as capital and labour force, and how these interact with culture and institutions to evolve social systems that support major growth in per capita income (Hayami 2001).

Although there has been substantial economic growth and development in Southeast Asia, this has been interpreted by some as rapid, export-led, capitalist growth (Rigg 1997). Thailand's experience is described by Bell (1996 p. 49) as:

> …a pattern of development with strongly negative socio-economic consequences in terms of inequity, unevenness, cultural fragmentation, and a negative impact on women and the environment.

Rigg (1997) claims that development concerns in Southeast Asia surround the creation of dependency and vulnerability from foreign investment-led, export-driven industrialisation. In addition, there is a perceived risk of global protectionism, with the potential exclusion of Southeast Asian countries from developed world markets. The primary impetus behind growth has been the mobilisation of resources and there is an expected sharp slowdown in growth as these resources are exhausted. To remain competitive in the world market, employers are forced to minimise labour and overhead costs. This perpetrates low wages, poor and dangerous working conditions, and ongoing poverty (Rigg 1997). Furthermore, in order to attract investment by multinational firms, trade unions may be banned or workers' rights infringed, perpetuating poor wages and conditions. Southeast Asia's environmental crisis is thought to be a direct result of economic policies. Bryant and Parnell (1996) argue the mix of rapid but uneven economic growth, and pervasive environmental degradation in Southeast Asia, clearly emphasise the contradictions between economic growth and development, and environmental conservation. Capitalist growth promotes a culture of consumerism, individualism, greed, and acquisitiveness that tend to replace traditional cultural traits of community action, consensus, and moderation (Rigg 1997).

Another view of the consequences of modernisation through development is termed the counterpoint. The counterpoint is an ideology which protests against modernity and the mainstream western viewpoint. The main argument is for decentralised, ecologically sensitive, small-scale, stable models of social development (Hettne 1995). The counterpoint suggests there will be a gradual weakening of institutionalised structures as maintenance costs increase, especially when the guaranteed economic growth fails to eventuate.

2.5 Development theory

The concept of modernisation arose from development processes in the Third World after World War II. Modernisation was seen as beneficial 'development', evaluated in terms of economic growth. As a consequence, development has been defined in a variety of ways as (i) a series of interlinked concepts, ideas and ideals, (ii) a set of practices and relationships (ii) guidelines for action, and (iv) deliberately planned change (Gardiner& Lewis 1996). Development is a description of activities, relationships and exchanges as well as ideas relating to problematic domains. Development continues to affect the lives of many millions of people across the world. Interpretations of discourse, knowledge, power and social transformation lie within the domain of development theory (Gardiner& Lewis 1996).

Sofield (2003 p. 33) claims that development theory became a collection of:

> …a wide range of various social science approaches that have tried to explain and understand the process of societal change in Third World countries that took place in the postwar period.

Development theory was initially approached using economic rationalism, in the form of the Widening Gap theory (Rostow 1960; Sofield 2003). The theory espoused that wealth disparity among nations could be corrected through infusions of capital, technology and knowledge, as had occurred in postwar Europe (Sofield 2003). The Take-off theory followed, with Rowstow (1960) declaring that economic growth was achievable in only one to two decades of assistance, as the market gained maturity and with high levels of mass consumption. Rostow (1960) described development in five successive stages of economic growth; traditional, transitional, take-off, maturity, and mass consumption. The "Big Push" theory explained the need to continue to concentrate resources into the processes of industrialisation (Rosenstein-Rodan 1963). Expenditure on social development and infrastructure i.e., education, capacity building, administration improvements, and agrarian development were neglected whilst resources were plunged into industrialisation processes (Sofield 2003). Many less developed countries experienced difficulties with development through industrialisation. Industrialisation did not provide adequate opportunity for rapidly increasing labour forces which threatened political stability. The neoclassical theories of economic growth treated unemployment in developing economies as "an essentially transitional problem" that would disappear with increasing industrial output (Bettelheim 1961 p.294). Very high population growth rates and a burgeoning labour force contested this theoretical postulation.

Doubts were expressed over the reliance on purely economic theories of development and Seers (1969, 1977) refined the definition by incorporating social concerns into development theory such as, poverty, unemployment, inequity, and the need for self reliance

Higgins states in the preface of Mehmet (1978) that economic theory was too general and simple to be an appropriate guide to development policy formulation, in either advanced or less advanced countries. There was a need to address problems such as; (i) unemployment, (ii) inflation, (iii) balance of payments, (iv) regional disparities, (v) inequities among social, ethnic and linguistic groups, (vi) pollution, (vii) congestion and urban blight, and (viii) shortages of energy and other non-renewable resources. Two decades of disillusionment has led to a disregard for theories in general. The challenge for development theory is to clarify what roles a national development strategy can have in an increasingly trans-national world (Hettne 1995). Rather than grand or general theories, development economists prefer theories that apply to smaller case studies that share a number of similar characteristics.

Mehmet (1978 p. 7) explores the development conundrum:

> Why is there a huge gap between the theory of development and the grim realities of developing countries? Why after two decades of economic planning, do the problems of mass poverty, unemployment, and inequity in the Third World remain unchecked, often causing conflict and division? Is it that theories are wrong-that the Western economic model is inappropriate? Or is it that the tool of planning has been misused- if so, by whom and how?

Development theory has been constructed and viewed through two oppositional paradigms, modernisation theory and dependency theory.

2.5.1 Modernisation theory

Modernisation theory is a term for a variety of perspectives that were applied by non-Marxists to the Third World in the 1950s and 1960s. The dominant themes arose from established sociological traditions. The re-interpretation of concerns of classical sociology was an attempt to replace philosophy with science. Evolutionism, diffusionism, structural functionism, systems theory, and interactionism all combined to form a mixture of ideas known as modernisation theory. Nineteenth century theories of evolution emphasised the naturalness and inevitability of change. Change appeared to follow the evolutionary pattern, and societies were distinguished through their position on the evolutionary scale, moving towards Western industrialised

societies that were regarded as the highest form of attainment. Structural functionism dominated sociological theory and has been interpreted by Harrison (1988 p. 6):

> Societies are more or less self-sufficient, adaptive social systems, characterized by varying degrees of differentiation, and with roles and institutions, rather than concrete individuals, as their principal units. The balance, or equilibrium, of the various parts of the whole is maintained for as long as certain functional prerequisites are satisfied. Finally, the entire system, or any part of it, is kept together through the operation of a central value system broadly embodying social consensus.

Modernisation theory reflected the optimism and idealism, and anti-communist sentiment of capitalistic, liberal democracy. To emulate the 'North' (First world), countries required savings and capital, with cultural value systems based on profit motives (Rapley 2002). The advance of modernity was symbolised by industrialisation and urbanisation with the growth of cities. In retrospect, with the abundance of cheap labour, Rapley (2002) suggests that most governments should have encouraged the development of comparatively small, labour-intensive production units closely linked to the economy. In many undeveloped countries, production per capita declined despite local and foreign aid efforts to stimulate agriculture and industry. With high birth rates and declining death rates the growth in population often outstripped the output of food and manufactured goods (Nisbet 1972).

The modernisation paradigm continued to dominate from the 1970's to 1980's, although the emphasis focused on poverty, inequity, and the provision of basic needs rather than industrialisation and modernisation. Vulnerable groups, such as small farmers and women-headed households were targeted for aid. Many projects were strongly welfare orientated and did not challenge existing political structures (Gardner & Lewis 1996). The concurrent but alternative paradigm viewpoint was known as dependency theory.

2.5.2 Dependency theory

Gardner and Lewis (1996) claim that development is exploitative, and that the countries of the South (combined Second and Third worlds) have been under-developed by the process of imperialist and post-imperial exploitation. Dependency theory describes under-development as embedded within particular political structures, arguing that the North actually hindered the emergence from poverty of the South (Rapley 2002). The North thwarted the development of the South by striking alliances with the dominant, dependant bourgeoisies' classes of the South.

However, dependency theory was criticised by Marxists, claiming that imperial powers drained the South of resources of labour, raw materials and provided markets for finished goods, rather than through deliberate exploitation (Rapley 2002). Development projects may have eased the short term miseries of under-development, but in doing so, continued to support the status quo. Dependency theory supports notions of empowerment that rejects aid as a form of neo-imperialism, and argues that positive change can only come from within societies.

Dependency theory added a social dimension and 'development' became an expression of social change (Sofield 2003). The redistribution of economic benefits combined with improved infrastructure of education and health services and a reduction in poverty, unemployment with greater equity became the indicators of 'development' (Sofield 2003).

By 1990s neither modernisation nor dependency theory was intact as viable paradigms for understanding change and transformation, or processes of poverty and inequity (Gardener & Lewis 1996). By mid-1990 the supposed benefits of economic growth, technological change, and scientific-rationality had failed to materialise. The desirability of technological progress was also challenged, in light of the environmental destruction. Technological change had in some instances led to inequity, and the breakdown of traditional networks of support. Gardner and Lewis (1996) agree with Sachs (1992) and Escobar (1995) that the concept of development is embedded in neo-colonial constructs, and is a key ideological tool in global power relations, with the continued Northern dominance over the South. As an explanation post–development theories arose with an emphasis on power and discourse.

2.5.3 Post-modernism and post-development

The new trends relate more to practice and policy, rather than development theory. The major strategies for development were Eurocentric and universalist in their assumptions that development required grand theories or meta-narratives (Potter et al 1999). Post-modernism of the 1990s challenged the belief in scientific rationality, and of the dominance of these unitary theories of progress. Post-modernism focused on the relationship between discourse (fields of knowledge, statements, and practice such as development), and power (Gardener & Lewis 1996). Post-modernism is inherently subversive insisting on locating voices and deconstructing them.

Gardener & Lewis (1996) suggest that development theory had reached an impasse, due partly to post-modern tendencies. Attention focused on specific groups and issues (i.e., women,

landless) emphasising the grassroots initiatives of bottom-up development. Practical issues of cost-benefit analysis, the need for good governance, human development, institution building, and empowerment further polarised theory and practice.

2.5.4 Development by Non Governmental Organisations (NGOs)

In the late 1990s, state-sponsored, project-based, top-down development was increasingly displaced by private, professional development organisations and development agencies in the voluntary sector (Gardner and Lewis 1996). This allowed for a diversity of approaches within the non governmental sector, a smaller scale of operation, and a degree of participation (Adnan 1992; Chambers 1983; Gardiner & Lewis 1996). Many donor agencies preferred to allocate budgets and work with NGOs rather than government departments. Perceived benefits were participation by farmers and the ability to orient technology adaptation and transfers towards real concerns. In addition, the use of local institutions and practices to initiate the adoption of new ideas and machinery provided a fruitful basis for innovation.

2.5.5 Development through participation and empowerment

Development interventions have accrued greater success when local people as 'stakeholders' contribute ideas, thereby strengthening local accountability and democracy (Eyben 1994). Chambers (1983) suggests inclusion and participation by those most affected by development programs would better serve the development process. Participation has been established in a variety of ways including ways to (i) inform the public of project plans, (ii) involve people in decision-making, (iii) involve people in project related activities or (iv) assist people to initiate activities (Adnan 1992). However, participatory approaches can be problematic, as they tend to operate at a community level, masking real differences between people in terms of class, gender and age (Gardner and Lewis 1996). Participation is a complicated process of disentangling conflicting interests within local communities and building support for the interests of particular, identifiable groups of people. In practice the rhetoric of participation can easily be misused while real power remains in the hands of the outsiders.

The practice of participation has led to development workers and professionals collecting information using less formal approaches and ultilising local knowledge in development activities (integrated rural development). Participation tends to facilitate mutual learning between researcher and informant through the analysis of local knowledge and local conditions (Gardner and Lewis 1996).

An alternative development approach is collective self-empowerment emphasising autonomy in the decision-making of territorially organised communities, local self-reliance, (not autarchy), direct (participatory) democracy, and experiential social learning (Friedman 1992). However, local action is severely constrained by global economic forces, structures of unequal wealth, and hostile class alliances. Consequently, collective self-empowerment can never be more than an attempt to keep the poor from even greater misery and to possibly deter further land degradation (Friedman 1992).

2.6 Influence of international development on agricultural change

The benefits of international development through provision of enhanced economic and human welfare have been felt globally (Potter et al. 1999). However, over three billion impoverished people risk further degradation of their fields, fisheries, forests, and waterways in spite of (or as a result of) continued 'development' (Jhirad 2005). The nature, cause and solution to development, international relations, and world poverty remains disputed (Ellis 2000; Escobar 1995; Esteva 1992; Hobart 1993; Korten 1990; Marris 1999; Potter et al. 1999; Sachs 1992). Furthermore, it is very difficult to attribute development impacts without attention to other elements of causation (EIARD 2003).

EIARD (2003 p. 331) ponders the appropriateness of development designed to alleviate poverty through rural development initiatives:

> ….the sustainability of poor people's livelihoods is often very fragile, and the impact of development initiatives should be assessed in this context. Do development initiatives allow poor people to cope with and recover from stresses and shocks and maintain or enhance their capabilities and assets while preserving the natural resource base?

In other words, development should not be evaluated in terms of just the products and services delivered, but assessed in terms of poverty, food security, and use/conservation of natural resources. Furthermore, EIARD (2003 p. 331) suggests that for an improvement in sustainable livelihoods to occur, it is necessary to address the requirements for access to (i) managed natural resources, (ii) a supportive and cohesive social environment, (iii) financial resources, (iv) quality education, training, knowledge, technologies, and information, (v) adequate nutritional staples, (vi) health facilities, and (vii) basic infrastructure.

Tripp (2006) stresses that a supportive institutional environment and appropriate government policies are required for this to be achieved, and adds that long term capacity building, institution strengthening, and access to political power are required for successful rural development. Improvements in basic education, information availability, and market operation are required. Tripp (2006) points out that strengthening farmer organisations, public education, and research and extension are critical when working towards sustainable rural development.

Development theory has been based on western economic theories of growth that have not proven useful to development practitioners or resource-poor farmers. Consequently NGOs have undertaken integrated rural development using participatory approaches to support farmers in constrained resource environments. The sustainable livelihood framework provides a systematic way to evaluate farming system options for resource-poor farmers.

2.7 Sustainable livelihoods

The concept of sustainable livelihoods emerged from integrated rural development (IRD) approaches in the 1970s that had unsuccessfully sought to deliver rural programs. Sustainable livelihood approaches attempt to reconcile conflicting environmental concerns with increasing production, using a people-centred approach (DFID 2006a**;** UNDP 2001). Chambers & Conway (1992 pp. 6-7) defined livelihood in terms of:

> …the capabilities, assets (stores, resources, access) and activities required for a means of living. A livelihood is sustainable which can cope with and recover from shocks, maintain or enhance its capabilities and assets, and provide opportunities for the next generation.

This definition has been central to research that adopts a rural livelihoods approach (Carswell 1997; Hussein and Nelson 1998; Scoones 1998). Batterby & Forsyth (1999) defined the concept as the net benefits, including the impact on other local livelihoods, global livelihoods, and longer term outcomes. Lindenberg (2002) considered long term sustainable development to occur when the economic and social conditions allowed improvement in well-being over time. These concepts have been combined in the concept paper on livelihoods presented on the UNDP_SL (2006) website that define sustainable livelihoods as:

> The capability of people to make a living and improve their quality of life without jeopardising the livelihood options of others, either now or in the future.

Ellis (2000 p. x) quarantines the term 'sustainable', believing that it has become the "most over-used and degraded word in development studies, rendered practically meaningless by the multiple aspirations it seeks to placate." Ellis (2000) considers that by exploring peoples' livelihoods the complexity of survival in low income countries becomes apparent. Understanding that people survive by engaging in many different activities through a diversity of strategies, may be used to inform rural development policy.

2.8 Investigative approaches to rural livelihoods using the sustainable livelihood framework

Multi-disciplinary and holistic approaches to agricultural research and development have been used in farming systems research, integrated rural development, agro-ecosystem analysis, political ecology, and sustainable livelihoods analysis (SLA) (Conway 1985; Lestrelin, Giordano & Keohavong 2005). The SLA was used by Scoones (1998) to ascertain the processes by which people achieve (or fail to achieve) sustainable livelihoods. The sustainable livelihood framework has been extended by the Department for International Development (DFID) at the Institute of Development Studies (IDS). The framework has become a composite of many theories, approaches, and considerations apparent within the development debate, and main features are depicted in Figure 3.

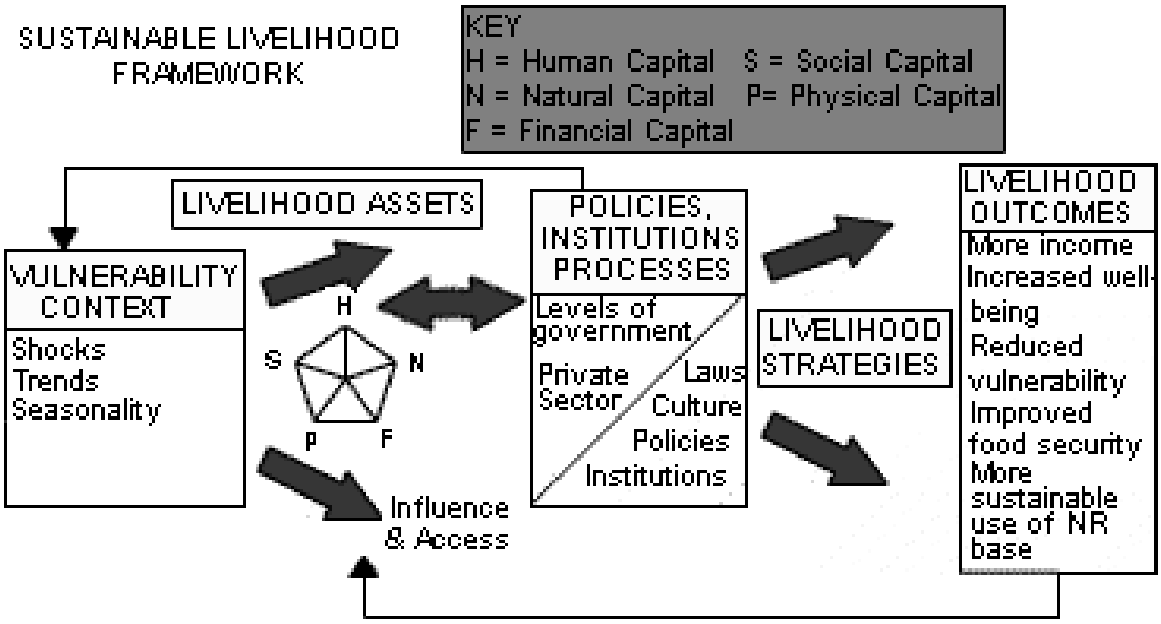

Figure 3 Sustainable livelihoods framework (DFID 2001)

http://www.livelihoods.org/info/info_guidancesheets.html © DFID October 2001 [accessed 23 December 2005]. Note that the arrows influence dynamic relationships within the framework rather than direct

causality. Clearly, these indicators are not definitive but rather are subject to assessment using both quantitative and qualitative approaches. These linked concepts are discussed in the following section.

2.8.1 Vulnerability context

Sustainability is determined by the resilience of livelihoods which is often dependant on the natural resource base. The ability to cope and recover from stresses and shocks becomes a measure of livelihood adaptation, vulnerability, and resilience. Sustainable livelihoods require flexibility in the face of change and adaptation through longer term shifts in livelihood strategies. To be sustainable, the natural resource base needs to maintain productivity whilst under duress. These may present in terms of predictable but stressful situations or infrequent, unpredictable impacts or shocks (Conway 1985).

2.8.2 Livelihood assets

Land use decisions are highly influenced by the resources available to farmers and geared to maximise food and livelihood security. Resource assets are defined as natural and community resources and various forms of capital. Natural resources (soils, forest, and water), human capital (health and education) physical and financial capital (on farm and off farm), community-owned resources, and political capital are all influenced by conditioning factors (policies, technologies, institutional arrangements, and community assets), that all act together on household production, and land use (Vosti & Witcover 1996). Pretty (1998) depicts these resources in Table 3.

2.8.3 Policies, institutions and processes

In SLA, the politics and policies, history, agro-ecology, and socio-economic conditions of the location, at an individual, village, regional, or national level provide information for a contextual analysis. Within this context, livelihood resources as different types of capital, enable or constrain livelihood strategies. Central to this framework are the institutional processes (embedded in a matrix of formal and informal institutions and organisations), that mediate the ability to carry out strategies and achieve (or not) such outcomes (Scoones 1998).

2.8.4 Livelihood strategies

Livelihood strategies involve agricultural intensification or extensification, livelihood diversification, and/or migration in SLA (Scoones 1998). Agricultural intensification is achieved through more output per unit area from increases in labour inputs or capital investment. Agricultural extensification requires more land under cultivation. Diversification

into other agricultural activities and/or off-farm income earning activities, and seasonal or permanent migration to other locations, are all options for livelihood strategies.

2.8.5 Livelihood outcomes

The outcomes of SLA are described in terms of sustainable livelihoods. Outcomes are assessed as working days with gainful employment, off-farm activities, and labour for wages or for subsistence production (Scoones 1998). Lipton (1991; 1993) claimed that 200 working days are necessary for the creation of viable livelihoods. Poverty reduction as a measure of the poverty level is also a key criterion for assessing livelihoods. Security, well-being, and capability broadens the scope of the assessment from purely material concerns and include factors such as self-esteem, security, happiness, stress, vulnerability, power, and exclusion (Chambers 1995, 1997; Sen 1984).

Table 3 Definition and example of livelihood assets

ASSET TYPES	DEFINITION/EXAMPLES
Natural	Nature's economic and cultural goods and services, including food (both farmed and harvested or caught from the wild), wood and fibre, water regulation and supply; waste assimilation, decomposition and treatment, nutrient cycling and fixation, soil formation, biological control of pests, climate regulation, wildlife habitats, storm protection and flood control, carbon sequestration, pollination, and recreation and leisure.
Social	The cohesiveness of people in their societies, including relations of trust that lubricate co-operation, the bundles of common rules, norms and sanctions for behaviour, reciprocity and exchanges, connectedness and social institutions.
Human	The status of individuals, including the stock of health, nutrition, education, skills and knowledge of individuals, access to services that provide these, such as schools, medical services, adult training, the ways individuals and their knowledge interacts with productive technologies, and the leadership quality of individuals.
Physical	Local infrastructure, including: housing and other buildings, roads and bridges, energy supplies, communications, markets, and transport by air, road, water and rail.
Financial	Stocks of money, including savings; access to affordable credit; pensions; remittances; welfare payments; grants and subsidies.

Adapted from: Jules Pretty. 1998. *Capital Assets and Natural Resource Improvements: Linkages and New Challenges.* Centre for Environment and Society, University of Essex, Colchester, UK (UNDP 2001 p. 72).

2.8.6 Research approaches

Scoones (1998) suggests that qualitative methods combined with conventional survey tools can be used with appropriate participatory rural appraisal techniques to form a 'hybrid' methodology. This systematic and rigorous collection of basic information underpins the outcomes. The key trade-offs can be identified, and then used for an iterative and a more participatory planning process, negotiated among different stakeholders. Furthermore, sustainable livelihood analysis identifies the main trade-offs of types of capital, livelihood strategies, and sustainable livelihood outcomes. Scoones (1998) claims the framework develops a checklist of issues to explore, that consequently brings to light key connections and linkages between the various elements within the framework. Rather than a precise measurement framework, the intention is to offer an heuristic tool for a more qualitative discussion of key issues.

Concepts from the livelihood analysis framework have been used as guidelines to explore and answer the research questions posed in this thesis. Both qualitative and quantitative research data have been collected. Demographic and historical information, population movements, and attitudes to government policies have also been examined. The impact of institutional forces through government and project initiatives and the influence of the emerging market economy are investigated and used to further understand the contextual nature of the agricultural decisions made by farmers in the uplands. An understanding of livelihood strategies and outcomes has been achieved through the many qualitative questions posed to the farmers in Xieng Ngeun District and both quantitative and qualitative analysis.

2.9 Rural development strategies used by international aid agencies

Mehmet (1978) alleges that donor countries and international aid agencies have not dealt with the complex social, political and institutional problems that reduce the efficiency and productivity of the traditional smallholder farmer. These farmers are responsive to favourable price and market incentives and tend to adopt and adapt appropriate new technology only under acceptable risk conditions.

> Real constraints to improved farm output and productivity are the social and institutional factors and the alleged resistance of traditional farmers to modernisation, is actually a reflection of the failure of the extension workers and agricultural technical advisors to take into account the negative effect of these institutional factors on the motivations and risk-taking behaviour of the cultivators. What is needed is low-cost technology, suitable for the smallholder, whose financial resources and social circumstances dictate a relatively modest and conservative investment strategy (Mehmet 1978 p. 233).

Attempts to improve the economic and social life of small-scale farmers, tenants, the rural poor, and the landless have used integrated rural development strategies (Hettne 1995). Land continues to be the main basis of wealth and political power in rural sectors, yet households engage in other activities and derive income from a wide and variable range of sources (Dixon 1990). Agriculture remains the main source of livelihood for the majority of the third world and is typically small-scale, labour intensive production of food for direct consumption.

In order to determine the impact that development theory and practice has had on smallholder farmers in the uplands of Lao PDR, details of the historical and geographical situation and the factors influencing development in South East Asia are now considered.

2.10 Rural development in South East Asia

Asia is confronted by serious problems, with fresh water shortages, and the degradation of land and biotic resources, whilst forests are fast becoming denuded (Rerkasem 2004). Concurrently, endemic rural poverty exposes the poor to malnutrition from calorie and protein deficiencies; they commonly experience chronic low levels of health and well-being, and have inadequate education (Pinstrup-Andersen 2004).

In light of these statements, Pinstrup-Andersen (2004 p. 18) suggests that agricultural change will be effected by:

> …accelerated globalisation, further trade liberalisation, sweeping technological changes, degradation of natural resources and increasing water scarcity, emerging and re-emerging health and nutrition crisis, rapid urbanisation and changing structure of farming and agribusiness.

The challenge for Asian agriculture is to increase productivity by continuing to develop supporting institutions, infrastructure, and technologies (Farrington & Robinson 2006, Humphrey 2006, Jones 2006). Increases in public and private investment in infrastructure are required with changes necessary to (i) rationalisation of subsidies, (ii) regulatory independence, (ii) corruption and (iv) involvement of the poor in decision making about infrastructure (Farrington & Robinson 2006). Jones (2006) claims that investments in education and roads will have most impact on reducing poverty in rural areas as physical infrastructure fosters economic growth and poverty reduction.

In addition, commodity portfolios and production patterns need to be responsive to relative price changes on the international markets in order for Asian countries to increase agricultural market share and remain competitive. Countries such as Myanmar, Lao PDR, Nepal, and Cambodia, in which agricultural production contributes significantly to national income, will be more affected by these factors than other Asian countries (Farrington & Clarke 2006).

Yield gains in cereal production using improved crop varieties have doubled in Asia during the last few decades. This has been achieved without further expansion of cultivated areas. Favourable agricultural productivity combined with industrial growth, and improved non-farm rural economies have tripled incomes in many countries (Pinstrup-Andersen 2004). Estimated high economic growth in Asia is projected to increase the demand for dairy products, meat, fish, fruit, vegetables, and refined sugar (Farrington & Robinson 2006, Pinstrup-Andersen 2004). Challenges to future agricultural growth requires avoiding the environmental degradation in irrigated areas as previously experienced in Asia, and the need to offer sustainable livelihood solutions to those in less favourable rural circumstances (Farrington & Clarke 2006; Pinstrup-Andersen 2004). The future of international development assistance is focused on a number of shared global challenges involving energy supply, environmental issues, climate change, and financial stability (Farrington & Clarke 2006, Farrington & Robinson 2006).

Agricultural production patterns are determined by a preference of rice as a dietary staple, sloping or upland agricultural land is primarily used for cultivation, and the alternative activities available to the upland farmer. The following section outlines the development initiatives operating in the agricultural sector in Lao PDR.

2.11 Development in the uplands of Lao PDR

In order to understand the context in which upland farmers make their agricultural decisions, the following section provides a brief description of the geographical, demographical, political, and historical setting.

2.11.1 Geographical location

Lao PDR is a sparsely populated Southeast Asian country, situated in the Mekong River basin (Fig.1). The area of arable land in Lao PDR is 3.8% of the total land area, of which 0.35% is permanently cropped (CIA 2006). The country is landlocked and divided into 18 provinces and one special zone, where the topography ranges from fertile river plains to rugged mountainous

terrain. Lao PDR occupies a total area of 236,800 sq km with a population of 6,217,141 (July 2005 est.) and growing at a rate of 2.42% pa (2005 est.) (CIA 2006).

Lao PDR has been undergoing slow economic transition from a centrally planned economy to a market economy, yet still remains amongst the poorest and least developed countries of Asia (UNDP 2001). The gross national income in Lao PDR in 2004 was reported as 390 US dollars per capita (World Bank 2004). Export earnings are from primary goods such as hydro-electricity and rural produce i.e., timber, unprocessed forest products, coffee, tin, and cattle (CIA 2006; GOL 1999; IRDC 2004). The main export partners are Thailand and Vietnam, with some commodities sold to France, Germany, and the United Kingdom (CIA 2006).

The gross domestic product (GDP) growth of approximately 7.5% was recorded in the first half of the 2005-2006 fiscal year (Vientiane Times 2006). The industry sector posted a production increase of 13.7%. Meanwhile, the service sector grew by 7.4% and the agriculture sector by 3.2%. Lao PDR attracted more than 2.5 billion U.S. dollars worth of foreign investment, and posted a year-on-year export increase of 73%, at an inflation rate of 8.6%during the 2005-2006 fiscal year (Vientiane Times 2006). Government policy remains committed to continue to strengthen security, accelerate the implementation of the 2005-2006 socioeconomic development action plan, and improve investment opportunities (Vientiane Times 2006).

Approximately 20% of the total land area forms the lowland alluvial plains along the Mekong and its tributaries where intensification and diversification of agricultural production and market opportunities have increased (GOL 1999 p. x). Production and trade in grains, livestock, fisheries, vegetables, and fruits is well established with market forces driving this process (GOL 1999). In contrast swidden cultivation is the major land use practice in the uplands, contributing to marginal subsistence livelihoods, and ongoing poverty. Where possible the valley floors and floodplains are used for irrigated paddy rice cultivation but this is limited and upland rice cultivation of sloping lands predominates. Approximately 85% of the population live in rural households with 40% fully or partially utilizing swidden cultivation and mainly located in the mountainous Northern provinces (Hansen 1998 p. 34; Souvanthong 1995 p. 3).

Lao PDR is one of the most heavily forested countries in Asia with extraordinary biodiversity. In 1993, there was 11 million hectares of forest (Domoto 1997 p. 310). The government estimates that 100,000 ha of primary forest and 300,000 ha of secondary forest are annually degraded by swidden cultivation (Fujisaka 1991 p. 95). Forests cover approximately 50% of the national area, a decline of 70% since 1970 (Fujisaka 1991 p. 95; UNDP 2001 p. 75).

2.11.2 Population, ethnicity and land use

The population of Lao PDR has doubled over the last 30 years to 6.2 million placing pressure on resources, particularly in the upland primary and secondary forests used for swidden cultivation (Chapman 1998; CIA 2006). The average population density in Laos is approximately 22 persons/km^2, ranging from 153 persons/km^2 in Vientiane to below 40 persons/km^2 in other provinces (Vandergeest 2003b p. 53; UNDP 2001 p. 14). Swidden cultivation is largely practiced in northern Lao PDR where population densities can be as low as 12 persons/km^2 (Warner 1991 p. 17). Contrasted with population densities in Thailand of 250 persons/km^2 and 1000 persons/km^2 in Vietnam, the population density in Lao PDR is significantly lower (Vandergeest 2003b p. 53).

The land under swidden cultivation in 1999 was estimated to be about 4.2% of Lao territory, which suggests that sufficient land and resources exist to allow swidden cultivation for those that cannot access land suitable for permanent agriculture (Vandergeest 2003b p. 53). Development agencies claim that only 3.3% of land in Lao PDR is suitable for agriculture, whilst the Ministry of Agriculture and Forestry Strategic Vision (GOL 1999 p 20) indicates when slope and fertility is calculated; 15-32% of land is arable. Government policy is focused on eliminating agricultural production on non-arable land by 2010 (Vandergeest 2003b p. 52). This reduction is to be achieved using a 3 year rotational cultivation system and only permitting swidden cultivation on land without primary forest.

In Lao PDR, swidden cultivation is practiced by the country's poorest, particularly ethnic minorities from the remote northern, eastern, and south-eastern regions (Ducourtieux 2004). Culturally diverse, and geographically dispersed, there are 46 officially recognised ethnic groups with different traditions and languages, predominantly living in the uplands (Stür, Gray & Bastin 2002). Ethnic groups have been stereotyped into three broad categories, Lao Loum 68% (Lao of the lowlands including Lao, Phu Tai, Lu and Yuan), Lao Theung 22% (Lao of the mountain slopes including Khamu, Lamet, Phong and Lawen), and Lao Sung 9%, (Lao of the mountain summits, including Hmong, Yao, Phu Noi, Ko, Kui and Musser). This is at best a classification (CIA 2006; Evans 2000; Roder 2001). Ethnic Vietnamese and Chinese people constitute 1% of the population (CIA 2006).

Altitudinal land occupation is more a consequence of recent migrations to unoccupied land, population pressure, and lack of available lowland, than of agricultural choice (Roder 1997). Many of the early inhabitants are speculated to have practiced both lowland and upland rice

cultivation. The emergence of the Lao Loum as the economic and political power base has influenced migration of ethnic groups to remote areas of sloping lands placing them at a geographical and socio-economic disadvantage (Evans 2000). Such disparity is further heightened by poor communication, limited access to markets and infrastructure, poor representation in government bodies, and lack of common language (Roder 1997, 2001). Swidden cultivation farmers tend to use fragile or poor soil resources, have disputed land tenure, live in hilly, remote areas, and are facing greater disadvantage than other rural or urban populations (Roder 1997).

With limited resource options in the lowlands, cultivation of sloping lands have been under pressure and resultant land degradation, environmental problems, and the effects downstream have been linked and attributed to hill farmers (Roder 2001). Consequently this has generated government policies to reduce swidden cultivation.

2.12 Governance in Lao PDR

For centuries Lao PDR has experienced waves of migration and invasion by the surrounding countries, Thailand, China and Vietnam. Lao PDR was ruled by Thailand during the late 18th century until the late 19th century when it became part of French Indochina. Extensive periods of governance have been overseen by French colonial rule with intermittent periods influenced by Russia, Japan, and America during the Vietnamese War. In the 1950s after French occupation most inhabitants were subsistence farmers providing their families with basic necessities and bartering and trading for products they did not have and Lao PDR was totally dependant on US aid (Evans 2002).

During the 1960s political struggles divided the country and the government collapsed and a civil war ensued with peasants experiencing undemocratic practices by the communists. The communists set up ‘mass’ organisations in villages and cooperatives were established to control the marketing of agricultural produce and to control traders with a rice tax imposed (Evans 2002). In the 1970s the Lao communists instigated agricultural collectivism to reform the agricultural sector. This strategy was to generate economic surpluses to finance state development and to maximise the effect of modern inputs into agriculture. However collectivism seriously disrupted agricultural production and proved very unpopular.

The Royal Lao Government was defeated by the Lao People’s Revolutionary Party in 1975 and the royal family deposed (Evans 2002). Following the end of the Lao civil war in 1975,

agricultural communities experienced government intervention through production directives and resettlement programs. The newly established Lao government was faced with a great diversity of ethnic groups and languages, limited health and education systems, a dysfunctional administration, and limited economic capability (UNDP 2001). During the 1980s the country began to embrace the market economy and formed trading cooperatives which were not successful and eventually abandoned (Evans 2002).

In 1986, the 'New Economic Mechanism' policy reform sought transition from the centrally planned, socialist economy to a market economy (Evans 2002). Privatisation and free enterprise became the driving principles of development (Ducourtieux 2004). A decade later the government's goal was to remove Lao PDR, from the list of 'least advanced' countries. In 2001, the 7th Congress quantified objectives to reduce poverty by half by 2005 and for poverty eradication by 2010 (GOL 2003; NGPES 2003). Poverty reduction was to be achieved through the equitable distribution of the benefits of economic growth, socio-cultural development, and environmental protection through sustainable resource management (GOL 2003; Peters et al. 2001; UNDP 2001).The foundations for reaching this goal have been laid during the past 28 years of peace and development in the country by:

• Moving consistently towards a market-oriented economy.

• Building-up the needed infrastructure throughout the country; and

•Improving the well-being of the people through greater food security, extension of social services and environment conservation, while enhancing the spiritual and cultural life of the Lao multi-ethnic population (NGPES 2003 p.1)

The Congress outlined polices to counteract poverty through the elimination of opium production by 2005, and progressive phasing out of swidden cultivation by 2010 (GOL 2003). This reflects attitudes of past colonial administration and current development institutions, which postulate that swidden cultivation is an out-moded and environmentally destructive form of land use.

Poverty is increasingly evident in Lao PDR due to increasing population pressures, reduced access to natural resources, and disruptions in livelihoods from the implementation of government policy for swidden cultivation (NAFRI 2004a). The National Poverty Eradication Program (NPEP) goals and strategies for agricultural development have been enunciated in the Ministry of Agriculture and Forestry Strategic Vision for 2020 (NPEP 2003). This program is supported by a decentralisation policy, where development is based on community demand, and on priority access for the poorest districts. The national policy has been developed through

consultation with local, national, and international stakeholders (Khamhung 2004). Whilst the aim of NPEP is to use more collective and collaborative efforts to ensure cohesive delivery of resources and action at target areas, debate is contentious as to the effects on poverty alleviation. Presentations and discussions at the workshop on Poverty Reduction and Shifting Cultivation Stabilisation in the uplands of Lao PDR in 2004 debated the effectiveness of policy, due in part to the absence of resource inputs by the government, and to the lack of appropriate, alternative farming system options (NAFRI 2004a).

Restrictive policies on shifting cultivation stabilisation, with village merging and land allocation, as well as the continued eradication of opium have impacted on the rural poor (ADB 2001b). These people are supposedly the main beneficiaries of the NPEP poverty eradication program, yet suffer through program implementation. Consequently, many communities of swidden cultivators, (including many ethnic minorities) are experiencing adverse social and economic impacts, as the pace of restrictions falls short of the capacity of the local government to deliver compensatory assistance (ADB 2001b). Decentralisation of governance to provincial and district authorities for provision of policy targets has negatively affected livelihoods (NAFRI 2004a). Recommendations indicate that changes in NPEP and current development strategies are required if poverty alleviation is to be a viable outcome (NAFRI 2004a).

Development initiatives in the uplands have proven difficult to implement due to remoteness, inaccessibility, endemic rural poverty, and poor access to credit and capital. Limited infrastructure and a narrow human capital base create further difficulties for development (GOL 1999). Progress towards the development and transformation of rural livelihood systems has been guided by the Government's Strategic Vision for the Agricultural Sector (GOL 1999). Major initiatives have been the Lao government's Shifting Cultivation Stabilisation Project and the land allocation program implemented during the 1990s. These initiatives have been used to facilitate changes towards permanent agricultural production (Fujita & Phanvilay 2004). Upland development is a complex issue with no single solution. However, integrated farming systems research, multi-disciplinary research and extension approaches, and interactions between extension agents and NGOs with economic sectors provide ways of working towards viable solutions (Hansen 1998; NAFRI 2004a).

Agricultural policies for rural production in the uplands were guided by the Shifting Cultivation Sub-program in Luang Prabang Province, established in 1989. Until 1995, the main objective was to devise and test technical, extension, and development methods that could facilitate sustainable and productive land use in the varied regions of the uplands of Lao PDR. This was

accomplished through a combination of research, training, and practical development activities in forestry, crop production, horticulture, and animal husbandry (Fujisaka 1991). From 1996 to 2000, the objective of the Shifting Cultivation Sub-Program was narrowed, by concentrating on applied research and development activities in villages (Hansen 1997).

The development strategy that evolved from the Shifting Cultivation Sub-Program covered several components including: land allocation, promotion of permanent cultivation, expansion of paddy production, tree planting, infrastructure improvement, livestock, and social development (Fujisaka 1991; Hansen 1997). The policies were to influence the transition of farming systems away from a reliance on diversified and extensive farming practice towards more intensive farming production. The assumption was that farmers who continued upland rice production in reduced fallow rotation with diminishing yields and lower returns to labour would respond to the market economy by intensifying cropping and livestock production. Under these circumstances, some farming systems failed to provide food security and income, and forced farmers to try other means to generate sufficient livelihoods (GOL 2003; Hansen 1997; UNDP 2001).

Bilateral and multilateral aid forms a substantial proportion of the revenue and capacity used to implement government policies. International donor organisations in collaboration with the Lao government provide essential infrastructure, and alternative livelihood options for swidden agriculture, often through short term projects. Research and development initiatives try to respond to the highly differentiated needs of rural communities by providing technological options for resource-poor farmers. The provision of new technologies and services is expected to create an enabling environment for change (Bainbridge et al. 2000). These alternatives require:

> …development of self-sufficient, diversified, economically viable, small-scale agro ecosystems…adapted to the local environment that are within the farmers' resources (Louks 1977, p. 47 cited in Warner 1991).

However, Roder (1997) suggests that significant changes in land use systems are stifled both by the dietary preference for rice, and cultivation on sloping lands where farmers are unable to introduce tillage technology. In addition, agro forestry-based livelihood systems are deeply embedded in the cultural and social life of the many different ethnic communities that steadfastly resist change (UNDP 2001).

There are many challenges faced by swidden cultivators when changing to sedentary production systems. (1999), points out that rural development programs supported by international development agencies should be designed to improve livelihoods, avoid impoverishment and acculturation, and preserve the natural environment.

Although the government has implemented policies to eradicate swidden cultivation, little progress has been achieved for several reasons. Rasul and Thapa (2003 p. 501) argue that even with a population growth over 2%, the gross population density is often less than 20 persons/km^2 in Lao PDR, and hence population pressure is insufficient to force agricultural reform. Encroachment on forests for additional cultivation, though illegal, probably occurs due to a lack of enforcement of regulations and the customary rights to the forest (Rasul & Thapa 2003). Politically, the socialist government is aware that swidden cultivation is the main source of a largely subsistence livelihood and risks public dissent if restrictive policies are to be adhered to without first establishing suitable livelihood alternatives (Rasul & Thapa 2003). Issues of land ownership rights, land tenure, and land allocation policies may influence changes in future land use patterns. Difficulties in accessing markets, lack of transportation facilities, and the unavailability of support services such as extension and credit, further undermine the farmers' ability to abandon swidden cultivation (Rasul & Thapa 2003).

Bouahom, Douangsavanh & Rigg (2004) claim that as the country moves toward a market economy, different diversification strategies emerge from subsistence livelihoods. Diversification and the transition to non-farm activities are driven by different forces such as markets and tourism and livelihoods then become less related to resources.

2.13 Livelihood systems in Lao PDR

Most rural households use multi-livelihood strategies, engaging in a diversity of subsistence and income-earning activities (Bouahom, Douangsavanh & Rigg 2004; GOL 1999; Raintree 2004; Rasul & Thapa 2003; Roder 1997; Sanderwell et al. 1997; Scoones 1998; UNDP 2001). Fluctuating environmental and economic conditions necessitates the integration of agriculture, horticulture, hunting and gathering, animal husbandry, and forestry to sustain households (UNDP 2001).

Livelihood systems in the uplands of Lao PDR comprise a very complex and intimately related set of elements including (i) cultural beliefs (rituals, ceremonies, and myths); (ii) land (territory, arable land, forests and sacred spots); (iii) rice cultivation (dry rice and paddy fields); (iv)

livestock (cattle, buffaloes); (v) maize, tuber and vegetables crops (in upland fields and home gardens); and (vi) natural resources (fish, wildlife, and other forest products) (ADB 2001b p.43). All these elements are organised into a continuum of activities and enterprises based on a fragile, but nonetheless, operational balance between human groups and their territories.

Livelihood activities are founded on farming systems and forests. Farming systems or enterprises have been classified into 10 different groups by the Ministry of Agriculture and Forestry (MAF 2001); with combinations of lowland rice paddies, upland swidden cultivation, and plateau plantation agriculture (UNDP 2001). In reality, these are invariably mixed systems. Forest access, home gardens, and extensive management of livestock support these systems to varying degrees, providing diverse sources of income and subsistence. Clearly, biodiversity is the foundation of traditional livelihood systems in rural Lao PDR (Raintree 2004). The utilisation of agriculture and the forest is an agro-forestry based livelihood system involving cultural beliefs and ritual technologies, evolving over time and specific to ethnic groups (UNDP 2001). Livelihood traditions are deeply embedded as forests play a special role in the livelihoods of rural people (UNDP 2001). Livelihood systems however, are often in conflict with government policy on issues of conservation and forest use. Furthermore, conflicts exist between the short term needs of rural livelihoods and long term goals of forest management, and the agenda of powerful special interest groups concerned with the economic conversion of forest resources.

2.13.1 Household livelihood strategies for food security

Rural households pursue a hierarchy of strategies to achieve their food security objectives (Raintree 2004). Rice sufficiency is maintained by growing either paddy or upland rice, or purchase of rice by collecting and selling Non Timber Forest Products (NTFPs), growing cash crops, raising small livestock, producing cottage industry products, engaging in trade, or selling family labour (Raintree 2004). The poorest farmers tend to spiral into indebtedness and are reduced to dietary staple substitution. Raintree (2004) constructs a typical household livelihood system, from diagnostic research in Luang Prabang Province. Household decisions on livelihood systems are dependant on basic needs and the supporting production systems, as described in Table 4.

Table 4 A typical household livelihood system

HOUSEHOLD LIVELIHOOD SYSTEM	
PRODUCTION SUB SYSTEMS (Components of Basic Needs Subsystems)	**BASIC NEEDS SUPPLY SYSTEMS**
Direct needs (outputs consumed directly by household) →	
▪ Crops, livestock, fish, NTFPs, purchased foods	▪ FOOD
▪ Firewood from forests & fallows, crop residues, etc	▪ ENERGY
▪ Timber, NTFPS, purchased goods	▪ SHELTER
▪ Medicinal plants, purchased medicines	▪ MEDICINE
▪ Short term cash crops, livestock, NTFPs, cottage industries	▪ CASH ▪ SAVINGS/INVESTMENT
▪ Long term savings/investments in livestock, trees, banks, farm improvements	
Indirect needs (major inputs for producing outputs that are consumed by the household) →	
▪ Grasses, forage, crop residues, feed crops	▪ FEED FOR LIVESTOCK
▪ NTFPs, timber, crops, purchased materials	▪ RAW MATERIAL FOR COTTAGE INDUSTRY

Source: John Raintree, (2004) Socio-economics Unit, Lao-Swedish Unit Agricultural Research and Forestry Program (LSUARF), NAFRI.

Diagnostic research by the Lao Swedish Upland Agriculture and Forestry Research Program (LSUAFRP) indicates that failures to meet basic needs in these livelihood systems are caused by insufficient food, cash, savings and investment, and feed for livestock (Raintree 2004). Furthermore, Raintree (2004) suggests that declining productivity of swidden-based upland farming systems, and the scarcity of NTFPs, combined with the failure of alternative income sources to transform the rural economy, have compounded to negatively affect livelihoods. Raintree (2004 p. 5) conceptualises a causal diagram of the 'swidden degradation' syndrome using information from the Participatory Poverty Assessment in 2001 (ADB 2001b) (Fig. 4).

Figure 4 illustrates the linkages and direction of causality occurring when there are dwindling and insufficient resources available to the swidden community. The circles with bolded text indicate the main issues that directly impact on other areas, often resulting from several other linked factors. Population pressure, insufficient rice production, and a lack of savings and investment direct the downward spiral of the 'swidden degradation' syndrome. The causal diagram serves to illustrate the complexity inherent within swidden systems that influences farmers' agricultural production decisions.

The downward production spiral is accelerated by localised population pressure, the government's relocation program, and reduced land availability through the government's land allocation policy. Land shortages and reduced fallow period result in soil infertility, and increasing weed and pest problems (Raintree 2004; Hansen 1998). Greater investments of labour are then required for diminishing returns creating more labour shortages. Rice insufficiency becomes problematic with the need to mortgage the coming rice crop, and sell family labour to buy rice, and poor health from nutritional depravation further compounds the downward spiral. Raintree (2004 p. 5) claims that, "without a sufficient rest period to rejuvenate the land, this downward spiral is inevitable unless there is a major change in upland farming technology." Furthermore, relocation has forced the movement of populations from remote areas into target villages, increasing the population concentration and placing severe pressures on local livelihood and biodiversity.

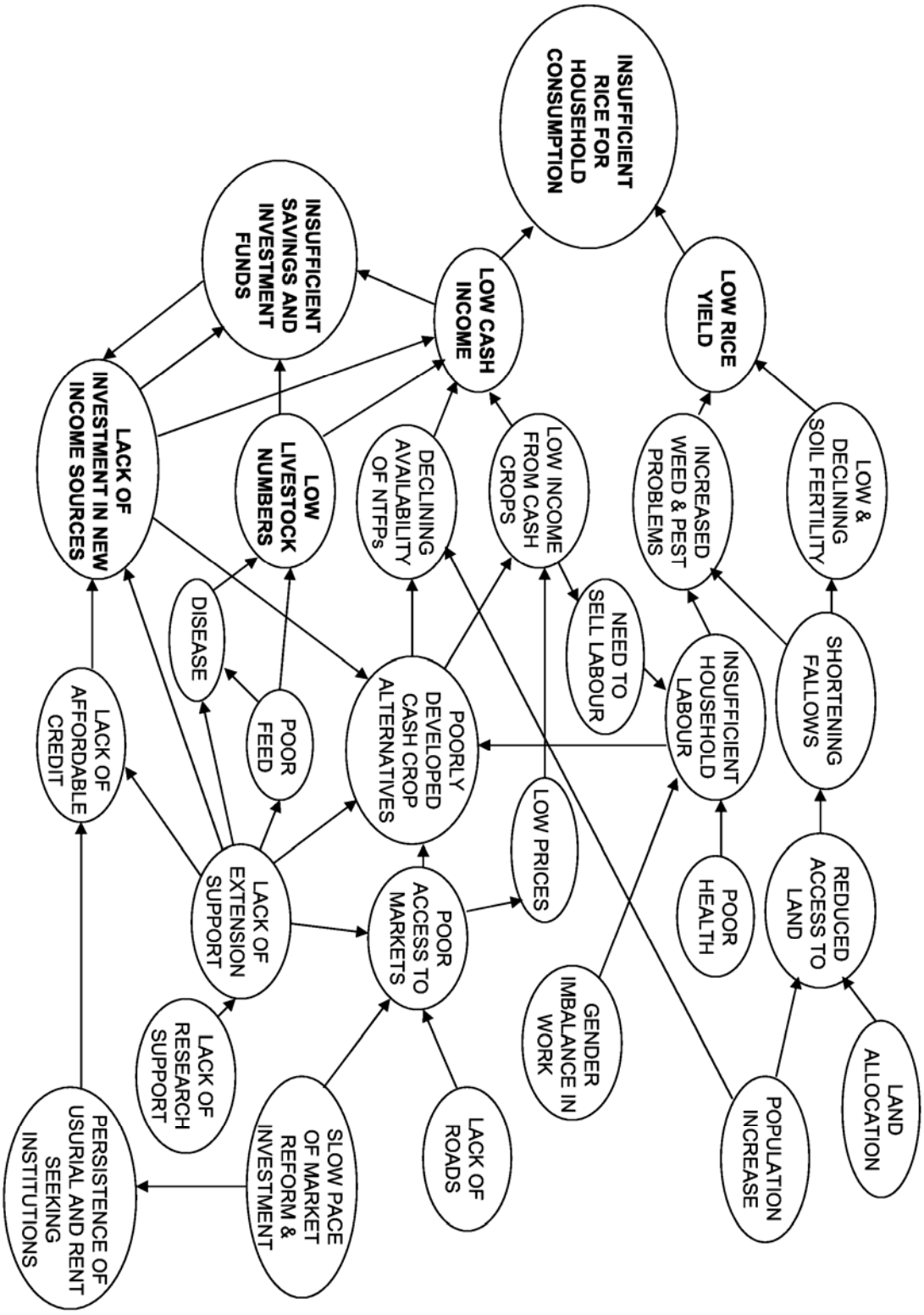

Figure 4 Causal diagram of livelihood problems describing the 'swidden-degradation' syndrome in upland Lao PDR. Source: Raintree 2004 p.5

In the degradation cycle, land scarcity forces production changes from upland rice production to rice paddies, cash crops, and livestock for the market. Paddy land is severely limited in Luang Prabang Province and poorly developed markets cannot provide sufficiently for market-oriented production (Raintree 2004). These weakly developed rural market systems are then subject to commodity boom and bust cycles. For technologies to be supported and cash crop alternatives to be adopted, several key problems need to be resolved. Improved access to markets, greater extension support, and access to affordable credit are all necessary to promote technologies and changes to farming systems (Raintree 2004).

Livelihoods are disturbed when upland rice yields are reduced by calamities such as natural disasters, pests, relocation or land allocation. In response, farmers compensate through the sale of livestock, reliance on and harvesting of forest products and wildlife, and hiring out their labour. This negatively affects village economics, ecosystems, and social systems, increasing vulnerability through the loss of savings, natural systems, and dignity and cultural pride (ADB 2001b).

Livelihood deficiencies cause an increased reliance and exploitation of natural resources with the consumption and sale of forest products for health care, medicines, education, transportation, clothing, and market goods (ADB 2001b). Forest products collected are usually cardamom, damar resin, broom grass, paper mulberry, palm hearts, bamboo shoots, and rattan shoots. Hunting of wildlife augments the basic diet but diminishes the supply of fish, mammals, reptiles, and birds. Livelihood deficiencies lead to farmers' selling their labour in neighbouring villages in exchange for money or rice, and reducing their own production. Produce and livestock are largely consumed rather than sold. Note that livestock are a form of savings or safety net used only when there is no other alternative. Starch staples, i.e., cassava, maize, yams and taro, can be substituted when rice is not sufficiently available (ADB 2001b).

Off farm income from the sale of handicrafts such as bamboo basketry, rattan mats, metal work, tools implements, silversmiths, weaving, and embroidery provide for additional income (ADB 2001b). Overseas consignments of such products to relatives in the United States of America can be particularly lucrative. The emergence of a market economy is rapidly increasing reliance on cash incomes in some upland areas.

2.13.2 Village strategies for food security in Lao PDR

Policies and strategies can be expressed explicitly and formally as statements or decisions, or can be actioned and actively expressed. Sanderwell, Ohlsson & Sanderwell (1997) claim that households and villages have strategies to ensure food security by investment in paddy fields or alternatively, pursuing economic diversification away from subsistence livelihoods through the market. There are often many different strategies to achieve a common objective. The reduction of swidden cultivation as an objective can be approached by a variety of strategies, often flexible and locally contrived. These strategies are affected by external and internal pressures and influence. Villages respond to this initiative differently, very much determined by circumstance and location (Sanderwell, Ohlsson & Sanderwell 1997). Within a village, variation also occurs, with several competing strategies contemplated and householders looking into different options. In fact, individual strategies can be developed irrespective of the village decisions. Both villages and households operate in a dynamic of decision making.

According to Sanderwell, Ohlsson & Sanderwell (1997) examples of strategies that can be used by villages and householders in response to changes in agricultural conditions include (i) avoidance, (ii) dependence on the government, (iii) continue as before whilst embracing the market, or continue as before but join the market as a consumer, (iv) embrace new technologies and economic diversification, (v) single item strategy for the village e.g., building a road, (vi) emigration, or (vii) gender specific strategies. Rural development can include both individual and organisational strategies, some of which are compliant and cooperative whilst others may conflict or compete with other (official) strategies.

2.14 Low external input technologies in Lao PDR

Low external input technologies (LEIT) uses locally available resources and encourages group activities, social learning and developing capabilities for individual and collective innovation (DFID 2006). Examples of these technologies introduced to communities in Lao PDR include forages for livestock feed, inter-cropping species, legumes to improve soil fertility. LEITs are expected to enhance rural development and improve productivity for those without access to conventional farming inputs. Tripp (2006) argues that LEITs require a high level of information and involves complex decision-making. Often adaptation occurs during implementation and is an iterative process. Tripp (2006) also states that patterns of adoption for low external input technologies are usually similar to those for conventional methods, dependant on farmers' education, attitude to risk, and their capacity to hire labour. These remain significant hurdles to the poorest farmers when considering production alternatives.

The provision of new technologies and services is expected to create an enabling environment for change (Bainbridge et al. 2000). New technologies include; irrigated rice, new rice varieties, introduced vegetables and fruit, fruit trees, teak, hedgerows, forages, legumes, grasses, plantation cultivation, silviculture, and livestock containment, irrigation construction and fertilisers.

While public investment in Lao PDR is largely directed at the development of paddy cultivation, education, health, and transportation, resource-poor smallholder farmers are more likely to need investment in upland agriculture, livestock, and agro-forestry or NTFPs (Fujisaka 1991). Paddy cultivation is limited, so the introduction of high yield varieties of rice and the use of fertilisers will not lead to an overall increase in rice productivity (Roder 1997).

Past approaches that aimed to reduce swidden agriculture have involved collaborative research that focused on improvements in rice productivity and sustainable systems, development of technologies for resource-poor farmers, and participation of farmers in the transfer and development of technology (Fujisaka 1991). These approaches included terracing, perennial crops, reforestation, livestock, and developing rural cottage industries. After a review of project experiences and in the face of minimal adoption by Lao farmers, Fujisaka (1991) concluded that there were few realistic alternatives to swidden cultivation.

Roder (1997) suggests that significant changes in land use systems are stifled both by the dietary preference for rice and cultivation on sloping lands where farmers are unable to introduce tillage technology. In addition, the agro-forestry based livelihood systems are deeply embedded in the cultural and social life of the many different ethnic communities that steadfastly resist change (UNDP 2001).

2.15 Agricultural market development in Lao PDR

Market systems are very reliant on the rapid dissemination of information. In South-east Asia, government managed marketing information systems (MIS) generate information that is used to develop and monitor agriculture policies and programs (Binayee 2005). Agricultural marketing information systems have been designed to support the marketing decision making of farmers through the collection, analysis, and dissemination of information (Binayee 2005). The information is also used to promote production and the marketing of agriculture products. Extension officers and development organisations have used the information to support agriculture programs and the delivery of government technical and legal services to farmers and business communities (Binayee 2005). However, marketing information systems have often

failed to provide information on value adding products to farmers. Binayee (2005) mentions difficulties in providing timely advice and information to grassroots communities or to remotely located communities. Communication problems have been compounded by the difficulty in providing analytical and accurate information in a way that the target groups understand. Furthermore, traders servicing poor farmers in remote areas may benefit from blocking the information on prevailing market prices.

Market information is vital to many stakeholders, such as government officers, development organisations, foreign consultants, farmers, and business communities. Little is known about the establishment, function, and effectiveness of marketing information systems in Lao PDR. Adoption of low external input technologies is also affected by the marketability of the product. Sale of the product is also dependant on the operation of the local market economy. There are several important stages in the evolution of market function experienced in transitional market economies.

Monopsony describes a market situation with only one buyer and many sellers. Table 5 presents the stages of agricultural market development from monopsony to monopsonistic competition and to perfect market competition (LSUAFRP 2005 p. 11). Monopsony market systems function in a competitive void and consequently the overall productivity and efficiency of the market is much below its maximum potential. The seller gains better bargaining power and increased income as monopsonistic competition moves closer towards the ideal of perfect competition. This opens up possibilities for new traders to enter the market. Productivity and efficiency of the market is then maximized (LSUAFRP 2005).

In Xieng Ngeun District in 2005 a monopsony market situation existed for the production and trade of numerous agricultural products, detailed in Chapter 8.

Table 5 Stages of agricultural market development from monopsony to perfect competition

Monopsony →	Monopsonistic Competition →	Perfect Market Competition
1. One trader & many farmers.	1. Increased number of traders & many farmers.	1. Many traders & many farmers.
2. The trader dictates the price at a low level.	2. Traders are less able to depress the price.	2. Traders and farmers have more balanced influence on the price.
3. Farmers have low bargaining power.	3. Farmers' bargaining power increases	3. Farmers and traders have equal bargaining power.
4. Excess profit for the trader.	4. The profit for traders decreases	4. The profit for traders decreases.
5. No profit, or even losses, for farmers.	5. Increased profit for farmers	5. Increased profit for farmers.
6. Overall productivity and efficiency of the market is below its maximum potential.	6. Overall productivity and efficiency of the market increases but is still below its maximum potential	6. Overall productivity and efficiency of the market has increased further and it operates at maximum potential

Source: LSUAFRP 2005 p. 11

2.16 Conclusion

Governments in developing nations are often dependant on international organisations to provide financial assistance for agricultural development to alleviate poverty in rural areas. In general, government policies are developed to directly influence agricultural practice that potentially have a profound affect on the smallholder farmer. Development theory is translated into practice by governments and international development agencies in the form of integrated rural development using less formal, participatory methodology. The sustainable livelihoods framework can be used as a guideline to assess farmers' livelihood strategies in response to rural development initiatives. A monopsony market in agricultural trade operated in Xieng Ngeun District which influences livelihood strategies. Adoption of low external input technologies by farmers are affected by the marketability of the product and the operation of the local market economy.

Chapter 3
Land use in South-east Asia and Lao PDR

3.1 Introduction

Swidden cultivation has been the primary agricultural practice for small groups of people in the mountains of Southeast Asia. Traditional swidden systems have proven to be sustainable when they provide subsistence livelihoods from the consumption of farm products, and the occasional sale of non-timber forest products (NTFP's), timber, and handicrafts (Brady 1996). Long fallow periods maintain soil fertility, and reduce degradation and erosion, with the water balance remaining unaffected by agricultural practice (Brady 1996). Swidden cultivation is perceived to be an environmentally suitable land use when the fallow period is sufficiently long enough to regenerate both the soil capacity, and vegetation (Brady 1996; Rasul & Thapa 2003; Warner 1991). Although population pressures on swidden cultivation have led to the degradation of forests and watersheds in many cases, the system is highly adaptive, and is often the only available cultivation method for agricultural conditions of poor soils, steep gradients, and heavy rainfalls (Collins, Sayer, and Whitmore 1991).

In Southeast Asia, swidden agriculture is more likely to be practised by 'ethnic minorities', who are either indigenous, or immigrants forced to relocate due to socio-economic constraints (Sanchez 1996). Swidden agriculture is a very complex and an extremely well articulated system that relies on strong social cohesiveness, in-depth knowledge of the territories' resources, as well as strong complementarities between various ethnic groups. Relationships between ethnic groups are largely dependant upon a peculiar relation to the land, as well as specific management of territories' resources in response to growing pressures from land tenure. Communities tend to retain their own religion, beliefs, values, and language. Such communities have been considered 'primitive' in light of their simple or different culture and 'wasteful' agricultural practices, and have been accused by governments of contributing to forest destruction and land degradation (Boserup 1965; Brady 1996; Warner 1991).

3.2 Traditional swidden land use

Swidden cultivation agriculture is known by several terms, such as shifting cultivation or slash and burn agriculture, and has been a major land use system throughout the world, largely in subtropical and tropical areas (Boserup 1965; Brady 1996; Brookfield 1972, 1984; Conklin 1961; Rasul & Thapa 2003; Roder 1997; Warner 1991). Conklin (1957) defined swidden

cultivation as an agricultural system in which fields are cleared, usually by fire and then cultivated for shorter periods than they are fallowed, in a system of cropping and fallow. Natural vegetation is slashed and burned and upland crops are planted.

Swidden cultivation is perceived to be an environmentally suitable land use when the fallow period is sufficiently long to regenerate both the soil capacity and vegetation (Brady 1996; Rasul & Thapa 2003). Although population pressures on swidden cultivation have led to the degradation of forests and watersheds, it is highly adaptive and can be the only sustainable cultivation method for agricultural conditions of poor soils, steep gradients, and heavy rainfalls (Collins, Sayer, and Whitmore 1991).

Worldwide, up to 300 million people practice swidden cultivation involving approximately 30% of the global exploitable soils (Brady 1996 p. 3; Roder 1997; Sanchez 1996; Warner 1991)**.** In Southeast Asia agricultural intensification has replaced traditional farming to varying degrees in Nepal, Thailand, Indonesia, Vietnam, and Malaysia. However, swidden cultivation is still widely practiced in northern India, Bangladesh, and Laos.

Rasul and Thapa (2003 p. 1) claim that such interregional variations are explained by:

> …several socio-economic, institutional and policy factors, including population growth, government control of common property resources, the land tenure system, physical infrastructure, technology and necessary support services.

Profound changes to agricultural practice occur in response to the process of economic development and changes in cultivation methods are both complex and dynamic (Boserup 1965; Brookfield 1972, 1984: Rasul & Thapa 2003). Land use developments in agrarian economies are usually linked to population pressure and the amount of labour required for production (Boserup 1965). Increased requirements of growing populations eventually forces a change from extensive to intensive agriculture and the adoption of technologies to support new systems for increasing crop yields. Changes in swidden cultivation occur through changing management practices and cropping patterns, and often the addition of inputs such as fertilisers, pesticides, and herbicides. Subsistence farmers are then forced to make economic decisions influenced by price, market, institutions, and policies (Rasul & Thapa 2003).

In 1999, approximately 39% of total agricultural land in Lao PDR was dedicated to upland rice production in swidden cultivation systems (UNDP 2001 p. 123). These farming systems are

highly variable and diversified, and developed in response to local environmental and cultural conditions. The main changes to upland rice cultivation in the last few decades have been a reduction in the fallow period (with a subsequent increase in labour requirements for weed control), loss in soil fertility, and diminished annual yields (Collins, Sayer, and Whitmore 1991; Conklin 1957).

During this time there have been many government policies and development projects aimed at improving the standard of living, achieving food security through stabilising the upland populations, and increasing paddy rice production (GOL 1999). Land degradation, decreasing soil fertility, watershed problems, weeds and pests, and loss of biodiversity have all contributed to the agricultural problems in the uplands. With increasing economic pressures current agricultural practices continue to provide but a meagre living (GOL 2003).

Roder (1997 p.1) claims that:

> …the options available are limited by the market opportunities and there is little chance that any of the technologies offered will be adopted on a significant scale. Hill farmers have a comparative advantage for livestock and timber production but generally lack the necessary resources to make long term investments in either operation. Market, credit opportunities, and land tenure are key factors affecting the direction of future hill agriculture in Laos.

Swidden agriculture is a continuum of highly diverse systems using crop species and varieties adapted to local environments, (i.e., soil type, rainfall, and sunlight), to produce a reliable food supply, with minimal disease and pest problems (Collins, Sayer, and Whitmore 1991). Variations occur in fallow times, dispersal of swiddens, and incorporation of livestock (Conklin 1961). Conklin (1957 p1) suggests that "shifting cultivation may refer to any one of an undetermined number of agricultural systems". What these systems have in common is agricultural practice built on centuries of experience of sustained crop yields. The subsistence production outcome requires self-reliant farmers to continue without dependence on scientific information, external inputs, capital, and credit or markets (Collins 1991).

Swidden agriculture depends on the extent of available land, labour and capital, local settlement patterns, and social and political integration with other segments of society (Conklin 1961). These systems rely on limited resources, low levels of technology, and the efficient use of labour. As social, economic, and natural environments change, so too does the overall

subsistence strategy. Resources are managed by shifting fields to exploit the energy and the nutrient capital of the natural vegetation and soil complexes (Warner 1991).

Sustainable cultivation practices in remnant patches of forest are a form of managed deforestation. Rather than abandoning fallows, farmers manage and use plants in the secondary successional vegetation (Fox et al. 2000). Successional vegetation includes grass and bushes, open-canopy tree communities, and mature closed-canopy tree communities that can be more productive to the farmers than the original forest (Warner 1991). Fox et al. (2000) claims that swidden cultivation alters the characteristics of the forest from a fairly homogeneous forest cover with open and closed canopy, to a heterogeneous cover of secondary vegetation. Furthermore, this may be a source of biodiversity, and used for collection of food, timber and non timber products (UNDP 2001). The availability and diversity of food increases as farmers incorporate harvested crops and wild plants. Various stages of vegetation re-growth at multiple sites complement the cropping systems, and provide a diverse habitat for wildlife, therefore improving the prospects for hunting (Collins, Sayer, and Whitmore 1991).

The integral swidden system initially pioneers deforestation, but once established, communities use cleared vegetation areas for crop rotations and hence engage in more sustainable practices (Conklin 1957). Sedentary agriculturalists use a number of conservation measures, contributing to biodiversity and the fertility of the surrounding village land. This includes preservation of primary forests and areas of forest re-growth to provide seeds and plants, and areas suitable for hunting animals. Crop rotations, long fallows, and minimal disturbance of the topsoil contribute to practices that maintain fertility rather than result in exploitation (Collins, Sayer, and Whitmore 1991).

Other communities with socio-economic ties outside the area of cultivation practice partial swidden cultivation. Ownership of land and productivity are viewed as more economically opportunistic, and used in addition to permanently cropped fields. Such systems are less sustainable, can be abandoned or sold or degraded and may encroach on the forest. Lack of knowledge of techniques and terrain contribute to the degradation (Brady 1996; Conklin 1957; Warner 1991). As the accumulation of sufficient local knowledge of the agrarian environment takes several generations, migration and resettlement impacts on the way land is used and tends to be exploitive.

Swidden agriculture, (slash or burn, or brush fallow) depends primarily on perennials to suppress weeds, restoring soil fertility during fallow periods. As a farming system, sustainability can be

achieved when there are long fallow periods and low population densities. The low productivity is compensated by the low labour and energy inputs, giving an overall high return (Roder 2001). In addition farmers often diversify livelihoods by intensive cropping, home gardens, livestock, hunting and gathering, and paddy rice production but tend to have minimal integration into markets (Chazee 1994; 1999). Furthermore:

> Traditional indigenous societies have generally established relatively balanced relationships with their natural environments from which they extract their subsistence….These societies possess, at the social level, regulating mechanisms which guarantee the survival and reproduction of the group and its values and have been able, from generation to generation, from empirical observations to thoughts, to establish generally implicit rules which govern the relationships between man and the natural environment Chezee, 1999 p. vi).

These rules are considered natural rather than explicit, and indicate the inseparability of material and spiritual culture in agricultural work.

Such relationships are not usually taken into account by agricultural economists and consequently swidden cultivation has been targeted as an inappropriate agricultural system, viewed as causing environmental degradation. Vandergeest (2003b) claims that negative perceptions of swidden farming systems in Lao PDR are contingent on several underlying assumptions, all of which have been challenged in the research literature. Assumptions underpinning attitudes are that swidden cultivation (i) causes poverty, (ii) is becoming unsustainable with increasing population densities, (iii) destroys forests, and (iv) reduces water available for agriculture (Vandergeest 2003b).

Warner (1991) argues that objections to swidden cultivation relate to the burning of trees and the loss of the inherent value of timber rather than the conservation issues of the disturbance to the natural resource base. The low productivity from natural and human resources, and the consequent soil erosion and degradation from the cutting and burning of forest, is seen as a waste of resources. However, the essential issue regards the beneficiaries, where governments perceive the burning of a national resource to be a misappropriation of resources from the national to the local, smallholder farmer (Lambin & Geist 2003; Warner 1991).

3.3 Deforestation

In Southeast Asia, swidden cultivators are increasingly under government pressure to change and adopt more sedentary farming practice. Swidden agriculture is considered by many to be environmentally and economically unsuitable, and efforts have been made to incorporate more productive and sustainable land use systems (Rasul & Thappa 2003). National governments have blamed swidden cultivators, traditionally ethnic minorities, for the rapid loss of forests. Farmers are commonly perceived as 'forest-eaters' and are a major cause of deforestation (Collins, Sayer, and Whitmore 1991; Devendra & Thomas 2002; Fox et al. (2000), O'Brien 2002; Roder 2001; Sanchez 1996). Sanchez (1996 p.1) claims that the "…continuing pace of tropical deforestation and its negative effects on global climate, biodiversity, and watershed stability is one of the major world-wide environmental concerns."

In Southeast Asia, during the decade between 1980 and 1990, the population increased by 2.1% whilst the forest cover decreased by 1.3 million ha/year and it is suggested that over half this deforestation was caused by swidden agriculture (FAO 1993 p. Annex 1: Table 1b, 4b). These figures show substantial population growth and food requirements were met through conversion of forest into agricultural land. From the international perspective, concerns arise as tropical deforestation contributes to global climate change, air pollution, diminishing biodiversity, watershed instability, and the reduction of natural resources in a world of dwindling forest reserves (Brady 1996; Vosti & Witcover 1996; Warner 1991).

In 1991, 60% of the tropical deforestation, (of approximately 10 million hectares) was carried out by small-scale farmers using slash-and-burn techniques for agricultural settlement (World Bank 1991, p.1 cited in Sanchez 1996). The burning of forested areas and the decay of trees, debris and soil organic matter, particularly in the tropics, contributed to 25% of total global emissions of carbon dioxide and other green house gases (Brady 1996 p. 5). Forest and land combustion makes a considerable contribution to global warming and hence climate change. Land use, atmospheric composition, and climate change are the main variables of global change (Tinker, Ingram & Struwe 1996). Deforestation from permanent land use change alters land cover, causes erosion, and adds to the production of greenhouse gases by emitting smoke and dust particles as aerosols.

Angelsen (1995) questions whether expanding traditional agriculture does contribute to half of all tropical deforestation, or is over-estimated through unclear definitions, uncertain estimates, and political biase. For example, land use intensification and government policy have accelerated clearing of primary forests in Indonesia. Destruction of tropical forests can occur

through population increases causing fallows to be re-cultivated in shortened cycles. Increasing populations require continued land cultivation, allowing weeds to establish, and soil fertility to decline. The cultivation of erosion prone soils and the use of forest resources that could be better retained for the conservation of biological diversity or for timber reserves, is problematic (Collins, Sayer, and Whitmore 1991).

At the 1992 United Nations Conference on Environment and Development, Agenda 21 was adopted as a global action plan, a political commitment to development and environmental cooperation (Keating 1993). Plans for future sustainable forestry development encouraged governments to limit destructive swidden cultivation by effectively addressing the underlying social, economic, and institutional causes (Keating 1993). The negative consequences of swidden were claimed to include environmental degradation, reduced productivity by the poor, dependence on rainfall, higher incidence of pests, and economic loss caused by burning the forest (GOL 1994).

3.4 Land use in Southeast Asia

Historically in South-east Asia, high ranking elites and other authorities controlled the land, ensuring access to subsistence agriculture without the need for land title. In colonial times agriculture expanded into globally traded cash crops in the lowlands such as sugar cane, rice, and rubber with colonial control of forests (Lambin & Geist 2003). In post-colonial times, multi-national companies have traded on export markets for forest products around the world. These factors have pressured swidden cultivators to intensify agricultural practice or cultivate in new forests (Lambin & Geist 2003).

There are examples in South-east Asian countries where agricultural intensification has largely replaced traditional farming. Pioneer and rotational swidden cultivation, once practised in the northern mountains of Thailand, is no longer the most important land use. Individual households have employed an array of livelihood activities to provide staple food and cash income. The use of land has been modified for wetland rice production, multiple cropping, and for the production of fruit and vegetables. Agricultural systems have changed in response to increased population and productivity requirements, government policy, and improved access and transportation to markets (Rerkasem 1998). Traditional and new technologies have been adapted to increase productivity, including irrigation, and the use of inputs such as fertilisers and pesticides. Commercialisation of crops through improved marketing and credit arrangements has facilitated change, as has off-farm income from tourism and handicrafts (Rerkasem 1998; Thapa 1998).

In Vietnam, dramatic increases in population combined with the forest protection of large tracts of land into reserves have reduced both available land, and fallow time between cultivation. By cultivating wet rice paddies with higer rice yields, less upland rice is grown and livestock have been be successfully integrated into this composite system. Other components include home gardens, fishponds, and forest products (Rambo & Cuc 1998).

In Nepal sedentary agriculture has replaced swidden cultivation; whilst there have been only moderate changes in Indonesia and Malaysia. Swidden cultivation is still widely practised in northern India, Bangladesh, and Lao PDR. Rasul and Thapa (2003 p. 1) claim that:

> …such interregional variations are explained by several socio-economic, institutional and policy factors, including population growth, government control of common property resources, the land tenure system, physical infrastructure, technology and necessary support services.

Examples of ecologically sustainable, more productive enterprises that have replaced swidden agriculture in other countries include (i) rice paddies, (ii) fish ponds, (iii) home gardens, (iv) trees and crop plantations, (v) mixed farming systems using draft animals, (vi) managed feed resources, (vii) extensive agro-pastoral systems in dry mountainous areas, and (viii) mulch/green manure/cover crop farming in humid areas (UNDP 2001).

3.5 Factors influencing changes to land use

Land use is influenced by environmental issues and land use history as well as government planning and planning instruments. Drivers and triggers of change cause social and ecological responses that lead to land use change. Lambin and Geist (2003) assert that the process of land use change can sometimes lead to rapid degradation of ecosystems and impoverishment. However, often technological innovations can dampen the deterioration and rate of change.

The triggers of deforestation and changing land use patterns include commercial forestry, livestock development, swidden and/or permanent cultivation, and the extension of overland transport (Fujisaka 1991; Geist & Lambin 2002; Thapa 1998). The development of market economies for commercialisation of timber and cash crops can also drive deforestation by increasing demands from nearby urban populations (UNDP 2001). Foreign exchange and export markets for national economic development that use natural resources and forest-derived products, further encroaches on the forest at the expense of the local farmers. Deforestation in

Southeast Asia is related to private and state run timber logging through timber concessions, development projects, and state logging (Lambin & Geist 2003). Commercial logging has been suggested as a primary cause of deforestation in Southeast Asia (Fujisaka 1991; Geist & Lambin 2002; Thapa 1998). Underpinning these causal factors is often government corruption, lack of law enforcement, and mismanagement of the forestry sector (UNDP 2001). Insecure land rights and disrespect for customary rights permits timber logging, and encourages deforestation to occur.

Lambin and Geist (2003) indicate that although it appears logical that agricultural modernisation policies should slow down deforestation rates, improving agricultural technology and providing secure land tenure, and giving farmers better access to credit and markets can potentially encourage greater deforestation (Angelsen & Kaimowitz 2001; Waggoner & Ausubel 2001). Improved farm incomes can be re-invested in forest clearing or can attract more migrants who require cultivation land. Labour-saving technologies can result in jobless and landless agricultural workers clearing forests elsewhere for off-farm income. Sudden shocks such as (i) war, (ii) economic crisis, (iii) implementation of land use policy, (iv) slower processes of agricultural technology uptake, (v) roads, and (vi) population increases are equally important factors influencing deforestation (Mertens et al. 2000). Government policy may choose more sustainable use of environmental resources even when economic development and technological change has the capacity to further degrade forest resources (Angelsen & Kaimowitz 2001; Lambin & Geist 2003; Mertens et al. 2000; Waggoner & Ausubel 2001).

Contentious arguments abound surrounding the management of forests, some of which suggest that forest biodiversity can be preserved through integrated and sustainable swidden cultivation practices, thereby meeting the needs of communities. Vosti and Witcover (1996) explain that people need to guarantee survival, but they can use inappropriate shortened cycles of cropping and fallow, contributing to global warming, and threatening biodiversity. Although some systems can be sustainable and pose little threat to biodiversity, agricultural intensification as an alternative cannot guarantee the safeguard of biodiversity, nor limit carbon emissions (Vosti & Witcover 1996). Tropical forests are rich in biodiversity, so the conservation of species and the maintenance of biodiversity in light of natural resource degradation are of global concern and consequence (Brady 1996).

The argument that deforestation or swidden cultivation influences lowland water flows and quality is not always supported by the literature, but is often used by governments to advocate the reduction of swidden cultivation (Vandergeest 2003b). Assumptions that better management

of watersheds would provide for irrigation and hydroelectric power, are not borne out by the literature either.

3.5.1 Land use and population density

Although swidden cultivation can be considered an environmentally sound practice when there are long fallow periods, only subsistence livelihoods result from the low return per unit of land and labour (Rasul & Thapa 2003). Without inputs and technology, the outputs are marginal. Nyle and Greenland (1960) claim these systems can only support 32 persons/km^2. Southeast Asian population densities vary greatly depending on urbanisation and land use systems. Boklin (1989, p. 17 cited in Warner 1991) reveals that swidden cultivation population densities range from a low 12 persons/km^2 per in northern Lao PDR, to as high as 250 persons/km^2 in northern Thailand (Vandergeest 2003b p. 53). These figures suggest that swidden cultivation will continue to meet the staple needs where there are still relatively low population densities, if forests are available to supplement diet and incomes. However, as populations in Southeast Asia are growing at the rate of 2.1% with coincident deforestation, population pressure will mount and alternatives to swidden agriculture seem imperative for future sustainable livelihoods (Sanderwell, Ohlsson & Sawathvong 2001 p. 1).

3.5.2 Land use and government policy

Governments facilitate changes to land use practices through legislation, policies, and programs. Difficulties in understanding local variations in land use by communities, significant historical factors, and unique driving forces have resulted in the implementation of unsuccessful strategies by many governments (Sanderwell, Ohlsson & Sawathvong 2001). In Lao PDR, the government has instigated large-scale resettlement programs in order to facilitate changes to permanent agriculture, sometimes with negative outcomes that further exacerbate poverty. Some farmers respond to these external influences by actively pursuing integration in the market economy, whilst others persist with marginal livelihoods (Sanderwell, Ohlsson & Sawathvong 2001). Brady (1996) suggests that national and international non governmental organisations should play a key role in understanding swidden cultivation, offering technical assistance, and seeking policy changes that legitimise heritage whilst assuring the sustainability of farming systems.

3.5.3 Land use and development

Profound changes to agricultural methods can occur in response to the process of economic development, and this change in cultivation methods is both complex and dynamic (Boserup 1965, Rasul & Thapa 2003). Land use developments in agrarian economies are linked to population pressure and amount of labour required for production (Boserup 1965). Increased subsistence requirements by growing populations eventually forces the change from extensive to intensive agriculture, and the adoption of technologies to support new systems to increase crop yields.

Changes in swidden cultivation occur through changing management practices and cropping patterns, and often the addition of inputs, such as fertilisers. This in turn challenges and changes the subsistence villager into a farmer, making economic decisions and responding to changes in price, market, institution, and policies (Rasul & Thapa 2003). Land utilisation varies globally from extensive systems with 20 year fallow periods, to a system with intensive, multiple, annual crops (Boserup 1965). When cropping practices are established with shortened rotation cycles, more settlements tend to be established and changes in farming occur (Rasul & Thapa 2003). New crops and permanent gardens are planted for consumption and sale as the market economy grows, increasingly supporting the marketing of cash crops.

3.6 Theory of agricultural change

The factors facilitating the change in swidden cultivation are numerous. There are long held views of the inter-relationship of agricultural change, and increasing population pressure (Boserup 1965, 1990; Rasul & Thapa 2003; Sanderwell, Ohlsson & Sawathvong 2001; Schultz 1990). Changes in land use patterns usually occur over a long time period, as do demographic changes, and causality is difficult to determine.

The macroeconomic theory of the relationship between demographics and agricultural change was first postulated in 1798 by Malthus and Ricardo in Europe and then related to demographic transitions in other parts of the world (Boserup 1990). Malthusian theory postulated that agricultural production and food supply was a limiting factor to population growth. With a fixed land supply, increasing human population would press on the supply of land and food, increasing the chance of war, pestilence, and famine. Rising death rates and falling birth rates would stem the population growth, to then balance in line with the land and food supply (Marris 1999). A return to prosperity caused population growth and the cycle to be repeated. Malthus

however, did not account for the effects of technological changes and social re-organisation increasing the general productivity of agriculture.

The population forced off the land then moved and were used as the labour force for the industrial revolution. Urban poverty did eventually decline, but this process took one hundred years to benefit the working class (Marris 1999). Malthusian theory was discredited but re-emerged in the 1960's as neo-Malthusianism, where the constraining factor was defined as the total natural resources of the planet, rather than the supply of cultivable land (Marris 1999). Neo-Malthusians believed that increasing population could outstrip agricultural growth (Turner and Brush 1987).

Boserup (1965) challenged Malthusian theory by establishing that changes to cultivation systems were explained by differences in population densities. With increasing population densities, greater agricultural production, and intensive land use takes place, pushed by developing market forces (Lele & Stone 1989). Growing population pressure and increased subsistence requirements stimulated farmers to shift from extensive to intensive land use systems with the adoption of new technologies (Lele & Stone 1989; Rasul & Thapa 2003). Furthermore, Boserup (1990) focused on the inter-relationships of labour productivity, population pressure, and demographic and economic behaviour (Schultz 1990). These factors, though inter-related, are constrained by climate and natural resources, and limited by social institutions of family, infrastructure, land improvements, and the impacts of education and technological knowledge (Schultz 1990). Association of these inter-related factors are surmised as evidence of causation, however tentative, and as a possible explanation of the process of modern economic growth, influenced by demographic and technical changes (Schultz 1990).

Boserup's theory suggests that population pressure promoted technological change and patterns of land use that raised the economic productivity of labour through intensification, land investment, and multiple cropping (Lele & Stone 1989; Schultz 1990). Population pressure gave rise to its own solution; land scarcity forced more intensive use of land. The surplus from intensively cultivated land then contributed to the growth of other sectors, including infrastructure, markets, credit, and services (Lele & Stone 1989). In practice, this indicates that farmers are unlikely to change from swidden cultivation until population pressure and short fallow cycles induce the need for more intensive agricultural practices (Sanderwell, Ohlsson & Sawathvong 2001).

In Lao PDR, government land allocation strategies are guided by Boserup's theory of intensification. By limiting the available land for swidden cultivation, the consequent increase in labour investments by farmers makes swidden cultivation less productive and forces changes towards permanent cultivation (Sanderwell, Ohlsson & Sawathvong 2001).

The process of change of land use is influenced by the inherent socio-economic, institutional, and technological factors. Knowledge and technological development enables improvement of production whilst using the same resources (Rasul & Thapa 2003). Although Boserup addressed the farmers' economic and practical circumstance, she failed to determine the impact of government policies on agricultural change (Sanderwell, Ohlsson & Sawathvong 2001). Of particular importance is the role of public policy as a factor in facilitating agricultural change by influencing the prices of inputs and outputs, and the availability and adoption of technology (Lele & Stone 1989). Intensification of land use can depend on policy and incentives to change to crops of higher value or yield, or to move to more productive land, rather than relying on the influence of market forces (Lele & Stone 1989). Government policies that assist in agricultural change for improved food security involve (i) land policy, (ii) production and consumption policies, (i.e., research, infrastructure, inputs, credit, markets), and (iii) managing the population growth (Lele & Stone 1989). A policy-led approach to intensification is critical to maintaining and preserving resources that otherwise become degraded through intensive use. Institutions facilitate the introduction and use of new technology in agricultural production. Furthermore, institutional reform, such as land tenure, and marketing and credit institutions enhance agricultural productivity, and is an effective incentive to development (Hayami & Ruttan 1971). Government policy affects land rights, land tenure, subsidies, taxes, commodity prices, transportation, and marketing opportunities, and is an important factor influencing agricultural decisions (Brady 1996).

Brookfield (1972, 1984) challenged Malthusian and Boserup's theories by suggesting that agricultural production can be for subsistence needs, social production, and for trading purposes. The proportions of agricultural production in these categories are culturally variable according to the social setting and not necessarily related to return to labour, ease of production or population size. The need for risk reduction is also and important consideration for farmers. Consequently, variations in agricultural intensification and disintensification over time may not be a direct result of fluctuating population or returns to labour. Brookfield (1984) claims there are no clear distinction between innovative practices and processes of intensification that modify farming systems. The scale of analysis then becomes important when describing agricultural change.

Turner and Brush (1987) contrast theories of agricultural change by noting that several key variables are common to all theories. These key variables include population density, land availability, agricultural technology, market impacts, and economic and political structures, that all act to stimulate change. Farming system change can be viewed in terms of structural and technological change. Structural change is a change in the socio-economic relations of production, land, and capital. Technological change can be observed through the variety of technologies, the management practices, productivity, and efficiency (Turner & Brush 1987). Intensification describes technological change where there are increases in the use of labour, and other inputs per unit of land (Turner & Brush 1987).

Brady (1996) describes land use change as a result of factors such as resources, constraints, and government policy that interact to influence farmer decision making processes, and resultant land use. Inhospitable conditions affect the available natural, human, technological, or financial resources for farmers. Constraints such as socio-economic circumstance and biophysical issues impact on farming systems, and act to influence decisions.

Vosti and Witcover (1996) claim persistent poverty necessitates unsustainable land use practices that will continue until alternative livelihood options are available. Farm households' primary objectives are food and livelihood security which ultimately guides land use decisions. Resources to be accessed include natural resources and capital. Natural resources (soils, forest, water), human capital (health, education) physical and financial capital (on farm, off farm), community-owned resources, and political capital are influenced by conditioning factors (policies, technologies, institutional arrangements and community assets), which act together on household production and land use (Vosti & Witcover 1996). Further information supporting this theory has been covered in more detail in Chapter Two (Table 3).

3.7 Facilitating agricultural change

Agricultural research and development policies and projects are used to attempt to balance environmental protection with social and economic sustainability, to develop sustainable production systems (Peters et al. 2001). Research and technology and investments in rural infrastructure are pivotal to rural development, and for poverty eradication. However, it is unlikely that farmers will respond to conservation issues as they utilise their farming and forest environment for a subsistence existence. Development alternatives recommend a focus on small-scale agro-ecosystems adapted to the local environment. Such systems should be resourceful, self-sufficient, diversified, and economically viable (Louks 1977, p. 47 cited in Warner 1991). In support of this recommendation, Warner (1991 p. 48) goes on to suggest that:

> Swiddeners should be active participants in designing new agro ecosystems that are sustainable when forest reserves decline or become inaccessible. Smallholders in the tropics have management needs and skills that should be studied within the context of their communities.

Warner (1991) also comments that it is not surprising that agro-ecological systems research in temperate climate imposed by development agencies on tropical ecosystems have met with little success in some areas. Western technology and knowledge resulting from temperate systems with large fields and inputs such as chemical fertilisers, pesticides, with mono-cropping based on market prices, is very different to the circumstances faced by poor, smallholder farmers in Southeast Asia. Moreover, population pressure, land degradation, and preferred use of forests leads to attempts to stabilise swidden cultivation with only limited success (Collins, Sayer & Whitmore 1991). Poor tropical soils do not support investments in labour-intensive agriculture, nor are fertilisers commonly used in subsistence agriculture.

Establishing new cash crops can be successful, but if markets are remote and difficult to access there are few viable options for crop diversification. Rather, Collins, Sayer, and Whitmore (1991) suggest that the following activities are essential to communities (i) self-sustaining agro-ecosystems that maintain the genetic diversity, (ii) development of land titles to avoid conflicts with timber concessionaires, (iii) mixed farming systems with paddy rice cultivation, and (iv) enforced protection of forests. Furthermore, employment opportunities in forestry are necessary for local development and growth. Issues such as reforestation, opium trade rationalisation, and transport and markets need to be addressed by governments. Collins, Sayer and Whitmore (1991) believe that in the longer term, most cereals will have to be produced intensively in the lowlands, and the uplands used for perennial crops and forestry.

3.8 Policies for subsistence agriculture

Degradation of natural resources is a major concern of international donors, national governments, and resource-dependant communities. Theoretically, resources are more likely to be conserved when land is privately owned (Hardin 1968). Land tenure governs access and use of agricultural land, common property resources, and state-reserved land. Increased tenure security is assumed to give rise to improved efficiency and equity, and subsequently increase productivity and conservation (Maxwell & Weibe 1999). Private ownership of land with security of tenure, allows for the internalisation of costs and benefits, and recompense for the investment in future income. Economic development policy has long advocated the specialisation and commercialisation of

subsistence agriculture, with such benefits as; increased production, income and employment, food consumption, and improved nutrition (Maxwell & Weibe 1999). However, when food and cash crop markets function poorly, subsistence production continues in response to food security concerns (Chambers 1988). Moreover, diversification of production strategies may be preferable to increase food security in some situations.

Smallholder farmers have difficulty maintaining traditional swidden cultivation when national land tenure policies increase central government control over forested lands (Fox & Vogler 2005). Increasingly the market is establishing the commercialisation of subsistence resources and the substitution of commercial crops.

3.8.1 Land tenure and allocation policy in Lao PDR

The Lao government has implemented land tenure in the form of land allocation policies to promote productivity, specialisation, and the commercialisation of subsistence agriculture. Land reform aims to consolidate land security, increase productivity, and give responsibility of natural resource management to farmers (Ducoutieux, Laffort & Silinthone 2005).Both national economic and government policy on land allocation and resettlement play a major role in determining agricultural production. According to Lestrelin, Giordano and Keohavong (2005 p. 2):

> These policies have artificially decreased the agricultural land availability and increased the population density without providing compensatory resources or, as yet, significant alternative opportunities. In response, farmers have intensified labour use, undermining the long term viability of the resource base.

The question posed is whether agricultural policies are supportive of small-scale family farming practices which allow farmers to further develop their plots of land. The following section discusses the implications of government land tenure policies and the impact on farmers in the uplands of Lao PDR.

3.8.2 Implications of government land tenure policies and the impact on farmers in Lao PDR

Historically, villagers in Lao PDR had open access to agricultural land controlled by various traditional rights (Evans 1995). Those that had owned land lost their rights to land ownership after the war as all documents had been destroyed. In 1978, agricultural collectivisation was initiated to

re-distribute land access. This proved to be unpopular with only 40% of farmers joining the nominal cooperatives (Evans 1995 pp. 58-63). This practice was abandoned by the late 1980s with the original landowners regaining control of their lands (Vandergeest 2003a). In 1994, the Ministry of Agriculture and Forestry (MAF) initiated the Land and Forest Allocation Program; land use planning and land allocation with the objectives of reducing swidden cultivation by nominating zones with restricted use and allocating plots of land to each household within the agricultural zone (GOL 1999). The current land tenure reform policies determine that state-owned land is subject to land title and allocated to households or village collectives. Land titling has been implemented in urban and peri-urban centres with the long term intention to extend titling throughout the country on the completion of the land and forest allocation program (Vandergeest 2003a).

In Lao PDR the original targets for swidden cultivation reduction were the Hmong upland farmers, practising in pioneer forests that in many areas resulted in denuded forestlands (ADB 2001a). The nutrient-depleted soils slowed regeneration and the subsequent problems of erosion and weed infestation have been blamed on the Hmong cultivators. However, Roder (2001) claims that all ethnic groups are engaged in swidden cultivation that may denude the forest area. Roder (2001) suggests that both population pressure and government regulations on land use have led to a dramatic reduction in fallow time across all ethnic groups, and consequently land degradation has been exacerbated.

One of the original intentions of the Land and Forest Allocation Program was to respond to illegal logging by provincial and district entrepreneurs. Illegal practices were to be mitigated by giving villagers ownership of forest resources, through participatory land use planning (Roder 2001). Development planning further modified this intention. By aligning the goals of the reduction of swidden cultivation, and the need for infrastructure development, the government relocated villages to services and infrastructure such as, roads and hospitals, and then allocated new village land (Roder 2001). Restrictions to agricultural land use were designed to reduce swidden cultivation and its impact on forest, land, and water resources. In order to solve the problems of resource degradation and livelihood security, land allocation to village communities developed as a long term bilateral forestry sector project funded by the Swedish International Development Agency. The intent of this program was to reduce the ambiguity in resource tenure through the demarcation of village boundaries. Village land was demarcated into land use categories, such as protected forest and economic forests using a participatory process (Vandergeest 2003a).

The Land and Forest Allocation Program objectives included (i) sustainable management of natural resources, (ii) reduction and gradual elimination of swidden cultivation, and (iii) the promotion of commercial production (ADB 2001a). Land title was given to land under permanent cultivation, as in the lowlands where permanent paddy is cultivated in combination with gardens, orchards, and plantations. The land and forest allocation program issued temporary land certificates to upland farmers only if they met the permanent criteria. A temporary land use certificate was issued for three years, and if the land was used as specified, a land title for long term use is then be issued (ADB 2001a). Households were allowed three to four plots of village land, and access to surrounding forest land, depending on the household labour resources (Connell 2003; Hansen 1998). Ownership then allowed for land to be inherited, sold, or leased according to procedures. The Land and Forest Allocation Program was designed to assist villages with land use planning and titling. This had the potential to assist with land rights for the poor and for the implementation of activities and/or new technology.

Difficulties in implementation have occurred through the use of a centralised management program. Standardised guidelines and formalised structures imposed uniform categories of land use. The original land use template was designed at the national level, and did not take into account the heterogeneous nature of the geography (Vandergeest 2003a p. 12). This process created further problems as it assumed an element of enhanced control, requiring enforcement by district officers once boundaries and land uses were fixed.

Problems in implementation, according to the Asian Development Bank (ADB) stem from the lack of uniformity in administrative practices of both the district and provincial agricultural officials (ADB 2001a). Where land and forest allocation have not followed policy, severe hardship has been experienced by swidden cultivation communities, resulting largely from reduced fallow times, and the consequent myriad of ensuing agricultural problems. Continued rice insufficiency for farmers forced decisions to cultivate remote uplands forest sites that are inaccessible to officials. In addition, lowlanders gain advantage by clearing land and thereby appropriating titles to the uplands (Vandergeest 2003a).

Although the zoning and land allocation processes have widespread support in resolving tenure and management issues, conflicts and resource degradation still occurs. Conflicts over access to natural resources continue to accelerate as the country (i) integrates the rural community into a market economy, (ii) is pressured by demands from Thailand over forest and water resources, and (iii) experiences migration and resettlement, thereby concentrating populations, and increasing pressures on land and resources (Vandergeest 2003a).

3.8.3 Effect of land allocation on communities in Lao PDR

Although tenure security is welcomed by many farmers, others are at risk of displacement and impoverishment (Vandergeest 2003a). Non-Lao ethnic minorities in the uplands are the most at risk of displacement whilst ethnic Lao on the lowlands are most likely to benefit from the program. Shoemaker and Baird (2005 p. 2) comment:

> Periodic resettlement and movements of people – whether voluntary, negotiated, forced, coerced, manipulated, or strongly encouraged—have been a prominent aspect of recent Lao history.

Vandergeest (2003a) suggests that alternative, permanent farming systems are yet to make significant gains. Paddy land given to replace upland rice cultivation has sometimes proven to be inarable for this purpose, due to poor soils and lack of water, and lack of government technical advice to deal with livelihood options (Raintree & Soydara 2001; UNDP 2001). Consequently, swidden cultivation communities have become further impoverished from declining rice yields. They now have an increased reliance on forest products to supplement livelihoods, thereby degrading these areas causing ecological changes and epidemics of pests (ADB 2001a).
Thomas (2004) claims that such efforts to transform livelihoods has resulted in disruption of subsistence enterprise and food security, without the promised institutional support and commercial opportunities to assist change. Many restrictions have been placed on swidden cultivation communities that then struggle to sustain their livelihoods using natural resources. Government land allocation policies determining village access to agricultural land have placed constraints upon and reduced the availability of land (UNDP 2001).

Community based research has shown that the Land and Forest Allocation Program affects villages in different ways with geography, demographics, and socio-economic factors influencing outcomes (Boulapha et al. 2002). The policy distributes land more equitably, and provides secure land titles with the intention to facilitate the move from subsistence livelihoods to a market economy (Boulapha et al 2002). Consequently, swidden cultivation has reduced in some areas, replaced by the cultivation of lowland agricultural land and the introduction of irrigation projects and cash cropping (Chanthasen, Ngophanxay & Bouaheng 2002). Reported decreases in land use for swidden cultivation can at times be due to social factors such as communication difficulties, fear of reporting to outsiders, and the practice of conducting swidden cultivation in other villages. Privatisation of land resources can also lead villages to forage in distant forests (Vandergeest 2003a).

UNDP (2001) claims that the main problem stems from a lack of sufficient government support for the land allocation process. Provision of adequate extension, rural credit, and ongoing research and development is required. Furthermore, the government's strategic vision for the agricultural sector has proceeded without the necessary and timely provision of roads, schools, clinics, and the development of markets for cash crops (GOL 1999). Although all of these things were envisioned in the plan, they have yet to be realised in most areas, and many households have not been able to transform their agricultural practices, thereby risking existing livelihood systems (UNDP 2001). For some rural households land allocation has already proceeded at a frightening pace. UNDP (2001) reports policy makers and rural development planners in Lao PDR are faced with a very difficult situation.

Nakatsuji (2004) revealed his concerns about the impact of land allocation in village Number Ten which is nestled amongst the survey villages in this study in Xieng Ngeun District. He claims that "Most households continue production without observing the rules established by the land allocation program……many households still continue on land where cultivation is prohibited,"(Nakatsuji 2004 p. 5). Households continue to balance subsistence rice production with market cash crops to mitigate the risks of fluctuating market price or crop failure. Other problems have arisen with encroachment on forests with land degradation of previously protected areas (Nakatsuji 2004). Profit seeking motives have increased forest degradation, increased wealth disparity, and caused labour shortages.

3.9 Conclusion

Agricultural change is facilitated by rising population and increasing demand on available land. Theoretically, intensification of land use is expected to result. Government agricultural policies reviewed in this chapter have been designed to direct farming decisions and modify farming practices. The government's intention using policies on land tenure and land allocation has been to promote productivity, specialisation, and the commercialisation of subsistence agriculture. These policies aim to influence the transition in farming systems away from a reliance on traditional subsistence faming towards more intensive farming production.

Chapter 4
Methodology

4.1 Introduction

The Lao government has based development policy on providing incentives for farmers to reduce the swidden cultivation of upland rice, and this is having a profound effect on food security, biodiversity, land degradation, and productivity. In this study the opinions of communities on the impact of government policy and the influence of the emerging market economy on their capacity to modify their farming practices have been explored. The research has drawn on the opinions of stakeholders involved in agricultural development in the uplands of Lao PDR. The perceptions of the many stakeholders involved in agricultural production evoked a sweeping scope of descriptions, details, and understanding. The nature of the research dictated a multi-informant approach, and an integrated mixed methodological design. This chapter details the philosophical and methodological approaches and describes techniques used for qualitative and quantitative data collection in these communities.

4.1.1 Study site location

The study site is located in uplands of northern Lao PDR in Xieng Ngeun District, Luang Prabang Province. Xieng Ngeun town, port, and marketplace are situated approximately 22km from Luang Prabang city, on the Nam Khan River and on Route 13, the main road to Vientiane. Xieng Ngeun District is represented in Figure 2 (Chapter 1), indicating main transport routes from Luang Prabang to Xaignabouri and Vientiane Provinces, and the Nam Khan River

Xieng Ngeun District was selected as a suitable representative district for the case study with 39% of the district villages included in the survey. This district is experiencing land allocation and land demarcation, complicated by increasing population concentrations. Proximity to Luang Prabang markets, trade and tourism influences production and district economic development. The district is frequented by development projects, and 2 major highways pass through the district further supporting trade to Vientiane and Xaignabouri Provinces. Consequently, changes to agricultural production would be more likely to be occurring in this district.

International maps located up to 100 villages (Fig. 5 referenced by information from the National Geographic Department, Vientiane, 2005). However, district statistics were confirmed by the Deputy Head of Agriculture and Forestry Extension Officers (DAFEO) that indicated

there were 79 villages in Xieng Ngeun District. These 79 villages were confirmed by an official document signed by the District Governor on 24th January 2005 on land allocation and village development (sourced from the Luang Prabang Provincial Forestry Section). Villages included in the survey sample are listed in Appendix F.

Figure 5 indicates the broad distribution of villages within the district and the location of survey villages in this study. The key informants to this study were headmen, community members, and farmers in the 31 selected villages. These farmers made decisions to adopt new technologies through the opportunities created by other stakeholders in the development process, i.e., government officials, international foreign consultants, DAFEOs, and traders.

The study site in Xieng Ngeun District was selected with permission of the Lao government, depicted in Figure 5. Thirty one accessible villages were purposively selected to provide data on livelihood activities, land use changes, village problems and issues, the influence of projects and new technologies, and perceptions of the role of markets and services. Data were also collected through semi-structured interviews with foreign consultants, government officials, and traders.

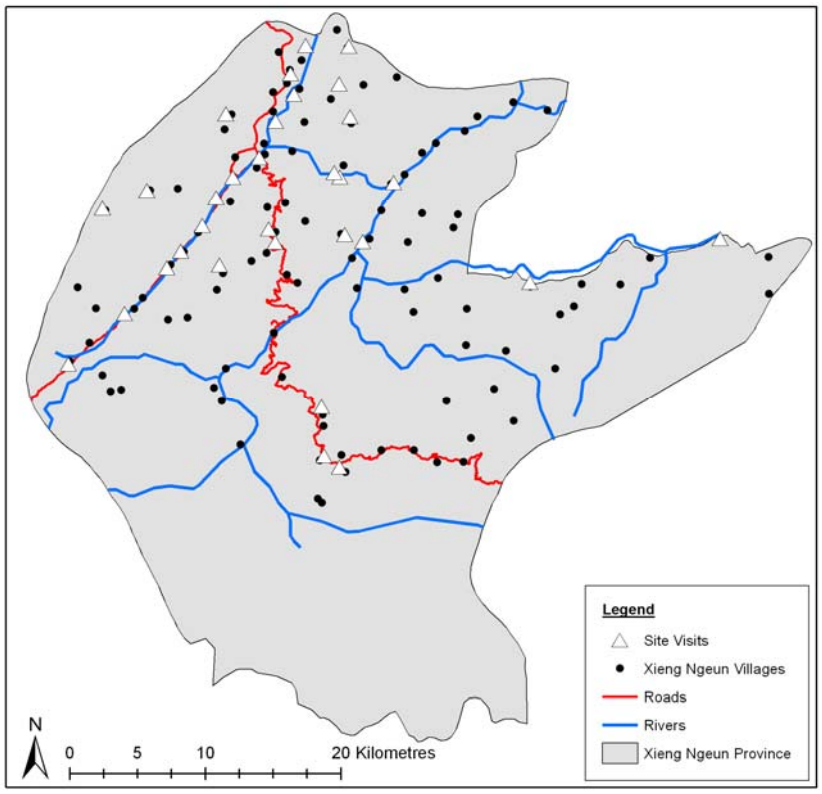

Figure 5 Map of Xieng Ngeun District locating study site villages

Source: http://www.cdc.gov/epiinfo/asia.htm [accessed 16 November 2005.] International Steering Committee for Global Mapping (ISCGM) Village information derived from the National Geographic Department, Vientiane.

4.2 Research challenges within this social context

Social research conducted in countries and cultures, unfamiliar to the researcher presents extraordinary challenges and often requires the use of adaptive and innovative methodology. Lincoln and Guba (1985 pp. 226-227) claim that "the purpose of research inquiry is to 'resolve' the problem in the sense of accumulating sufficient knowledge to lead to understanding or explanation." Collection of qualitative research using semi- structured interview is heralded as a useful method in cross cultural situations. Patton (1990 p. 339) argues that, "as difficult as cross cultural interviewing may be, it is still far superior to standardised questionnaires for collecting data from non-literate villagers". However, without the aid of a skilled interpreter the complex layers of understanding and interpretation remain elusive. Careful translation and interpretation is vital.

The need to engage competent interpreters to translate interview responses was pivotal to the collection of valid data. Several investigative field trips to Lao PDR foreshadowed difficulties in gathering information and meaning when using semi-structured interviews with Lao nationals. This was due in part to the inability of the interpreters to convey the meaning contained within the Lao language and culture. Difficulties in the selection and engagement of a trained interpreter were compounded when it became apparent that those available had limited vocabulary and struggled with English language expression. The research was designed to incorporate both qualitative and quantitative methodology in two survey formats, thereby increasing the number of farmers in the sample and ensuring the expression of many opinions. The survey allowed extension officers to read questions to the farmers and community members, and transcribe the answers on their behalf. Concurrently, an interpreter conveyed interview responses from the headmen to the researcher. This provided a process that allowed communication and understanding to evolve with each field visit to the villages.

The researcher developed an understanding of the views and pressing concerns of farmers in a wide range of communities and details of individual experiences at various life stages. The approach largely overcame the language difficulties, through subsequent translation into written interview records by competent Lao nationals, more familiar with English language and Lao agricultural terminology. In confidence, Lao translators reviewed the survey responses and decided that the methodology used collected mainly frank opinions from villagers. Some responses appeared guarded and expressed unconditional support for government rhetoric supporting agricultural policies.

4.3 Research Paradigm: Approaches and methods

A cross-sectional research approach provided an opportunity for an in-depth examination of many viewpoints in the district at one point in time (Neuman 2000). This approach developed an iterative understanding of the micro level activities of individuals. Inductive (grounded) theory was developed to explain elements of social behaviour and personal attitudes. This was achieved by linking observations and emerging patterns back to universal principles (Guba & Lincoln 1994). A deductive approach allowed explanations to emerge from basic theoretical understanding (Babbie 1995). Mixed method research combined qualitative (inductive theory) and quantitative (deductive theory) approaches to provide methodological triangulation to study this social setting (Tashakkori & Teddlie 1998). Methodological triangulation used in this research allowed access to a wider variety of information, increased validity and reliability, and was used to overcome deficiencies of single-method studies (Burgess 1984).

This mixed method approach integrated qualitative and quantitative research using a 'dominant-less dominant design' (Creswell 1994). The 'dominant' research paradigm was interpretive with a social constructionist perspective. This allowed the development of understanding of the culture and the inherent social relations within the study area (Denzin & Lincoln 1994; Guba & Lincoln 1994; Neuman 2000; Sarantakos 1993). Neuman (2000) claims this paradigm views and analyses socially meaningful action through the direct observation of people in natural settings to understand and interpret social worlds. The ontological assumption is that there exist subjective and multiple realities among the participants. This also provided for an interactive, participatory, informal approach and legitimised value-laden, context-bound, biased reporting (Creswell 1994; Johnstone 2004).

Qualitative methods involving in-depth, semi-structured interviews and open-ended interviews were used to gather data. Observations and field notes complemented the interviews by providing rich description and insights (Sarantakos 1993). Written documents were gathered in the form of excerpts, quotations or entire passages from organisational and program records, correspondence, official publications and reports, and open-ended written responses to survey interviews. In-depth, semi-structured interviews were transcribed and categorised for content, meaning and themes.

A quantitative approach was also used to provide a measurable understanding of the farmers' perceptions of their circumstance, livelihood, and lifestyle. Short answer questions, numerical scoring and ranking, and scaled opinions were used in the survey questionnaire as the 'less dominant' quantitative component. Notably this methodology differs in paradigm assumptions,

as stated by Creswell (1994 pp. 4-7) who synthesised the work of Firestone (1987), Guba and Lincoln (1988), and McCracken (1988). He detailed a comparison of the two paradigms from the ontological, epistemological, axiological, rhetorical, and methodological perspectives (Johnstone 2004). The quantitative paradigm assumes independence from those being researched, with formally reported unbiased and value-free findings. The perspective of a logical positivist describes reality as objective and predictable (DePoy & Gitlin 1994). Methodological assumptions differ from the qualitative approach by using a deductive, statically designed process, context-free, to formulate generalisations leading to predictions, explanation, and understanding. In this manner both qualitative and quantitative methodologies were used to explore farming systems in the selected communities.

4.3.1 Details of research methods

The methodologies used are indicated in Table 6 and the broad research framework is illustrated in Figure 6. Details of the various methods used in the fieldwork are shown in Table 7. A summary of the process of data collection is depicted in Table 8. The various interview guides and questions are shown in Appendices A-E.

Table 6 Use of methodology for research enquiry

Chapter	Research Question	Methods
Chapter Five Agricultural production and livelihoods and changes to farming systems	Research Question 1 To what extent are farmers modifying their farming systems from a reliance on swidden cultivation of upland rice?	Semi-structured & structured interviews of headmen, committee members and farmers, Government officials & foreign consultants.
Chapter Six Land, socio-economic & environmental factors influencing farming system decisions	Research Question 2 What are the consequences of land use change for farmers?	Semi-structured & structured interviews of headmen, committee members and farmers, Government officials & foreign consultants.
Chapter Seven New technologies & the impact of government and project assistance on farming decisions and livelihoods	Research Question 3 How are farmers integrating new activities and/or technologies into their farming systems?	Semi-structured & structured interviews of headmen, committee members and farmers, traders, Government officials & foreign consultants.
Chapter Eight Market system, the availability of market information & marketable goods	Research Question 4 How is agricultural production influenced by the market economy?	Semi-structured & structured interviews of headmen, committee members and farmers, traders, Government officials & foreign consultants.

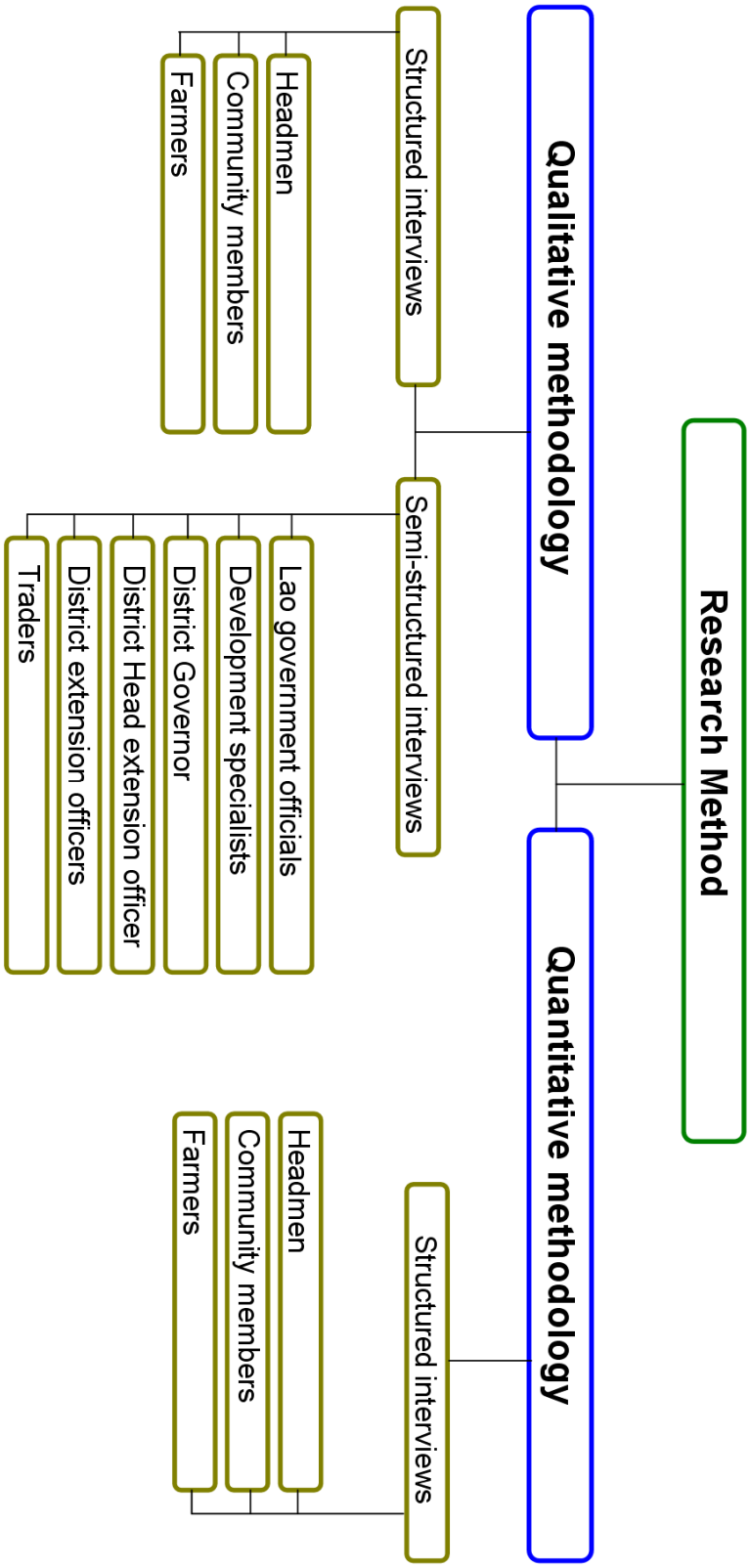

Figure 3 Overview of the research framework

Table 7 Details of the various research methods

Stakeholder	Qualitative	Quantitative	Interviewer	Format
Foreign consultants (N=10)	Semi- structured interviews		Researcher	Interview guide (Appendix A)
Senior government officials (N=6)	Semi- structured & structured interviews		Researcher	Interview guide (Appendix A & Appendix E)
Extension officers (N=15)	Semi- structured & structured interviews		Researcher	Interview guide (Appendix A & Appendix E)
Headmen (N=31)	Structured interviews. Additional questions & information	Questions on general attitudes and farming system activities. Attitudes to progressiveness, technology adoption, & change.	Researcher Dr Bountom* Mr Sengpasith*	Headman Interview form (Appendix B)
Farmers & committee members per village (N=310)	Structured interviews	Questions on general attitudes and farming system activities to check village perceptions. Attitudes to progressiveness, technology adoption, & change. (N=171; N=139	DAFEO staff Agricultural students	Individual Interview form 1 (Appendix C) Individual Interview form 2 (Appendix D)
Traders in Luang Prabang Province (N=5)	Semi- structured interview.		Researcher Dr Bountom	Interview transcripts (Appendix E)
District Governor (N=1)	Semi-structured interview		Researcher Dr Bountom Mr. Souvahn * Mr. Viengxay*	Interpretation of interview Participant observation

* Dr Bountom and Mr Sengpasith are PAFO government officials, Mr Souvahn is deputy head DAFEO for Xieng Ngeun district and Mr Viengxay is from NAFES

Table 8 Summary of the process for data collection and outputs

Date	Process of data collection	Outputs
Sept-Oct 2004 Phase 1	Key informant semi-structured interviews concerning general issues affecting upland farming systems, land use/allocation policies, alternative activities/technologies, and household livelihoods. (N=17)	1. *Transcription of 17 semi-structured interviews of government staff (N=5) and foreign consultants (N=12). 2. Coding and analysis of qualitative data 3. Results used to design fieldwork in 2005.
Jan- March 2005 Phase 2	Structured interviews of village headman, village committee members and farmers using a survey interview. Open and closed questions and statements relating to livelihood activities, land use changes, village problems and issues, influence of projects and new technologies, and perceptions of the role of external markets and services. (N=341) Interviews and conversations at the markets and with traders were undertaken to understand market dynamics and to describe commercial perspectives. (N=5) General observations were noted throughout fieldwork period. Interviews with senior government officials (N=6) and extension officers (N=15) to understand governance, marketing and trade issues.	4. Meeting with District Governor to seek permission and inform on research goals and activities. 5. Research training workshop for Provincial and District staff and agricultural students. 6. Village headman interviews interpreted and recorded on survey interview. 7. Village committee members and farmer interviews recorded on survey interview by DAFEO staff and students. Interviews transcribed into English. 8. Coding and analysis of qualitative data 9. Quantitative analysis of all interview records using SPSS and S Plus. 10. Interviews and conversations at markets and with traders recorded for analysis. 11. All observations recorded and analysed with qualitative data.
March- April 2006 Phase 3	Ensuring validity and trustworthiness of data and interpretation by continuing observation, peer debriefings, checking dependability and confirmability of results.	12. Conference presentation, Chiang Mai, Thailand. Peer review of initial results 13. Meetings with key informants to check interpretation and reliability of results (N=12). 14. Extensive validation of results from discussions with interpreter and translators

*Transcription is the conversions of interviewees' responses to interviews - to written format in English language

4.4 Training of research staff

Details of the research process were communicated at a staff training workshop, using an inclusive and iterative approach. An initial village in Xieng Ngeun District was selected to test the suitability and strengths and weakness of the interview format and questions. Extension staff

read the questions to the individuals and completed the survey form on their behalf. This was necessary as villagers were often illiterate. Subsequent discussions of that village trial ensured the format and questions were modified, and re-organised, and translations into the Lao language were checked. District staff and agricultural college students used to interview farmers, were selected from those available to the researcher from the Provincial Livestock and Fisheries Section and the agricultural college. All individuals involved were trained in interview techniques before assisting with village interviews. Staff were rotated in a continuous schedule of interviews for completion within the two months allocated for fieldwork, January to March 2005.

On arrival at the survey village, a senior Lao member of our research team explained the purpose of our visit at the group meeting, as was village custom. The headman had received official instructions from the district office to comply with requests for interviews with the research team. Agricultural extension staff explained the structure of the questions (i.e., Likert scale questions) and indicated the required style of answer.

To conform to Lao cultural prescriptions, interviews were conducted in consultation with other village members, sometimes including the deputy headman, or committee representatives from the Lao Women's Union, Lao Youth Union, Elderly Group, Construction Union, or the Protection Unit. On occasions, village residents sat in on the interview process and expressed their viewpoints. In this manner, opinions were often consensually derived. More often men were available for interview than were women, as it was common in this cultural setting for men's opinions to predominate, and women were more reluctant to express their viewpoints.

Interpreted interviews of the village headman took up between 1.5 to 2 hours. When time permitted, additional questions were asked to clarify information, avoid confusions and develop a better understanding of the situation. After completion of the research, the Lao interviews were again checked for accuracy of translation to verify comprehension. Completed village interviews were compiled and translated from Lao to English by several translators familiar with agricultural terminology. These interviews were transcribed into relevant databases after the completion of the fieldwork. Field notes and reflections were transcribed immediately after the village interview to ensure descriptions and impressions were recorded.

4.5 Operationalising the research design using qualitative methodology

Semi-structured interviews of a convenience sample of government officials and foreign consultants were undertaken during fieldwork in October 2004 (Appendix A). This provided contextual background and information for the research design and selection of study sites for the village survey. A survey was used to interview 341 village residents, i.e., farmers (N=274), headmen (N=31), or community members (N=36). The survey format consisted of open-ended and closed questions that were developed from previous fieldwork experiences and a review of the literature (Appendix B, C & D). Semi-structured interviews of a convenience sample of traders (N=5) provided useful information about the market and traders' impressions of the village's propensity to trade and engage in the market economy (Appendix E). Senior government officials and District extension officers involved in the fieldwork completed a market questionnaire and provided opinions through semi-structured interviews (N=21) (Appendix E). The District Governor and several senior government officials were interviewed at the completion of fieldwork (Fig. 6 & Table 7 & 8).

4.5.1 Analysis of qualitative data

Semi-structured interviews and written answers to interview questions were transcribed and coded for major themes using N-Vivo™ software for qualitative data. Additional data collected through interview, observation or obtained from government documents were also analysed using N-Vivo™. Observations and field notes complemented the interviews and provided rich description and insights.

4.6 Operationalising the research design for quantitative methodology

The survey was designed to use the individual living in the village as the unit of analysis. Within each village, individuals were identified by their roles as headman, village committee member, or farmer. A stratified, non-clustered sub-sample of 31 villages was selected to undertake the survey interview. From this sample of villages, headmen or deputy headmen (N=31) were interviewed about their personal attitudes and perceptions of their village situation. These viewpoints were verified or contrasted through concurrent interviews with committee members (N=36) and farmers (N=274). The selected sample was to reflect the characteristics of a larger population in Xieng Ngeun District. The information from the sample villages provided a statistically representative sample of the district.

Villages to be included in the survey were selected from the range of accessible villages (N=79) in the Xieng Ngeun District. This was determined through consultation with the Xieng Ngeun

District Agricultural and Forestry Extension Officers (DAFEO) and Luang Prabang Provincial Agricultural and Forestry Officers (PAFO) involved in the research fieldwork.

4.6.1 Purposive sampling

Various sampling plans such as systematic sampling, simple random sampling, stratified random sampling, cluster sampling, convenience sampling, and purposive sampling were explored. A purposive sample of 31 villages (341 respondents) was selected after the following factors were taken into account: ease of access to the market, the presence or absence of development projects, ethnicity, and the agro-ecological zone of the village. These factors were hypothesised (from the literature) to be the main factors affecting the village and its propensity for change. The villages sampled were chosen to reflect these inherently heterogeneous environments. Villages were segregated according to these factors and then specific villages were selected. This technique maximised the range of villages in the overall sample. The advantage of purposive sampling was the selection of characteristics determined important to the research. However, as a non-random sample procedure the bias within the method can lead to sampling errors.

Differences in population, ethnic groups, accessibility, infrastructure, and farming systems were evident. For example, on two occasions the researcher was told after the village interviews that there were safety concerns and protection had been organised for the group. In view of this fact, villages with more remote access were not included in the survey.

Villagers were selected from the sample frame of the accessible village. Factors that determine sample size are cost, how much confidence in the results is required, and how much error can be tolerated (Sproull 1988). Many authors suggest a minimum sample size of 30, so that the distribution approaches a normal distribution (Sproull 1988). Taken that the total number of villages is 79, then 31 villages sampled represent approximately 39% of villages within the district. Changes to the selection of villages occurred, as throughout the sampling selection details about villages were modified, reflecting communication difficulties and/or information that the researcher was unable to verify by any other means. Villages were segregated according to these factors and then specific villages were selected in a sub-sample to maximise the range of villages in the purposive sample. This frame is represented in Table 9.

Purposive sampling provided a broad sample of district farmers, thereby increasing the probability that the research findings had population external validity, commonly used in quantitative research. Rosnow & Rosenthal (1996 pp. 158-159) define external validity as “the

approximate validity by which we can infer that the…relationship can be generalised across alternate types of persons, settings, times, and measures."

Table 9 Sampling criteria for structured interviews with farmers

Village location	Lowland altitude (200-500m)
	Highland altitude (501-1500m)
Village access	Access by vehicle
	Access by boat
	Access by walking < 2 hours
	Access by walking > 2 hours
Presence or absence of project	No project
	FLSP* project
	Other projects
Ethnicity**	Lao Theung
	Lao Loum
	Lao Soung
	Mixed

*Forages and Livestock Systems Project **The three ethnic groups have been categorised by the Lao government into geographically determined generalised groupings, which in reality consists of people of distinct ethnic groups in their own right. The three ethnic groups have been found to cultivate in all geographical zones. Different viewpoints and methods of production may be explained by differences in ethnicity.

4.6.2 Analysis of quantitative data

The sample of 341 participants allowed statistical analysis to be undertaken with confidence. Descriptive and inferential statistics were used to analyse quantitative data via social science statistical software (SPSS and S Plus). Descriptive statistics provided a method to describe trends, and draw generalisations and conclusions about the population using statistically significant results. An exploratory factor analysis was conducted on the Likert scale statements as many significant correlations were found within the data. A factor analysis of salient Likert scale statements reflecting farmers' attitudes to new technology was performed using SPSS. Both qualitative and quantitative data were merged as part of the process that provided triangulation of the findings.

4.6.3 Assuring the research design is valid and rigourously conducted

Validity is acquired through a rigorous approach to data collection, analysis, and interpretation. Lincoln and Guba (1985 p. 290) consider the validity of qualitative research enquiry as a measure of 'trustworthiness'. Four criteria are used: credibility, transferability, dependability, and confirmability. The criteria indicate the trustworthiness of the inquiry (Tashakkori & Teddlie 1998). Of these, credibility is the most important criterion used to establish the trustworthiness of the results and the consequent inferences. Credibility according to Lincoln & Guba (1985 p. 290) is established by:

> …the degree of confidence in the 'truth' that the findings of a particular inquiry have for the subjects with which – and the context within which – the inquiry was carried out.

Trustworthiness is often gauged by considering such criteria as (i) prolonged engagement, (ii) persistent observation, (iii) use of triangulation techniques, (iv) peer debriefings, (v) thick description analysis, (vi) dependability, (vii) confirmability, (viii) negative case analysis, (ix) referential adequacy, (x) member checks, and (xi) reflexive journal (Tashakkori & Teddlie 1998). Some of the criteria were not found to be applicable in this situation. In this study trustworthiness was enhanced through prolonged engagement, persistent observation, triangulation, peer debriefings, thick descriptions, and assessed for dependability, and confirmability.

Prolonged engagement requires that there is sufficient time in the field to build trust and cultural understanding and to determine misinformation or individual biases of informers. The quality of information is improved with increasing awareness of contextual factors and a knowledge of individual perspectives. Persistent observation provides the researcher with a greater understanding of socially relevant behaviour (Tashakkori & Teddlie 1998). I relied on previous fieldwork experience in villages and reflections on data from semi-structured interviews to underpin the study and provide a basis for trustworthiness, through prolonged engagement and persistent observation. Undoubtedly, the trust and understanding developed during engagement and as a consequence of the intense survey fieldwork experience which strengthened cross-cultural understanding. The survey involved 31 villages, and whilst allowing for minimal disruption to agricultural practice, the researcher gained an understanding of the heterogeneous nature of village location, ethnicity, problems of access, lack of infrastructure support, and the innumerable issues faced by farmers.

Several sources of information were used to ensure trustworthiness through triangulation. Semi-structured interviews, survey questionnaires, field notes, observations, informal discussion and personal communications, workshops, and NGO literature were combined to provide data and contextual information to further promote understanding. Teams of investigators including provincial and district government staff and agricultural students helped to collect survey field data and were also involved in evaluations of the fieldwork experience. Several translators were used to interpret the farmers' opinions on the survey, thereby limiting individual translator bias. The sheer number of responses allowed for many voices to be heard and for a synthesis of descriptions and stories to emerge.

Peer debriefing as described by Lincoln & Guba, (1985) aids clarity and reveals implicit knowledge. Discussions with academic supervisors provided peer debriefing sessions and crystallised reflections on personal bias that may be embedded in the reporting and analysis of the research. Presentations at seminars and conferences gave rise to discussions and scrutiny of the inquiry by academics, extension staff, colleagues, and fellow research students. Peer debriefing also occurred during discussions with provincial and district staff, experienced international foreign consultants and other international team members, international academics, and long term residents in Lao PDR. This also enabled members of the research and development community to check the analytic categories, conclusions, and interpretation of the research investigation. Lao nationals also added to this process in many conversations and debriefing sessions. In addition, several peer reviewed papers were presented at the international conference on mountainous agriculture, further promoting discussions and personal reflection.

Thick descriptions derived from qualitative research relate to the extent to which a study's findings can be applied to other contexts or with other informants at a later date, and mirrors the concept of external validity used in quantitative research. As the results of naturalistic research cannot be replicated elsewhere, Erlandson et al. (1993 pp.32-33) argues that the thick description that is generated should:

> …enable observers of other contexts to make tentative judgments about applicability for their contexts and to form working hypotheses to guide empirical inquiry in those contexts.

The purposive sampling of 31 villages in Xieng Ngeun District and the survey format of open-ended questions provided thick description with a degree of transferability beyond that which is normally attributed to naturalistic research.

Dependability is assessed through the capacity for replication, with similar participants in a similar context and the appropriateness of the inquiry decisions and methodology. The survey format allowed collection of individual accounts of circumstances, giving voice to issues in peoples' daily lives. The size of the sample and the purposive sampling technique allowed for descriptions and accounts of many individuals to be analysed and used to infer a deep contextual understanding of the situation confronting farmers when they make agricultural decisions. Confirmability has also been achieved by findings and interpretations that are internally coherent and supported by the data.

The data collected provided sufficient information on which to perform a qualitative analysis. Triangulation of data from the various interview techniques allowed for effective, valid, and rigourous research to be conducted. This methodology resolved the research 'problem' by accumulating sufficient knowledge to lead to an understanding or explanation, as suggested by Lincoln and Guba (1985 pp. 226-227).

4.7 Limitations of the research approach

An inherent difficulty within this study was the absence of previous studies of this type, limited information on the district, government maps, and statistics that proved, at times, to be unreliable. The researcher was not fluent in languages used in Lao PDR and relied on verbal interpretation and written translation of survey interviews. Inevitably there was some loss in meaning in translation through two or sometimes three languages.

Care was taken to ensure that data were collected at times suitable to villagers with minimal disruption to their agricultural practice. The fieldwork was conducted early in the dry season during the slash and burn cycle, when farmers were not as preoccupied with seasonal tasks. A cross-sectional survey with data collection at a single point in time was used rather than a longitudinal study (Alreck & Settle 1995; Babbie 1990; De Vaus 1991; Sarantakos 1998; Sproull 1988). Although agricultural change can be assessed over an extended period, this was not possible due to time limitations – so change was assessed through questions in a single interview.

Constraints of time and cost, distance, accessibility of villages, and the requirement to have a local government staff guide the survey, limited the number of villages to be included in the study. This prohibited a multi-district approach but allowed for a multi-informant approach.

It must be noted that although the accompanying District Agriculture and Forestry Extension officers (DAFEO) were welcomed, their presence at interviews may have influenced the opinions expressed by farmers. This bias was buffered by the numbers of individuals interviewed, sufficient to provide qualitative data that expressed the diversity of opinions and experiences, and provided a large sample to use for quantitative analysis. Bias due to the nationality, gender, class, level of experience and education of the researcher is unavoidable and will affect the interpretation of data.

4.8 Conclusion

The methodology chosen was regarded as the most appropriate to the research situation, given the cultural context and methodological considerations. The research design and implementation was both challenging and rewarding. Methodological reliability was sought through triangulation of methods to verify the research findings. Cross-cultural experiences and language difficulties were dealt with. The methodology as well as possible in the circumstance has led to an understanding of the social processes operating within this particular cultural context. This holistic experience proved to be enriching for the researcher, and for those government officials involved in the research design and delivery, and who were woven into the research fieldwork experience.

Personally, my experience was one of discovery, contemplation, and an endless process of iterative reflection. I shared this experience with Lao colleagues, extending friendship and trust, which managed to bridge our cultural differences despite having few words in common language.

Chapter 5
Farming systems and changes

5.1 Introduction

The first research question explores the extent to which farmers were modifying their farming systems away from a reliance on swidden cultivation of upland rice. Intensive or extensive farming systems changes are indicated by a reduction in upland rice and cultivation of alternative crops with changes to livestock production. Diversification strategies using a mixed approach and migration were also occurring in response to government policy to reduce upland rice production. This chapter provides demographic information, agricultural production figures, land use details, and describes changes to production. Productivity issues influencing current farming systems and projected changes to agricultural production are outlined.

Structured interview questions provided information on their farming systems, future farming aspirations, and upland productivity as proffered by the headmen, committee members, and farmers. From the sample of 341 villagers, 203 surveys responses containing largely open-ended statements were collated and analysed. In a concurrent survey, 138 farmers from these villages were asked their perspectives on the relative importance of farming activities which formed data for descriptive statistical and multivariate analysis. Semi-structured interviews were also analysed for comments on farming systems by government officials and foreign consultants. Several senior government officials and DAFEOs involved in the fieldwork responded to semi-structured interview and survey questions to indicate current agricultural production in the district. Secondary data was also used to understand demographic changes in the district.

In order to understand the preferred farming systems and village livelihoods, certain demographic details are pertinent. The following section provides information on village populations, village establishment, ethnic composition, and village accessibility.

5.2 Village characteristics

5.2.1 Population

The total population of the 31 surveyed villages was estimated to be 13,431 people. The population of villages ranged from 179 to 1,053 (mean = 433, SD = 253). The sample included 39% of villages in the district. Interviews of 341 people, approximately 1% of the total district

population, were conducted. The average village population was 433 individuals. Over half (55%) of the villages had populations of 200 to 400 people, with an average family size of 6 persons, indicating that villages commonly had between 33 and 66 families.

The locations of villages were compared by the altitude (metres above sea level). Land has been organised into 6 agro-ecological zones (AEZ 1 to AEZ 6) in Lao PDR according to several features, one of which was altitude (GOL 1998; Raintree and Soydara 2001 p. 7). The land in Xieng Ngeun District falls into categories of foot slopes AEZ 2 (200-500m) and central northern upland AEZ 5 (501-1500m). Surveyed villages were grouped into these altitude ranges and comparisons of village populations in agro-ecological zones (Table 10). Villages with populations over 800 people were found in both altitude ranges. Approximately 60% of villages were located in the lowlands (200-500m), and 40% of villages are located in the uplands (501-1500m).

Table 10 Population in lowland and upland villages (N=31)

Village population	% Total population	Lowland % Villages at 200-500m	Upland % Villages at 501-1500m
200-400	55	32	23
400-600	29	19	10
600-800	3	3	0
800+	12	6	6
%Total	100	61	39

5.2.2 Establishment of villages

Examination of the data from the Integrated Rural Accessibility Planning Project (IRAP) in 1999 indicated the year that villages had been established and the governing presence at time of establishment. The categories included villages established (i) pre -1910, (ii) during French colonial rule, (iii) during the civil and Vietnamese wars with American presence, (iv) during the revolution with communist rule assisted by Vietnam and Russia, and (v) post-1990 villages (Table 11).

There were constant movements of people during changing colonial rule, the unrest and upheaval from war and conflict, and during communist governance. The data revealed that

villages characteristic such as village size, altitude, and time of establishment were not strongly correlated as factors but rather serve to describe a heterogeneous population. This means that the size of a village is not related to its location or the period of time the village had been operating, rather the size is a chance occurrence or dependant on other factors.

Table 11 Village establishment (N=31)

Village Establishment	Period of governance	Lowland % Villages 200-500m	Upland % Villages 501-1500m	Total
-1910	Provincial governance	20	13	33
1910-1960	French administration	23	0	23
1960-1975	American presence	7	17	24
1975-1990	Revolution	10	7	17
1990-	Recent villages	0	3	3
Total %		60	40	100

Source: Integrated Rural Accessibility Planning (IRAP) project 1999 which incorporated data from MCTPC, SIDA, and UNDP projects in 1999. This data was in used by the World Heritage Project for the Protection and Enhancement of Nam Khan Watershed as a candidate for the UNESCO Man and Biosphere Program in Luang Prabang, 2005.

Time of establishment of the sample villages was calculated using the Integrated Rural Accessibility Planning (IRAP) project data (1999). Fifty six percent of villages were established prior to the civil war in 1960-1975. During the war (1960-1975) 23% of villages were established and subsequently 20% of villages have been established (1975-2005). Forty three percent of villages were established in the lowlands prior to the war (1960-1975) and 13% of upland villages were established during this period. During the war, more villages (17%) were established in the uplands with only 7% in the lowlands. During the Revolution (1975-1990) villages were established in both the uplands and the lowlands. Since 1990 a further 3% of villages have been established in the uplands. Figure 8 indicates the establishment of villages in reference to periods of governance presented in Table 11.

Figure 7 shows an upland village in Xieng Ngeun District, Luang Prabang. This village largely inhabited by Hmong residents and is nestled on an upland ridge 1.5 hours walk from the nearest road.

Figure 4 Senodon village Xieng Ngeun District Luang Prabang Province Lao PDR, March 2005. Photo K Alexander

The percentage of villages established at lower altitudes in comparison to the percentage of villages at altitudes above 500m are depicted in Figure 8. During French administration more of the sample villages were settled in the lowlands, while the conflicts of civil war during the American presence saw more villages established in the uplands, perhaps to avoid involvement. During the Revolution villages were established in both lowlands and uplands as dictated by the government with the resettlement of shifting cultivation communities. Only 3% of sample villages have been established since 1990. This suggests that villages have been affected by major events incurring population movements which may account for heterogeneous nature of these communities.

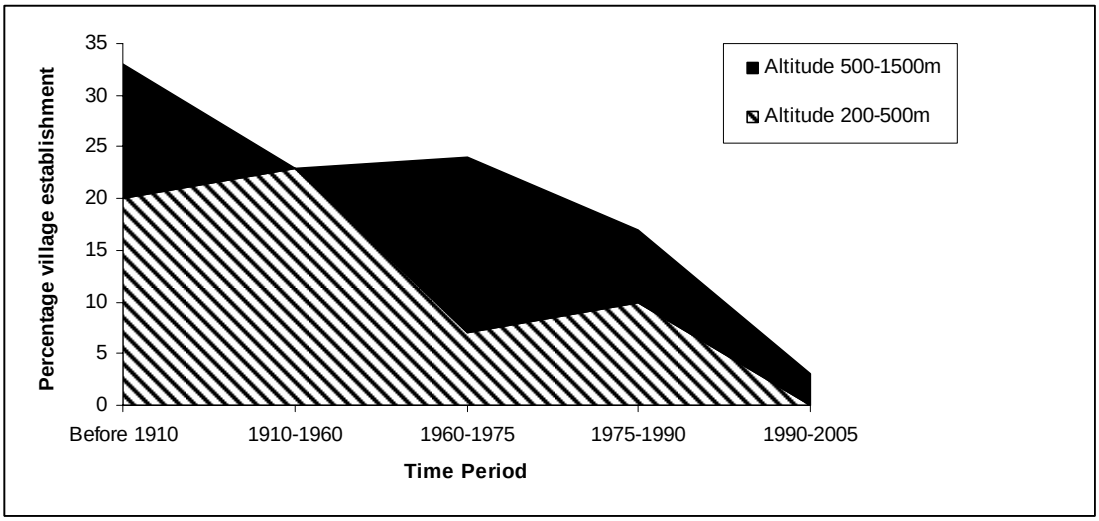

Figure 5 Village establishment in the district (N=31)

5.2.3 Ethnicity

Ninety percent of villages in the study have Lao Theung residents, 50% of villages have Lao Soung residents, and 27% of villages have Lao Loum residents. The Lao Theung are the exclusive residents of 37% of the villages whilst 10% of villages are exclusively Lao Soung, and there are no villages with only Lao Loum residents. In 67% of villages the majority (over 60%) of people are from the Lao Theung ethnic group. In 16% of villages the majority of people are from the Lao Soung ethnic group, and in 10% of villages the majority comes from the Lao Loum ethnic group. These ethnic proportions are similar to district data depicted in Table 12.

Table 12 Comparison of ethnic groups within the study district

Ethnic groups	% District population (N=79)	% Sample villages (N= 31)
Lao Theung	62	67
Lao Soung	17	16
Lao Loum	21	10

Source: Source: Government Census February 2005

Figure 9 illustrates the altitude of villages and the predominant ethic group composition. Clearly, the majority of villages have Lao Theung residents. The predominantly Lao Soung communities lived at higher altitudes, and constituted half of all villages at these altitudes. The predominantly Lao Loum communities resided in villages at the lower altitudes.

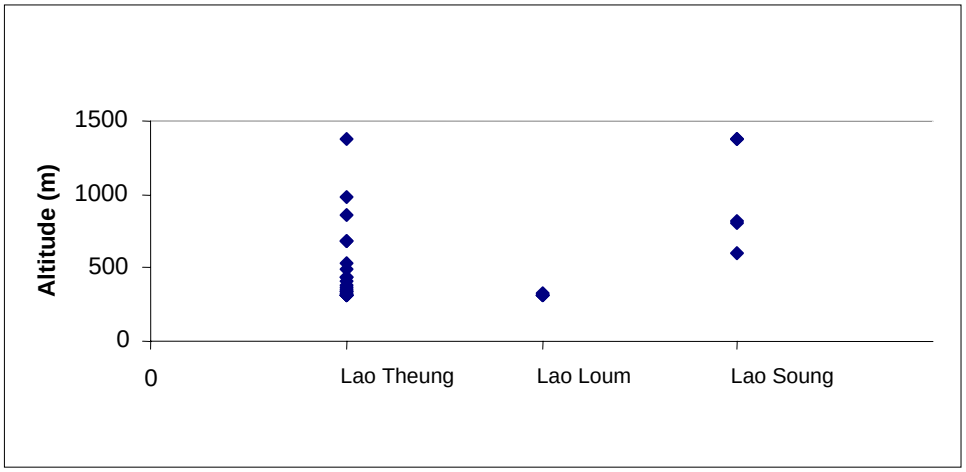

Figure 6 Ethnic groups and the altitude of villages in Xieng Ngeun District (N=31)

5.2.4 Population movements

Data from the Integrated Rural Accessibility Planning Project (IRAP) in 1999 (District statistics from 1995-1996) were used to compare village population obtained records from each headman. These data indicated that there had been a considerable movement of people over the last decade between villages, due in part to government policy on relocation. Government programs and policies have been directed towards the resettlement of ethnic communities from the more remote highlands to lowland areas and along the roads. Villages have been relocated, people have been moved, and smaller villages have been amalgamated.

This issue was mentioned by a number of villages such as, Khone Vai, Silaleck, and Ensavan whose recent experiences of large influxes of people to their villages were related. Houay Khong village was relocated in late 2004 from the old village site (several hours by walking track), to a location nearer to the road. In Pha-Liem, a remote village accessible only by walking track, residents described experiences of waves of migration, and the imminent forced relocation to a roadside village in 2005. Villages on the road have had large influxes of people, whilst the remote villages have had an exodus, their populations were moving to the lowlands and/or to other provinces.

The experiences of village migrations in the study district over the last decade are indicated in Figure 10, which shows the most frequent fluctuations in population amounted to approximately 50 immigrating people (8 families). Migration occurring in the population could be of the magnitude of approximately 200 people exiting the village (31 families), with an immigration of greater than 300 people (50 families) settling in some villages.

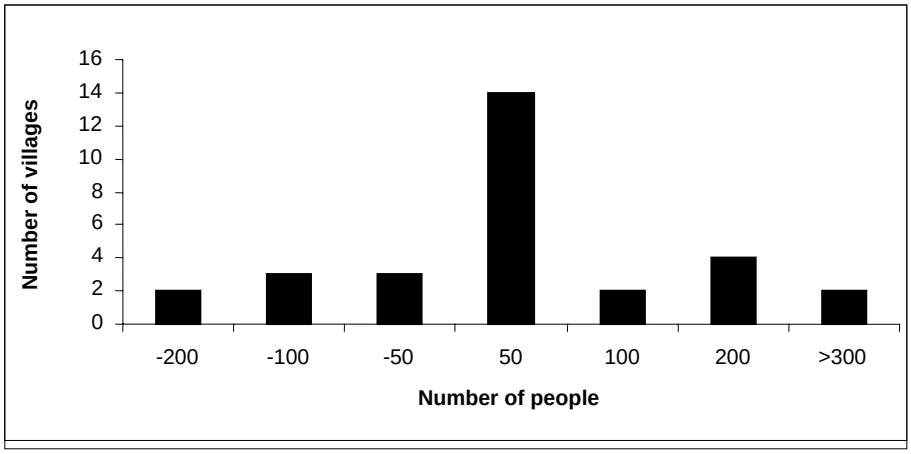

Figure 7 Net movements of people in villages 1995-2005 in the study district (N=31)

5.2.5 Village access

Villages are accessed by vehicular roads, motorcycle tracks, walking tracks and/or boat. Over half the villages had vehicular access, 26% of villages had boat access, and 23% were accessible on foot or only by motorcycle. Ten percent of villages were accessed by a river crossing and then by walking. Roads traversed all altitudes, those villages on the river at lower altitude used boat access and often higher altitude villages had only walking access.

5.2.6 Access to Xieng Ngeun market

Xieng Ngeun marketplace was the major trading area in the district. The time taken to drive, to travel by boat, or to walk from each village to Xieng Ngeun marketplace was estimated and compared with the village population to determine whether a relationship existed. There was no significant relationship (R^2 =0.0321) between the time taken to access Xieng Ngeun marketplace and the population size of a village. However, when villages were compared according to altitude and the time to market, a strong relationship was revealed between the number of villages and proximity to Xieng Ngeun market in the lowlands (200-500m). More villages were located closer to this market in the lowlands. There was no significant relationship between the number of villages and the time to get to Xieng Ngeun market in the higher altitude villages. This may be a reflection of the fact that distant villages are mostly reliant on traders for crops and livestock produce. This also may reflect a lower productivity of the available land in the uplands, with a greater requirement for extensive areas of cultivable land (Figure 11).

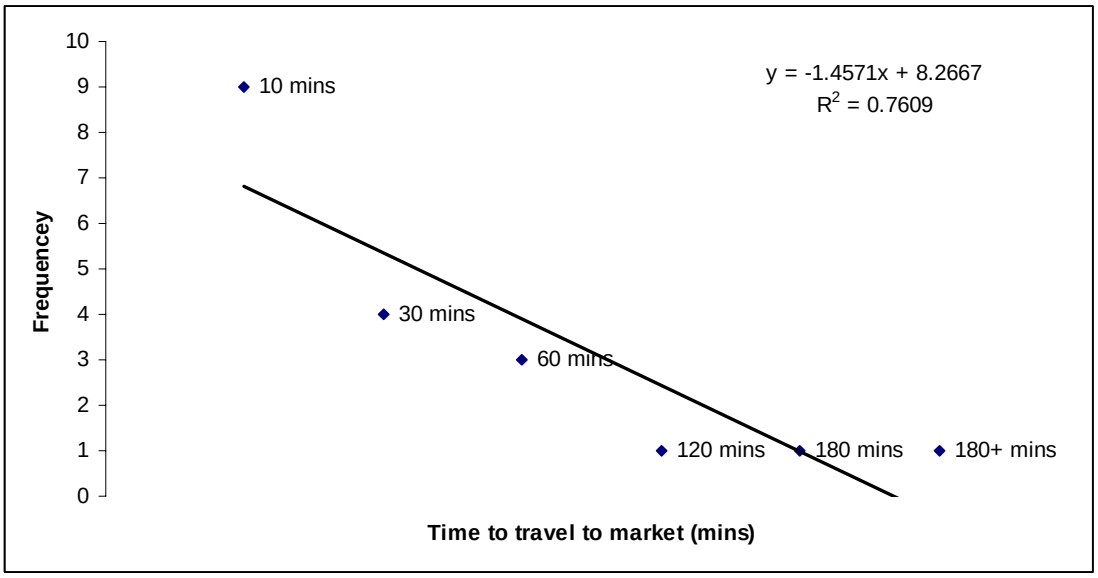

Figure 8 The number of lowland villages (frequency) in the study district and their proximity to Xieng Ngeun market in the lowlands (N=31)

Initial findings indicated that villages on roads and close to the commercial centre of Xieng Ngeun port and village were more prosperous and progressive than the distant villages. These villages had land on river flats for vegetable production, fishing, and paddy fields, indicating successful diversified production systems. Villages situated on the road to Xayabouri Province were generally well-serviced by transport and had regular access to markets with traders frequently visiting the villages. Villages concentrated on small livestock production and cultivated wet paddy and/or walked to distant fields for upland rice and crop production. Higher altitude villages on the Vientiane road found transport to be more difficult and expensive to access. The main issue in these villages was access to water, limiting crop and livestock production. Farming systems comprised mainly upland rice and crop production with livestock and NTFP collection.

Villages on the Nam Khan had a well developed river transport system and frequent visits by traders, but many claimed it was expensive to go to market. Market access could be up to a 10 hour walk for some villages; consequently they were largely dependant on traders and river transport to market produce. These villages did not have access to paddy land and concentrated on river products, upland rice and crop production, livestock, and NTFPs.

People in villages accessible only by motorcycle track or on foot, had great difficulty transporting produce to and from the market. Many villages were limited by what they could carry on their backs. For some, going to the market took up to several days or entailed many

hours walking to a road access point. Negotiating a good price with traders for livestock was more difficult in these villages as the stock were generally not domesticated and difficult to manage, hard to find and created problems when transporting to the road.

This section has described several key demographic characteristics of the survey villages. The following section outlines information on agricultural activity production in these villages.

5.3 Rice production –the main farming enterprise

Rice production is of utmost importance to upland farmers. However, government policy is directed toward the reduction of swidden cultivation of upland rice (Hai). Rice remains the dietary staple in Lao PDR, boiled rice and rice flour noodles beingconsumed daily. Upland rice is traditionally grown glutinous rice, often a preferred rice variety that is considered to be very tasty. Villages rely on rice production for their largely subsistence livelihoods. Upland rice is generally consumed by the household and storage is limited to that season due to spoilage. Consequently rice shortages often occur between harvests. While irrigated paddy cultivation is commonly undertaken in the lowlands, dry paddy can also be grown on plateaus in small areas of undulating land. Paddy rice (Na) production has a higher yield but there is limited land available for paddy cultivation (Raintree 2004).

Official District figures in Table 12 indicated the amount of land used for the production of upland rice for Xieng Ngeun District decreased from 3,394 ha in 2004 to 2,415 ha in 2005, a reduction of 29% (Khounsy, B. 2005, pers. comm. 10 August). The total land used for the production of paddy rice for Xieng Ngeun District increased from 585 ha in 2004 to 602 ha in 2005, and produced 3. 5 ton/ha for a single crop of rain fed paddy rice. Irrigated paddy land (2 crops/year) decreased from 252 ha in 2004 to 250 ha in 2005 and produced rice 4.5 ton/ha (Khounsy, B. 2005, pers. comm. 16 December). In 2006, the Deputy-head DAFEO reported total upland rice production to be 2,045 ha and paddy rice to be 595 ha. In addition, 253 ha of irrigated paddy rice was cultivated. This suggests a further reduction in upland rice cultivation, with a slight decrease in paddy rice cultivation (Darachith, S. 2006, pers. comm. 17 March). While upland rice production has significantly decreased, there has not been a significant compensatory increase in paddy rice cultivation (Table 13).

Table 13 Rice production figures for Xieng Ngeun District

	2004 (ha)	2005 (ha)	2006 (ha)
Upland rice	3394	2415	2045
Rain-fed paddy rice	585	605	595
Irrigated paddy rice	252	250	253

Source: Official District rice production estimates (Darachith, S. 2006, pers. comm. 17 March)

In this study farmers reported the average yield of upland rice to be 1.5 ton/ha, and that of paddy rice to be 2.2 ton/ha. Our data suggested that paddy rice provides a 68% greater yield/ha than does upland rice. Factors such as amount of land under cultivation, fallow periods, weeds, pests, irrigation, and drought all affect productivity and the total seasonal yield for each farmer. Figure 12 shows upland swidden fields in Luang Prabang Province.

5.3.1 Rice sufficiency

An important issue in most survey villages is rice insufficiency, determined by the number of months that farmers experience rice shortages. In the villages studied only 10% of headmen claimed their villages they had sufficient rice each year with 71% of villages claiming insufficient rice for 2-4 months prior to harvest each year. Three percent of villages were without sufficient rice for 9 months of the year (Figure 13).

Figure 9 Swidden cultivation fields (brown and light green areas), Luang Prabang Province. Photo P Horne

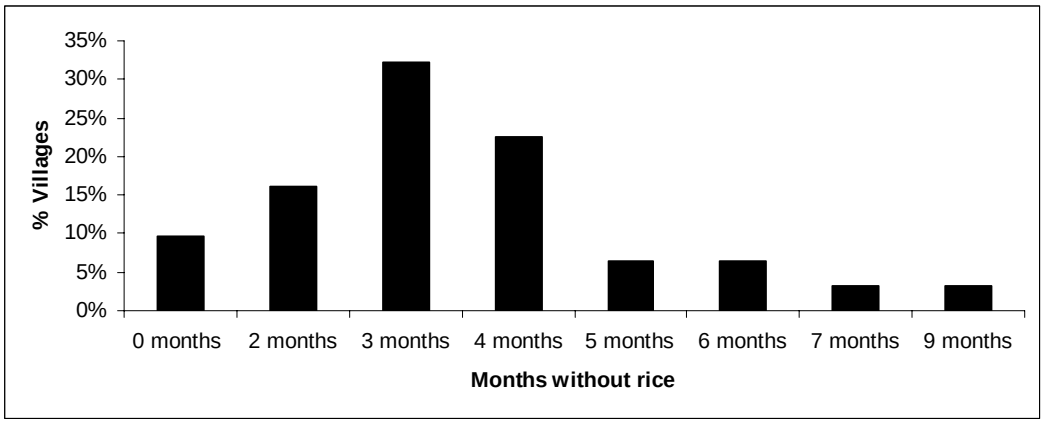

Figure 10 Period of rice insufficiency in villages in Xieng Ngeun District (N=31)

Rice sufficiency was not significantly related to the size of the village population, the altitudinal location, or the time taken to get to the market. When the headmen were asked to estimate rice sufficiency over the last 5 years, 74% indicated that their village had not produced sufficient rice. However, when farmers were asked about their rice production they held more conservative estimates, with 59% of farmers indicating they produced sufficient rice for their own consumption. This difference might be interpreted as a concern by headmen not to expose problems of productivity and welfare of their communities.

Overwhelmingly, farmers indicated that the production of upland rice for home consumption benefited families by providing food security. Many followed their parent's example and continued to cultivate upland rice despite the production problems. "We keep tradition from generation to generation, to have rice for consumption," said a male farmer. The benefits of rice sufficiency were explained by another farmer who said, "We have rice for home consumption. We have time to do another thing like commercial crop production, casual labour with others families, and make timber." When planting rice, other upland crops such as sesame, Jobs tears, and maize can often be planted nearby providing income, livestock feed, and used to diversify livelihoods. During the cropping of upland rice there are periods of inactivity that allow time for some farmers to harvest NTFPs, gather paper mulberry, and to sell their labour. Figure 14 depicts the paddy rice fields and upland rice cultivation on sloping land in a river valley.

5.3.2 Land productivity issues

Generally farmers were concerned with dry land agricultural production issues, for example, a committee member mentioned soil fertility problems:

> In the last 5 years upland rice was good and produces good results. This was because old forest was cut for cultivation which contained lots of fertiliser. And at that time rains came in the right season. Today rice doesn't produce good result, drought and no rain in raining season, soil is rocky.

This was reiterated by a headman:

> …before 1988 upland rice was a good yield, after 1990 we have land allocation, 3 ha/household. Then they do second upland rice, and receive low yield 0.5-0.6 ton/ha, not enough rice. Problems when we do upland rice are weeds and erosion, and use more labour.

Figure 11 Paddy Rice fields and upland slopes in Khan River valley, Xieng Ngeun. Photo K Alexander

The many production issues raised included (i) forest destruction, (ii) high cost in labour and time for diminishing returns, (iii) focus on the production of a single crop, (iv) reliance on weather conditions, (vi) problems with soil fertility from short fallow of 2-3 years, (vii) erosion, (viii) loss of biodiversity, (ix) weed proliferation, and (x) problems with pests and disease. These issues exacerbated labour constraints and lowered productivity as mentioned by a male farmer:

> Forest was destroyed, soil lost balance and there was erosion, rain in wrong season, wild animals escape to other place, not any fruit trees in forest so no fruit available for feeding birds.

Production of upland rice was considered very hard work in light of the low yield and the labour required for preparation and weeding during production. “Too much work, waste of time, low productivity, destroys forest, and environment,” said a committee member. Regardless of these issues, most farmers felt they still had no choice other than to continue upland rice cultivation to ensure sufficient rice for family needs. Concerns were also expressed about the continued low yield that only provided a subsistence livelihood, without providing a surplus to supplement incomes. Poor families without incomes were unable to trade in market crops and could only continue to cultivate upland rice.

The government strategy targeted livelihood improvement by discouraging the production of upland rice and encouraging commercial crop production, as one a headman claimed:

> Not enough rice for eating but also none for sale. Only planting cash crops can help family be better off. Upland rice they have enough only for consumption. The government plan is to stop swidden cultivation; farmer in the village needs to stop upland rice production. Change to upland crops for market for better income and improve livelihood for householders.

Those with an option to cultivate paddy rice indicated a higher yield and more productivity. Many benefits of paddy were listed such as (i) less labour for weeding, (ii) less time consuming, (iii) frees up time for the farmer, (iv) no forest damage, (v) irrigation allows for crops in wet and dry season, and (vi) provides a surplus for income. The paddy fields were usually in easy walking distance of houses and used for re-cultivation in the same area each season.

However, some farmers mentioned additional labour and monetary costs as they replenished the paddy soil using manure or fertiliser, and used buffalos or tractors to plough the fields. Irrigation and water management also required the maintenance of bunds (irrigation corridors). Hence, greater production costs required higher productivity. Paddy rice production was not a viable option without access to suitable land, water, inputs, and implements. In addition, paddy rice has a higher risk of damage by pests such as rats, birds, or insects than upland rice. One committee member commented:

> Having paddy rice cultivation is good because there's more time to do marketing, selling, buying and earn more money. Saving labour and having time to raise animals and paddy rice also produces more results than upland rice. Weak point of having paddy land is using money to plough, its expensive and not good soil as no fertiliser to replace nutrients.

5.3.3 Changes to agricultural production

Farmers were asked their impression of changes to rice and crop production through time. They were asked to think back to when they were 15 years old and consider the amount of upland rice they were now growing in comparison with past production. Only those opinions from residents who were in the village at that specified time were reviewed in relation to past experiences. The respondents were then asked to speculate on their future production of upland crops and rice as represented in Table 13.

Table 14 indicates that 70% of farmers claimed they were growing less upland rice than in the past. For 8% of farmers their production had remained stable, though 9% claimed that they were growing more upland rice these days. Twelve percent of farmers had stopped growing upland rice altogether. The overwhelming majority of farmers (90%) were predicting future decreases in upland rice production, although only 2% of farmers felt that they would stop production altogether. This reflects the district figures of a 29% reduction in upland rice production over the last 12 months (Khounsy, B. 2005, pers. comm. 10 August). Change in agricultural production was indicated as 87% of respondents claimed they would be growing more crops, with only 1% declaring they would stop crop cultivation altogether.

Table 14 Changes in cultivation of upland rice and crops

Changing Productivity	% farmers changing production in relation to past cultivating upland rice (N=97)	% farmers changing production in relation to future production of upland rice (N=61)	% farmers changing production in relation to future production of upland crops (N=193)
More cultivation	9	7	87
Less cultivation	70	90	6
Same cultivation	8	2	7
Stopped cultivation	12	2	1

Upland rice production has traditionally underpinned the farming system, inter-cropped with Jobs Tears, sesame, maize, cassava, or soybean. Many farmers indicated they were continuing to plant traditional crops as they were familiar with the practice, and they produced good yields. Local varieties of seed continued to produce viable yields without incurring greater production costs through the purchase of seeds. Relocated farmers continued to cultivate the fields in the old villages and felt little had changed. Soil fertility was a primary determinant of production choices. However, lack of viable alternatives, no access to new seed varieties, few government recommendations, and declining land productivity, all reduced the propensity for changes to production.

Furthermore, farmers related negative experiences with using new varieties, such as incurring expenses without gaining improved yields. "We won't use the same crops, as the seeds provided by the district resulted in a low price for production. Therefore we will use our own native seeds," said a male farmer. More cautious farmers indicated that their decisions to plant new varieties of crops usually took into account the climate, soil, and perceived productivity, as well as the appropriateness of the seed variety.

Comments from other farmers indicated that many new varieties had been planted including Jobs Tears, maize, sesame, and soybean. The emergence of cash crops such as paper mulberry, physanolaena, pineapple, kaem (broom grass), cucumber, water melon, tomatoes, and papaya were also mentioned. The reason cited by one farmer explained the change, "We have changed because upland rice gives very little yield and it is not worth using the labour." Many farmers expressed a willingness to try new activities and had confidence in new varieties of rice and maize seeds from Vietnam that produced higher yields.

Improved varieties of paddy rice, maize, and soybean that differed from the locally available seeds were used by some because they were seen to be adapted to the environment and to market demand. According to one headman there appeared to be many benefits from production changes:

> Mother and father have rice and other crops, sesame, maize, soybean, then come and change to new variety, new crop. Traders come to see, and advise about sesame, Jobs Tears, good price and good money. Plan to change to plant more soybeans. Small area for soybean and livestock, but get a good price. Soybean is a good crop to feed pig, cassava for animal feed, and plantation crop is dependant on trader.

The district agricultural plan and market demand were mentioned by headmen as the primary forces orchestrating change. Crops with high market demand were seen to be a good source of income, especially when contracted by commercial agents. “Now we plant soybean, and Jobs Tears. There is a good market price ensured by the company and they plan together with the farmers,” said a female farmer.

5.3.4 Government influence on production

Annual agricultural production targets are set by the District Governor detailing the number of hectares to be planted to particular crops and number of tons to be produced per cropping season. Livestock production is also encouraged. Agricultural production zones are determined by DAFEO staff who base their decisions on the (i) bio-physical requirements of the crop or agricultural activity, (ii) biophysical conditions in the villages; (iii) interest of farmers in cropping and/or livestock, and (iv) proximity to the roads and transportation (LSUAFRP 2005). DAFEO extension staff then facilitate agricultural production plans for villages. Farmers are encouraged to plant similar crops in proximity to other farmers rather than in dispersed plots, to control production and to help solve agricultural problems that may arise.

5.3.5 Marketable products

The most important crops that lowland farmers have been marketing included paddy rice, Jobs Tears, soybean, maize, and sesame. Lowland farmers have been growing numerous vegetables and spices for cash crops including; lettuce, cabbage, tomatoes, cucumber, chili, Chinese mustard, coriander, spring onions, gourds, pumpkin, snake bean, and pineapples. Fish products, river crustaceans, and Mekong weed are sold at market. Small and large livestock were sold at market or to traders. Mature teak trees was harvested and sold to traders. Other products were value-added and sold at market e.g., handicrafts, furniture products, food products, industrial products, and products for general consumption. Mixed cropping and multiple cropping in the wet and dry seasons have been instigated to increase productivity in valuable flatland areas. Figure 15 shows a local woman embroidering whilst waiting for customers to buy her vegetables at Phousy market in Luang Prabang.

In the mountainous areas upland rice, cash crops, and livestock were produced and sold to traders or at market. Jobs Tears, soybean, maize, sesame, taro, cassava, chili, cotton, cucumbers, and bananas were cultivated. Upland farmers collected NTFPs e.g., rattan, mulberry, bark of tree (red bark and mucus), bamboo worms, bamboo shoots, red tree, eaglewood, and orchids.

Handicrafts, tools, rattan products such as baskets, mats and brooms, and cooking items were produced in the village and sold at the market.

Forest products including wildlife, eaglewood, cardamom, mushrooms, and rattan were often considered less procurable, because of scarcity, maintaining a high price at sale. Vegetable and fruits such as potatoes, watermelon, and avocados were in demand, as were meat and aqua-culture products. Culinary specialties included Mekong weed and crab paste (specific to the Luang Prabang Province), were sold as niche market specialties. Local crafts and skills used to produce traditional items included handicrafts, such as, weaving and sewing, silk production, blacksmithing, and brick making continued to be produced in response to tourism demands in some villages. The new products farmers were interested in trialing included soybean varieties, new maize, rubber, eaglewood and rattan, cash crops out of season, mulberry, and asparagus.

Figure 12 A vegetable stall at Phousy market in Luang Prabang. Photo K Alexander

5.4 Current agricultural production

5.4.1 Relative importance of farming system enterprises

Farmers were asked to indicate (using tokens to provide scores Appendix D Question1) the productivity of farming activities and the relative importance to the household for use, and as a source of income. Farmers were also questioned on their personal investment of time and labour, and the saleability of products at markets and to traders. The farming system was described using the following categories of: (i) upland rice; (ii) paddy rice; (iii) upland cash crops (maize, Jobs Tears, sesame, soybean); (iv) vegetables (tomatoes, asparagus, chili, pineapple); (v) trees (plantation, fruit trees, oranges, teak, rubber); (vi) livestock (buffalo, cattle, pigs, goats, horses, poultry, fish); (vii) NTFPs (bamboo, mulberry paper, rattan); (viii) off-farm income (labour, enterprise, trading); (ix) handicrafts (weaving, bamboo products, clothes, wood carving, silversmith); and (x) other activities (making alcohol, rocks from river, tourism). Figure 19 represents the relative status of farming activities in terms of the importance for subsistence production, for income generation, the time and labour required, and the benefit when sold at markets or to traders.

Upland rice was of primary importance and was largely for household consumption rather than for income generation at the market, or with traders. This activity required considerable inputs of labour and time, and the overall use was as a staple for subsistence livelihoods.

Paddy cultivation played a small role in the farming system in the uplands. Paddy rice was not perceived as greatly important to the farmer, and provided rice only for household consumption. Neither was the paddy cultivation important for income generation, as indicated by lower time and labour inputs. Although paddy rice required less labour than upland rice cultivation, the activity was not practiced to any great degree by upland farmers.

Other upland crops were regarded as having equal importance to upland rice for use by the family. Those crops required similar investments in labour and slightly more time was required than for upland rice. However, these crops were significantly more important for income generation. Other upland crops could be sold at market but were more often sold to the trader.

Vegetables and fruits were generally considered to be of less importance than upland rice or crops, although production tended to be for home consumption or for sale at local markets. Less labour or time was invested in this activity with little sold to traders.

The relative importance of trees and plantations was very low and little time and labour was invested. This activity was not regarded as an important source of income, although trees were versatile and timber could be used by the family when necessary for a variety of domestic purposes.

Livestock production was regarded as the most important activity for income generation when farmers sold to a trader, and to a lesser degree when sold at market. Clearly, time was invested for the upkeep of livestock although less than that required for the production of either upland rice or crops. Livestock for domestic consumption and for use as draft animals were also important. Livestock had the potential to generate income and the relative importance indicated that production could increase to generate income.

NTFPs were important for income generation and were more often sold to a trader. Less time was invested and less importance was placed on this activity by the farmer, than another enterprise.

Off-farm activities were not considered important to the family, although for those that did invest time and/or labour some income was generated through trade or at the marketplace.

A comparison of the overall relative importance of farming activities using Kruskal-Wallis analysis of the importance score data (Appendix F) indicated there to be a significant difference in opinions of importance for the activities; chi-square χ^2 = 1977.069, df = 9, 2-tailed, P < 0.001. The number of observations totaled 973, with median values of livestock (6), crops (5), NTFPs (2) and upland rice (1). All other activities had mean values of 0. This analysis indicated that farmers weighted livestock and crops as the most important activities, indicated in Figure 16. Upland rice and NTFPs were also not significantly different to each other in relative importance but were of greater importance than paddy rice, off-farm income and handicrafts.

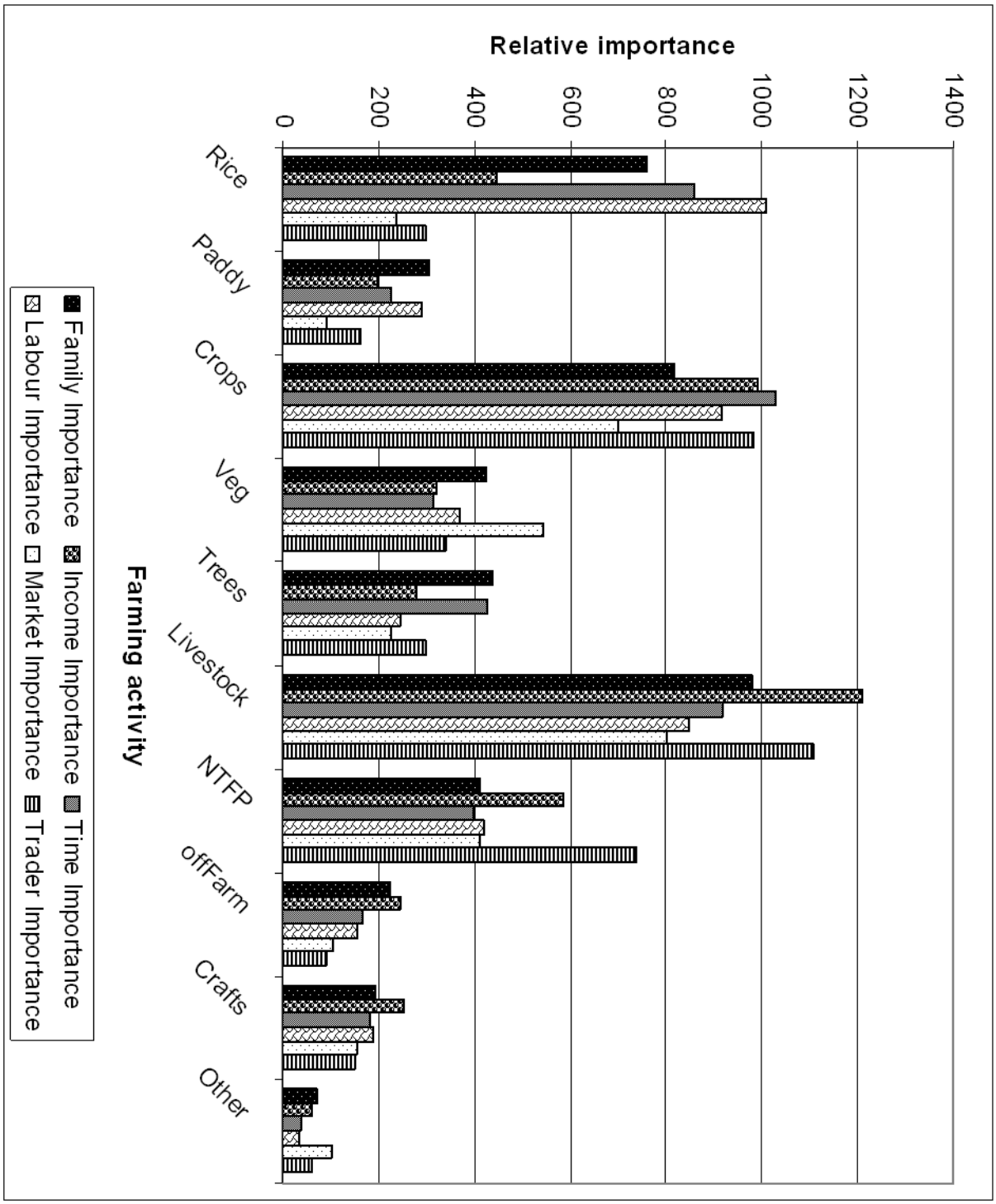

Figure 13 Relative importance of farming activities (N=139 farms) based on an analysis of farmer opinions (scored 0-33 using tokens in Appendix D), in Xieng Ngeun District

Figure 17 (derived from Fig. 16) depicts a comparison of the importance of activities used by the family and those used to generate income. Upland rice was grown for household consumption. Crops and livestock were also important to the household, but they have a greater value for income generation.

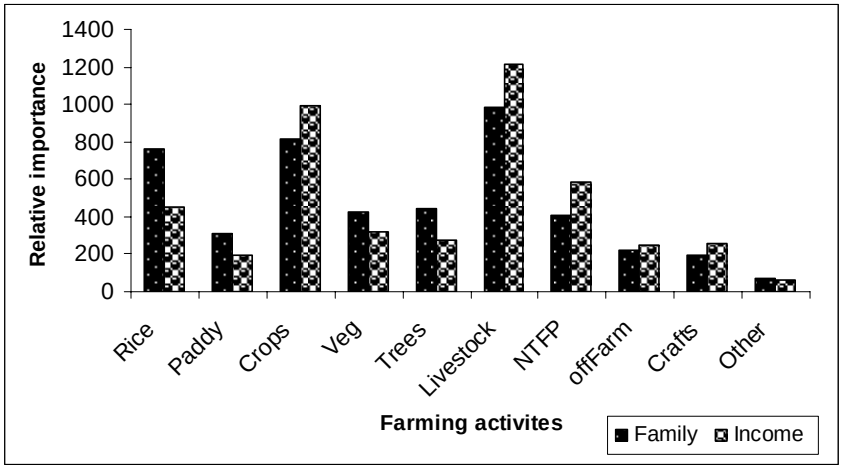

Figure 14 Relative importance of 10 activities for family use or for income generation in Xieng Ngeun District (N=139) based on information presented in Figure 16

Time and labour were considered to be similar concepts in contribution to personal investments in farming activities, as outlined in Figure 18 (derived from Fig. 16). Labour was considered to be greater than the time used for upland rice, whereas crops and livestock required more time than labour. Slightly less labour (than time) was considered to be used for plantations (trees); however this might be explained by a delay in harvesting plantation timber or for maturation of the tree in order to bear fruit.

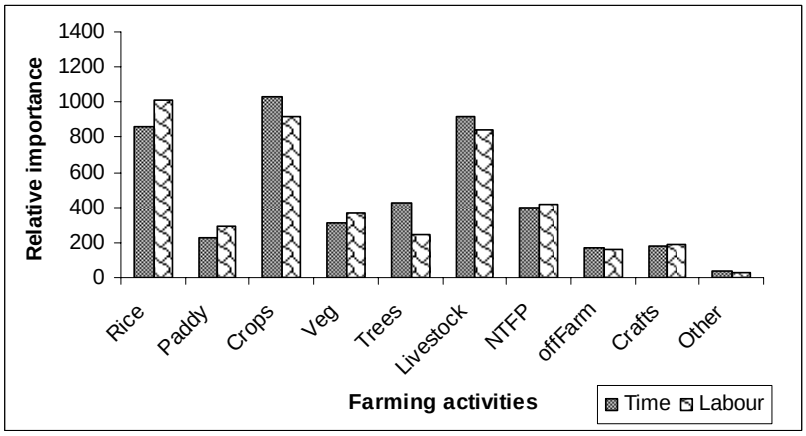

Figure 15 Relative importance of 10 activities for time and labour in Xieng Ngeun District (N=139) based on information presented in Figure 16

More livestock, crops, and NTFPs were sold to traders than were sold at market. Generally goods were exchanged with traders. More vegetables were sold at market; otherwise trading occurred in the village. Figure 19 (derived from Fig. 16) outlines these details. Farmers indicate that they have been be selling goods to traders that arrive at the village rather than taking goods to market. This suggests that farmers have less bargaining powers with the trader and will get less for their produce but avoid the cost and labour to get goods to market.

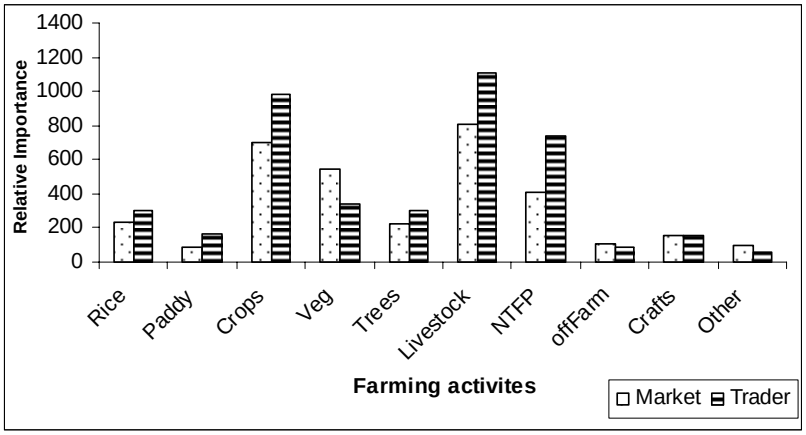

Figure 16 Relative importance of 10 activities for sale at market or to the trader (N=139) based on information presented in Figure 16

5.4.2 Farming system decisions

Most farmers commented that they were intending to modify agricultural production by investing time and labour into crops, livestock, rubber and teak plantations, and NTFP collection. Mention was made that an assessment of weather, soil fertility, and suitability of planting different varieties would be necessary prior to finalising agricultural decisions. The farmers' family life stage and circumstance would determine some farming decisions. Theses factors included; availability of labour, money, production implements, and the stability of the family (i.e., relocation, and the availability of land for agriculture). The need to access credit and inputs prior to changing production was stressed, "Credit is needed for pig production and veterinary health centre, vaccine and antibiotics for treatment when the animal is sick, is needed," said a male farmer.

A committee member mentioned the need for planning group decisions:

> The farmers in this village always catch up with each other to talk about what they are going to plant and how to do, especially about planting maize, approximately 2 ha, per family, watercress about 10 rows per family and in the future we will stop upland rice cultivation".

For the introduction of a new technology, a village often required consensus. It was necessary for many cropping and livestock decisions to involve the whole village "I want to request that forest and production land should be clearly separated so we can set up the area, where we can make the crop or livestock grazing land," said a male farmer. "In this village before we do something we are always planning together. This year the village has set up a plan for a rubber tree plantation. The target is 2 ha/family. They have already implemented this plan," said a male farmer.

Farmers also mentioned the need for the communication of technical information and training to improve and initiate new choices of enterprise, "I would like to ask for other breeds of forages and rubber trees for our village," said a male farmer.

The influence of the market on production decisions was highlighted, and included consideration of the viability of enterprise, product supply and demand, the market or trading price, and the intent of commercial companies in negotiating contracted production at the farm gate. "Before they start some activities they have to think about market price, company who will buy and appropriate breed that adapt to their local conditions," said a committee member. This is a complicated activity for the farmer, "Before farming we plan and divide responsibility. We are thinking about production, livestock and other things, according to the price." This statement indicated a need for market information coincidently informing agricultural planning.

5.5 Future farming systems

Farmers were asked to predict and indicate the change in the importance of the components of their farming system activities over the next five years. The importance of each activity was determined by scoring from 0 to 10. The relative importance of each activity was determined for household use, local sale in the village or for sale at market or to trader. The farming system was described by using the previous categories and the results are summarized in Figure 20.
From Figure 20 farmers believe that upland rice will continue to be important for household consumption. Upland rice will remain the main staple and the focus of production. Generally, upland rice will not be a source of income for householders. There will continue to be some movement of upland rice amongst village households or to neighbouring villages. Upland rice crops, vegetables, timber, and livestock will continue to be of great importance to the household. Farmers are not predicting that paddy rice will become important as a commodity for householders, though some villagers may use paddy rice for domestic consumption.

Upland crops will become increasingly important for personal use and for trade and sale at market. There will be a greater household reliance on crops for use and consumption. Householders predict more crops will be sold to traders. There appears to be some indication that crops may be traded within the village or village cluster but farmers feel they are less likely to be sold at market.

Vegetables will remain important to the householder for home consumption. There appears to be little interest in producing vegetables as commodities for sale in the village or village cluster, at the market or to the trader.
Home gardens with fruit trees or plantations, such as teak and rubber, are regarded as useful largely for home use and consumption. Trees are not expected to provide an income over the next five years which might reflect the need to establish plantations over a 10-15 year time span before gains are recouped.

Livestock are of great importance to the household for home use and consumption, and to sell to traders. Livestock are also important to the householder to sell to other farmers or proximal village clusters. Livestock are expected to be traded rather than sold at market; villagers prefer to use a trader than to transport livestock to market themselves.

NTFPs were predicted to be of importance for personal use and of greater importance as saleable items to traders and at market. There appears to be little interest in pursuing sales of NTFPs amongst the farmers in their village.

Householders did not consider that off-farm income will be a viable alternative to present production options. Handicrafts were considered to be useful to the family but were not viewed as significant as a source of income. Handicrafts are important to the householder for domestic use with little potential for income generation.

A comparison of the relative importance of future farming activities using Kruskal-Wallis analysis of the interview score data indicated there to be significant difference in opinions of importance for the activities; chi-square χ^2 = 1910.819, df = 9, 2 tailed, P <.001(Appendix F). The number of observations totaled 804, with median values of crops (5) and livestock (5) indicating a greater weighting for importance as future activities. Median values for upland rice (1), vegetables (1), trees (1), NTFPs (1), and handicrafts (1) were slightly greater than those for paddy rice (0), off-farm income (0) and other activities (0). Farmers indicated that in future, crops and livestock will continue to be of primary importance. Upland rice, vegetables, trees

and NTFPs were not significantly different from each other and will continue to be of importance in the farming system. Of lesser importance are paddy rice and off-farm activities as well as handicrafts and other activities (Fig. 20).

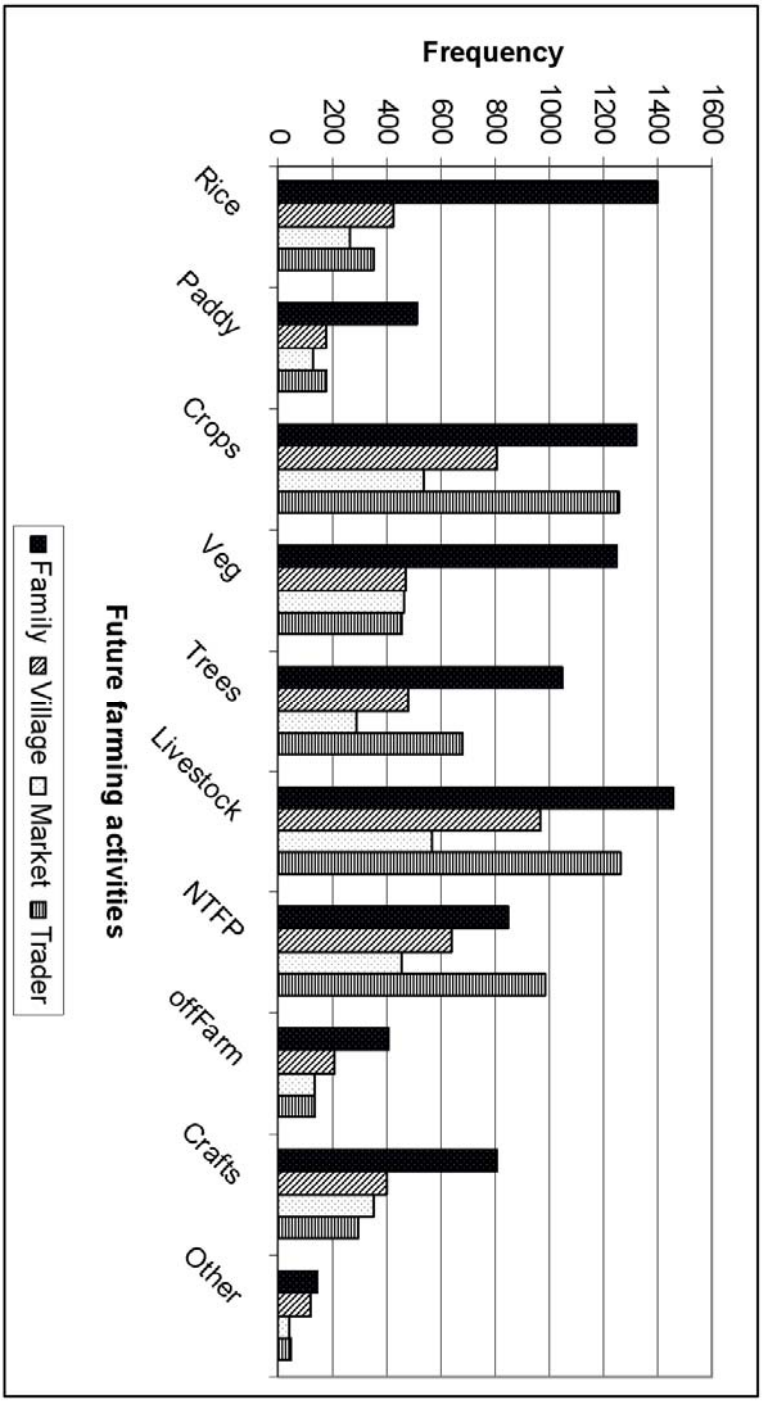

Figure 17 Farmer opinion on relative future importance of farming activities for household use and for sale in the village, at market or to traders (N=202) in Xieng Ngeun District

Livestock, upland rice, crops, vegetables, plantations and NTFPs will be of importance to the family in the future (Fig.21). Farmers expect to continue to trade or exchange crops, livestock and NTFPs in the village.

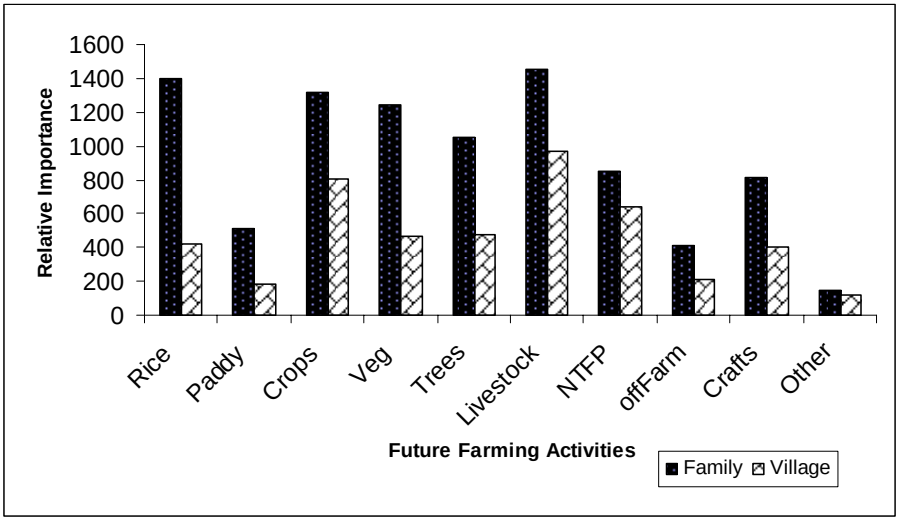

Figure 18Farmers opinion on relative future importance of 10 activities for the family or to the village (N=202) in Xieng Ngeun District

Trading of crops, livestock, and NTFPs will be of the greatest importance and expected to occur, and there will be movement of crops and livestock between households and villages, see Figure 22 (derived from Fig. 20). Traders arriving at the village were expected to provide opportunity for produce sales. The market was not expected to provide greater opportunity and services, rather trade opportunities may occur with traders at the village (see Figure 22 derived from Fig. 20).

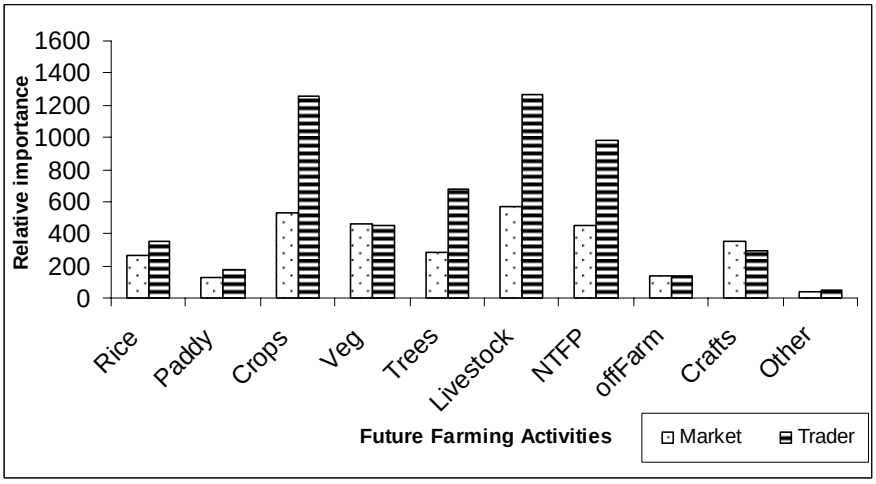

Figure 19 20Farmers opinion on relative future importance of 10 activities for sale at market or to trader (N=202) in Xieng Ngeun District

5.5.1 Future marketable products

Opinions from district staff indicated predictions of growth enterprises that would continue to be of importance to farmers (as niche products or opportunities within the emerging market economy). Rice, cash crops, and small livestock were considered the higher growth products. Maize was also considered a growth product, as were vegetables, fish, and cash crops (i.e., tomatoes). Production of sesame, soybean, mulberry, fruit trees, and large livestock will continue to expand. Demand for rattan and teakwood remains high. The cultivation of NTFPs and vegetables and fruit such as tomatoes (out of season), small green corn, sweet cucumber, and watermelon were seen as products with a competitive advantage.

5.6 Conclusion

The purpose of this chapter was to assess whether farmers were modifying their farming systems from upland rice cultivation and to determine their views on future enterprises. There are few current realistic alternatives for resource-poor farmers to choose from when farming sloping lands in remote locations. Upland rice cultivation continued, with diminishing yields and rice insufficiency. Farmers seemed unable to increase paddy rice cultivation and had difficulties establishing other enterprises. The issue of swidden cultivation production of upland rice is complex, on the one hand it has been seen as destructive by farmers and actively discouraged by the government, yet it remained the main agricultural production activity in the uplands.

Where possible, farmers were responding to government policies to stabilise swidden cultivation by reducing upland rice production and investing labour and time into the production of other upland crops and livestock. This response has been anticipated in the literature. When farmers are confronted by land use tenure, planning, demarcation, or allocation, and when populations are purposely concentrated in a targeted area intensification is expected to occur (Boserup 1965). This however, is not without problems, many of which have been cited by farmers and are further explored in the following chapters.

Diversification of farming systems has occurred using a mix of intensification and extensification approaches. Voluntary and involuntary migration was also occurring in response to this policy. Some farmers have been forced to change their livelihood strategies and need to purchase rice or seek supplementary forest products. These behaviors may have impacted on forest biodiversity; caused changes in production to cash crops and livestock, and may have introduced debt and/or changes to the staple diet. In addition, the market economy appeared to

be influencing agricultural decisions to increase crop and livestock production. Farmers perceived that they will be using traders in future transactions more than the marketplace. They may then be faced with unfavourable prices, dictated by traders venturing into the village.

Chapter 6
Land use change, farming systems and livelihoods

6.1 Introduction

Chapter Six explores the consequences of changes to land use and farming practices. Decisions on the way farmers use their land are influenced by governance, land allocation policies, and socio-economic and environmental factors. This chapter details the farmers' main concerns while attempting to manage changes to land use and farming systems. The implication of government policies on farmers and their communities are explored. The research reveals farmers' concerns about environmental and socio-economic factors affecting their communities, all of which underpin their farming decisions and land use. Opinions and personal experiences suggest many factors are influencing farming decisions in the uplands.

Structured interview questions with headmen, committee members, and farmers (202 respondents) were used to gather information on the effects of land allocation and land use planning on agricultural practice (see example interview guides in Appendices B, C & D). Data were further clarified by semi-structured interviews with the District Governor and other senior government officials. Several open questions explored environmental and socio-economic concerns. Information was collated from interviews with 139 farmers' data for descriptive statistical and inferential analysis.

6.2 Government policy on land allocation and land use planning

Land emerged as a major factor affecting farming and livelihoods in the study area. Government politics on land allocation, land use planning, and land demarcation have been enacted in this district over the last decade (Chapter 3). The Land Act governs the land and forest allocation program. Land is divided in three land demarcation categories:

1. Land suitable for agricultural production: paddy field, divided between (a) land bearing permanent production and garden land; and (b) land type bearing no permanent production: shifting cultivation area, fallow land, deforested land;
2. Land which can not be used for cultivation is reserved for tree planting and
3. Other land: water source forest, village reserve forest and utility forest

Land with permanent agriculture such as paddy fields and gardens are not included in the allocation program because they are permanent production. Land without permanent agriculture

is allocated according to previous agreements with local authorities who grant an initial three year temporary land title known as land tenure.

The consequence of changes to land tenure for the district farmers were explored during interviews. Communities have been affected by these changes, with many issues remaining resolved. In general, the village applies central government land use directives to the allocation of agricultural land, and then individual farmers make land use and production decisions. Land allocation and land use planning is the government's strategy to reduce upland rice cultivation and influence agricultural changes to production. Chapter Three has outlined government land policy.

According to Xieng Ngeun District figures in 2005, the use of village land had been officially determined in 77% of the surveyed villages. Land demarcation had been enacted in 42% of these villages and land allocation in 35% of these villages (Savathvong, S. 2005 pers. comm., 1st Nov). Government agricultural policy was communicated from the District Governor via DAFEO staff to the farmers. District staff relayed guidelines and advice to the headman and the farmers in the village. A basic understanding of government policy was illustrated by the following quote from a female farmer, "The District Agriculture and Forestry office divides the land and gives the land to us and decides how we will use it." Generally, DAFEO were expected to offer advice to farmers on crops, livestock, markets, and market price. They were also expected to facilitate commercial contracts with private companies and to assist in agricultural decisions.

Village headmen concurred that they had been involved with district officers in land use planning, though there was much confusion over the terminology. This was understandable as there have been many problems associated with the delivery of this initiative. The assessment of village land without using survey equipment proved difficult. Further problems raised by headmen included (i) issues of traditional land ownership, (ii) lack of staff to undertake lengthy land demarcation assessments, (iii) lack of staff to negotiate village land use agreements, (iv) contentious land ownership problems between villages, (v) difficulties in determining village boundaries, (vi) the loss of records (mice ate the paperwork), and (vii) passive non-compliance.

The majority of villagers expressed anxiety over the impacts of land use planning. For example, Nong Khouay and Kiou Kacham were to have land demarcation and land use planning in 2005, and people did not know how this would affect their villages. Pha Liem was to be relocated in 2005 and intended to use existing fields to continue production, as did Houay Khong (relocated

in 2004). The advantages of relocation to the road for these villagers were dampened by the division this created within the village group, as farmers continued to tend their fields far away from the new village location. Migrations into villages also presented unique problems. The headman at Phone Savang proudly indicated their village had a land use planning certificate celebrating elimination of swidden cultivation. However, he expressed some alarm at the recent influx of new settlers whom he thought might re-introduce swidden cultivation, and hence incite government disapproval.

The headman of a Lao Soung village explained the complexity and impact of government policy on agricultural production for his village. Prior to land allocation most farmers felt they owned and managed their land. The district requirement for a reduction in upland rice production has required increased access to markets and traders, the need for commercial contracts, and development of solutions to cropping and livestock interaction, as voiced by a headman:

> Now we are using land allocation, before that the land belonged to the people. Then the DAFEO plans are to reduce upland rice, using rice only for consumption. Need to change to upland crops, with a private company to buy soybean from this village. Maybe we need to increase production of livestock, but how can we do this.

6.2.1 Benefits of land allocation and land use policy

When farmers were asked their views on land allocation and land use planning, how implementation had affected them personally, and how these actions had affected the village, they responded in various ways. Many farmers felt that land allocation and land use planning had no effect or impact on their family or their village. Several reasons surfaced: (i) land had not yet been allocated, (ii) families had access to sufficient and suitable land, and (iii) there had been no land conflict from the implementation of the land use policy. These opinions are highlighted in the following quote, “No impact, this is because the use of planning and land allocation is a good way of managing the land,” said a female village committee member, perhaps echoing her government role.

Many farmers agreed with the government on their implementation of land distribution. Families often said they had sufficient land, with an allocation of 2-7 hectares per household, including 3 fallow plots. These farmers were empowered to decide on how best to use their land productively, “A family determines how to use the land according to their own conditions and

capabilities regarding the government policy," said a male village committee member. One farmer clearly stated his position on land management, "Good appropriate government strategy, farmers change from traditional farming practice to the new farming practice."

Farmers often expressed the opinion that land allocation was beneficial to the community and assisted in the conservation of forest, water sources, and wildlife. "Land allocation and land use planning is good for the village and community. It helps to reduce forest cutting to some extent," said a male village committee member. Land allocation often introduced more equitable land distribution as commented by a male village committee member:

> Land allocation and land use planning makes it easy for us to use the land as we have decision making on what we like to use the land for. Another thing is that people cannot fight for more than they actually need and are able to use.

Land allocation has the potential to legalise the ownership of land, solve land disputes, and encourage changes from upland rice production to upland crops. Generally, farmers were permitted to cultivate more land if they were prepared to implement rotational systems of cropping and to pay land tax. Some villages had sufficient land available to meet the demands of the village and actively encouraged new farming techniques to increase production.

6.2.2 Disadvantages of land allocation and land use policy

In some cases, land allocation and land use planning did not provide sufficient land for the farmers as a village headman indicated:

> Land allocation is not enough for households with many children. Four plots for upland crops, is a small area. Soil fertility is not good when we rotate crops every 1-3 years, i.e., rice to crop to fallow to rice. Some families don't have enough land for married children. What can they do? The first family already has land but if not enough, they need to change to livestock when they have money. The families without land need to take land from another village.

Others disputed the benefit of intensification and rotational farming practice. Issues of productivity from shortened fallows surfaced including weeds and pests, soil fertility, disease,

increasing labour demands, and decreased yields, illustrated by the following quote by a female community member:

> The main problem now is short fallow period which has a lot of weeds, low rice yield, use a lot of labour to do weeding, poor health because no time to find food for ourselves.

Complaints about the distribution and productivity of allocated land were mentioned including (i) insufficient and unsuitable land far from village, (ii) inequity in distribution; (iii) increasing population requirements for land, (iv) increased labour requirements, (v) decreasing yields, (vi) excessive weed infestation, (vii) crop disease, (viii) erosion, (ix) problems with soil fertility, (x) difficulties with cropping/livestock interaction, and (xi) increased cost due to land taxation. These problems describe the limitations of land availability, land selection, and land productivity associated with land allocation.

Farmers' land use and management decisions were affected by land allocation. Land demarcation had not resolved some village boundary issues and relocation has not solved land access issues, "The land is not enough for crop production and very small area for paddy rice. There is a need for more land allocation," claimed a male farmer. Land was sometimes sold by the village authorities to people from other villages, and this then required more land to be re-allocated to the farmer. Often newcomers to the village were given land with poor soil that was far from the village. Migration between villages was reportedly common, so unallocated land was still required for future allocations. Population density and proximity to nearby villages tended to reduce land availability for some villages, and led to problems over disputed territory.

For some farmers, conflicts and confusion arose over land ownership after land allocation. Ultimately, the village headman resolved these disputes. "It's affecting because there are still conflicts about dividing the land and people are fighting for the best one for themselves," said one female farmer. In certain instances farmers were using plots of land allocated to other farmers or to other villages. There was on occasion ongoing conflict between neighbouring villages that had not been resolved by land allocation, or by land use planning. Appeals were frequently made for government intervention when village land remained in dispute.

A male farmer suggested that, "The allocation is not a problem, but the problem is that people did not follow the plan. They were still cutting trees near the water source which makes or creates a water shortage." This indicated that policy may remain ineffective, and that it may not

be possible to conserve resources in the longer term as originally envisaged by the agricultural land policy.

6.2.3 Land use decisions

The village headman, community members, and farmers discussed and decided on crops, livestock, and land production. Typically, land would be allocated by the village headman and the farmer then assessed the soil fertility and land suitability. The farmer reflected on his/her personal experience in crops and then planted combinations of rice, cassava, Jobs Tears, sesame, and mulberry, to name but a few. One plot of land was cultivated and 3 plots remained fallow, for which the farmer was required to pay tax. Agricultural decisions were ultimately made by the farmer. "Myself, I decide how to use my land because I was given and have the full rights to manage it. The authority is only a provider and an organisation," stated a male community leader.

The decision of a family to plant market crops is often influenced by new seeds, market information, and the ability of the headman to negotiate contracts with private companies. When Unused allocated land will often be transferred to other families who are in need of more land.

6.2.4 Attitudes to government land policy

The impact of government land policy on farming and livelihoods was investigated using several questions and the responses from farmers indicated that government land policy was pushing farmers to look to different activities. These questions attempted to appraise the sense of empowerment of an individual in light of government land policy. The results strongly reiterated that the government policy assisted and benefited them (100% agree). However, there were mixed opinions on whether the government land policy actually affected them as individuals (62% agree). Farmers expressed compliance but were generally divided on the affects of government policy on their agricultural production. There was agreement that there was sufficient land for the village to try new activities now and for the future.

Spearman's rank-order correlations indicated there to be a highly significant association between farmer views on government land use changes forcing farmers to look to different activities (96% agree), and the need to grow other things instead of rice to feed their family (98% agree), ρ =.38 n=136, p<.001. There was a highly significant association between responses to the notification that government land use changes forcing farmers to look to

different activities (96% agree) and whether the village will always be able to support the family as there is enough land for the future (94%) ρ =.23, n=137, p<.01. A highly significant association was also shown between the view that government land use changes forced farmers to look to different activities (96%) and the need to grow more crops to feed the family and livestock because there was not enough rice (98%) ρ =.25, n=139, p<.01. These high levels of agreement with the statements reflected the change occurring in agricultural production, driven by government policy and the need to diversify their farming systems.

6.3 Environmental concerns

Villagers were asked to specify their main environmental concerns unprompted by a list. Responses were classified into several categories (i) village water supply for domestic and agricultural purposes, (ii) land productivity, (iii) deforestation, (iv) climate and the effects of drought, and (v) land for cultivation and results are represented in Figure. 23.

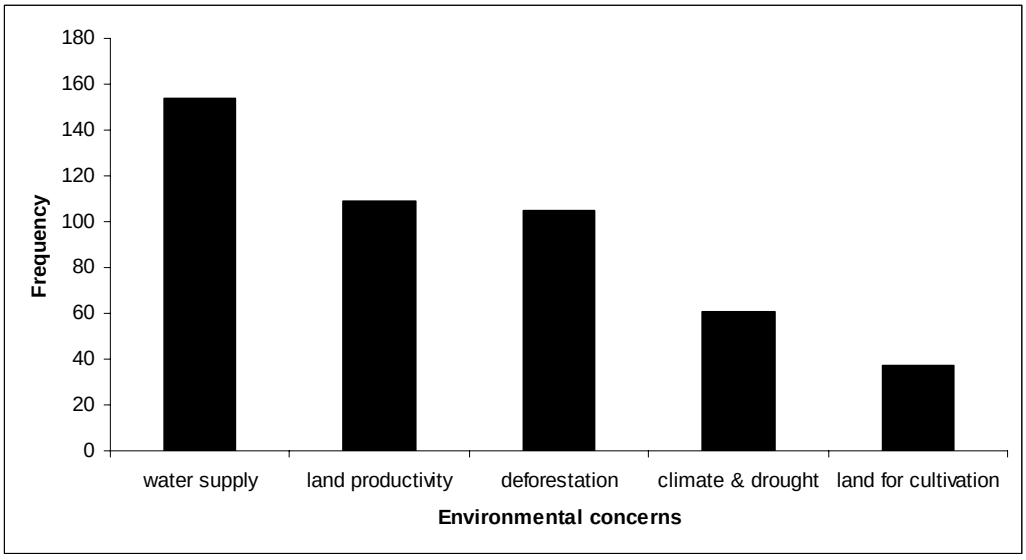

Figure 21 Environmental concerns among farmers in Xieng Ngeun District (N=202)

Note: Frequency is number of times mentioned. Some respondents mentioned more than one concern as an unprompted response.

6.3.1 Water supply, deforestation, climate, and drought

Many villages expressed their concern about the climate, drought, and fluctuations in weather patterns that impacted on water availability and rain-fed crop production. These issues are not separable and have been combined for discussion in this section. A tropical, wet-dry monsoon climate prevails in Xieng Ngeun District with considerable temporal variation in rainfall. The interviews were conducted during the dry season (November to March). The villages in the field

study were located in the uplands between 200-1500m above sea level. Village water was supplied by springs, creeks, or the river. Water was pumped from wells and could be piped overland when necessary. Government or NGO project intervention had improved water infrastructure for some of the villages. However, villages are asked to supplement the cost of the development and often couldn't organise sufficient funds from within their villages to do so. World Vision had provided domestic water supplies in a majority of villages in this study.

Villages had a limited capacity for water storage, and they were reliant on the water catchments to supply their domestic and agricultural needs in the dry season. Consequently, farmers were reliant on water sufficiency from local water resources, and on seasonal rain events to implement their agricultural systems. Lack of water limited opportunities to diversify into upland crops and livestock. One female farmer explained that, "There are many things worrying me, forest rains do not come when they should, water sources dries out, production results are bad."

Farmers mentioned they were concerned about agricultural productivity associated with water availability, and also about deforestation at the water source. One male farmer stated, "In the last 10 years, many water source areas dried out, which has never happened before." Forest and water conservation were of great concern to farmers, who expressed that they were unable to control the re-occurring deforestation. "Swidden cultivation is the main cause of deforestation, which causes drought, and soil erosion. Forest has been destroyed, wild animals disappear," said one male farmer.

Environmental conservation of forest land and water source was discussed broadly but most solutions considered modifications to farming systems through diversification strategies. Some farmers felt the environmental problems were beyond their ability to solve as individuals or as a group. Other farmers extolled government rhetoric and economic incentives to stop slash and burn activities. One community member emphatically provided the solution, "Stop swidden cultivation and produce other crops that make more money and higher value than upland rice. Do other things that can generate income." This diversification strategy was further described by farmers who felt they had the ability and means to change their farming system, "Plant the cash crop Jobs Tears, maize, NTFP collection, and paper mulberry. Shift to other crop production namely garden, plant fruit tree, and other non-rice crop production."

Problems were often perceived as solvable only by outside intervention, through government directives or assistance. Farmers suggested that the government should be instrumental in

finding solutions for village problems, “the authority should come and help the villagers in protecting and preventing the forest from being cut and in preserving the water source” stated a male farmer. However, assistance from the government was not always forthcoming and villages expressed the difficulties they faced when dealing with the government, “Go to government to ask for these problems to be resolved. Have waited 3 years since relocation but the government hasn’t solved this problem,” claimed a headman.

6.3.2 Availability of land for cultivation

Land productivity and the availability of land for cultivation were perceived by farmers as significant environmental concerns. There was an unclear distinction made by farmers between natural resources and land used for agricultural activities. Although there were areas of protected forest and conservation forest, generally, agricultural land was within forested areas.

The uplands encompass a heterogeneous environment and every village revealed different levels of land availability and productivity. In all interviews with headmen they reported land use planning had taken place in their village, though often they were unclear about the details. Unanimously, they claimed acceptance and agreement with land use plans. However, concerns were often then expressed about insufficient land availability, and ongoing land disputes with other villages. A headman from a remote village facing relocation to the lowlands described the discontent over land use planning issues:

> There is a problem with the change from upland rice to other upland crops. Big problems, people need to cultivate rice, government says reduce upland rice production, stop shifting cultivation, change to upland crops or upland cultivation crops for industry, e.g., mulberry tree, but this is very difficult.

Villagers often mentioned that there was insufficient land available for farming, “The problem facing my family now is not having land for family,” said a male farmer. Several reasons were given for lack of land availability including (i) not enough land, (ii) insufficient cultivatable land, (iii) the need to rent land from other villages, and (iv) problems over conflict or land disputes with other villages. Several comments were made concerning land allocation including, the lack of allocation, the conflict that may be caused by land allocation, and the complexity of problems emanating from the land allocation policy.

Some farmers suggested that communities, the government and NGOs should take action to solve these complex concerns. Community action in cooperation with government policy was suggested in the following quote by a female farmer:

> We would like the village to help in solving problem about land for cultivation by having land allocation and land use planning for the villagers. Maybe the village committee needs to allocate land again and control the use of land carefully. We will have more detail of land use management.

Irrigated paddy was considered by government as the main alternative to growing upland rice (where the same plot of land is repeatedly used for rice cultivation). This practice generally requires flat or terraced land with access to water and an irrigation system. In Luang Prabang Province there is only 2% of land suitable for paddy rice cultivation, but the government has encouraged paddy as a major alternative to the swidden cultivation of upland rice.

Several comments were made about paddy rice production, indicating that farmers would like to produce paddy rice but that there was, "no suitable land available", "land was too steep", and there was "insufficient water for paddy rice cultivation." People moving to the lowlands or facing relocation were hopeful of cultivating paddy land; however there was often no lowland paddy available. One village facing government relocation indicated that there was no paddy available in the new village and the farmers would still have to work in the dry upland fields after relocation, "Farming is far, coming and going is difficult, said a male farmer"

Migration of people between villages was common, and new settlers often experienced problems with land availability. A committee member mentioned that a family had moved to the village and as yet had no land, "No farming land because just moved in to village, a new family in village. We will ask the village headmen for new land," said a committee member.

6.3.3 Land productivity

While some farmers reported they were satisfied with land productivity, others said production rates of land for cultivation were low, and there was a cycle of diminishing yields. Decreasing soil fertility, low yields, erosion, drought, and increasing weeds, pests and plant disease, were all mentioned as compounding difficulties in agricultural production systems. "The livelihood is not enough every year. Now they produce upland crops and very low yield," claimed one headman. A greater labour input was required for a diminishing rice and crop yield. "There is no

social problem but the main challenge for us is declining yield and productivity of crops," said a female farmer.

Soil fertility and yields were generally reported to have reduced over time, as had the fallow phase of swidden. The yield of rice from swidden cultivation is partially dependent on the length of time the land has been fallowed; optimal fallows were usually to be greater than 7 years and preferably 15-20 years between crops. Cropping on young fallow (less than 7 years) usually implied that soil was less fertile, with successive short fallows continuing to denude the soil quality.

Difficulties were faced by village headman when trying to encourage practices to increase productivity, "People don't understand new agricultural technique, and they continue to produce old traditional production." Intensification of agricultural systems requires the introduction of agricultural management products into farming systems, i.e. fertilisers, herbicides, and pesticides. To enhance productivity, fertiliser, or livestock manure was occasionally used. Farmers in this cultivation system were often too poor to afford additional management production costs and also had difficulty delivering these goods on site, even if affordable.

Farmers mentioned that insect damage to the crops such as maize, Jobs Tears, and sesame were limiting productivity, as did the damage from mice and rats. Crop and livestock diseases further reduced productivity. Epidemic diseases, particularly in pigs and chicken populations, were of concern and were regular occurrences in these villages. Vaccination was often not effective as it was not regularly carried out, or is cold-chain dependant, and farmers object to the cost, as indicated by one headman:

> Animals affected by disease. We will try to continue raising animals. Animal disease every year but they have vaccination program each year in the village for Veterinary Extension Worker (VEW) in the village.

6.4 Social and economic concerns

Farmers had many social and economic concerns relating to farming and livelihood. Responses were classified into several categories (i) insufficient money, (ii) food shortage, (iii) infrastructure, (iv) land productivity, (v) land for cultivation, (vi) labour, (vii) ethnical/social problems, (viii) health, and (ix) education (Fig.5). Land productivity and availability were often mentioned and import concerns and have been covered in the previous section.

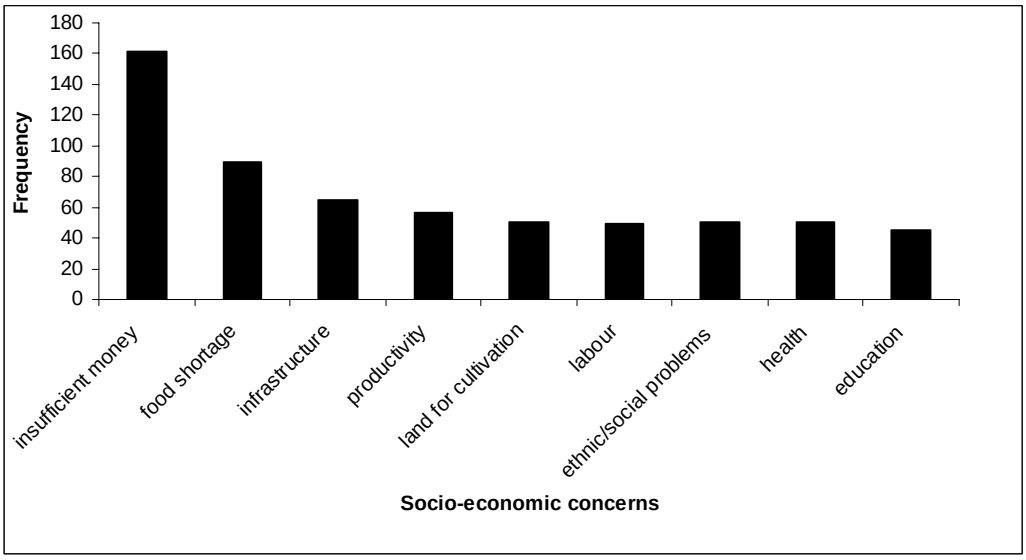

Figure 22 Socio-economic concerns among farmers in Xieng Ngeun District (N=202)

6.4.1 Wealth

The term wealth was considered to include concepts such as (i) sufficiency of money, (ii) poverty level, (iii) food scarcity, (iv) access to facilities and infrastructure, and (v) the farmers' ability to operate within their environments, -rather than purely financial terms. Most villagers were reluctant to speak about their wealth and the headmen were often evasive when answering questions on village wealth, pointing out that there were several very poor families in each village. Notably, investment in livestock has traditionally been the mainstay of the village cash economy, livestock were sold when necessary to cover immediate demands e.g., medical expenses, cost of education.

Almost every farmer indicated that they had insufficient money and that family rice and food shortage was commonly experienced. The headmen discussed these issues in more depth, relating production issues to money and food insufficiencies, and the consequent impact on their village:

> Thinking about village wealth, many people cannot get more money so they need to collect in the forest everyday. Slash and burn and working in uplands uses much labour. No weed control because of the new fallow and decreasing production with low yield. Because of land allocation, there is a short fallow. We have 1-2 plots of land, with fallow time for 3 years. Don't know how to solve the land allocation problem.

This quote from a headman is an example of the many integrated issues faced by subsistence farmers struggling to provide for households and to generate wealth.

Many poor families were denied an opportunity to expand agricultural production. Those faced with insufficient rice production, needed to purchase rice and were without means or capital to increase production. A committee member added, “Worry about the poor families who don’t have enough rice to eat in the whole period of the year and have low income.” A village fund was often the only opportunity afforded to the village poor to maintain their livelihoods. Problems of adapting to land use policies were often mentioned by poor farmers: “Plan to reduce swidden cultivation of rice and change to crops for market, but cannot sell produce as trader won’t come, and we need to extend livestock for poor family, but we don’t have a fund.” Diversifying into other upland crops can only be successful if there are traders willing to buy and transport stock. The need for access to credit, i.e., revolving funds for livestock, rice bank, and bank loans to fund new activities was often mentioned.

6.4.2 Food shortage

Food shortage was of great concern in every village. “The main problem is to find enough (good) food and rice for consumption,” said a male farmer. Villages usually experienced rice shortages for several months preceding the harvest. When there was insufficient rice for home consumption, they needed to buy rice: “The most difficult time is during two months of not having rice to eat therefore, we have to seek money to buy rice,” said a female farmer. Comments were made by village headmen, committee members, and villagers claiming that there were many families with insufficient rice for consumption. “Produce upland crop, very low yield, more labour but small effect. Beginning August to December people do not have enough rice,” explained a headman. Another farmer explained the difficulties for his village:

> Not enough money, not enough food, especially rice shortage each year. If they have money they can buy animals for income. Now we don’t have enough money and food, only enough for daily consumption.

Some households were found to experience severe food shortages when there was no male head of the household or insufficient labour within the household to produce enough rice for consumption.

6.4.3 Infrastructure

Villages often a lacked access to basic infrastructure including, road access, transportation, electricity, water supplies, sanitation, and required the construction of dwellings and meeting

rooms. Difficulties were faced in villages without adequate road access to markets, where changes to agricultural production was possible, but transactions prove difficult:

> Problem about the road, we can produce upland crops but not a good price from the trader. Traders come and they have to pay for transport to the road or boat, and that reduces the price. They must construct the road but people don't have money. It's good to grow upland crops and improves our livelihood, claimed a headman.

Without roads and transport the villagers find it difficult to take upland crops and NTFPs to market. "There is no bus that comes to the village and this causes problem with market accessibility. When we produce something, it's quite hard to sell," said a male farmer.

Of primary concern is the absence of electricity supply or hydro-electrical techniques for use by villages for powering television, radios, refrigerators, other small appliances and rice mills. The problems of village hygiene and the lack of sanitation and toilets, and water supplies were mentioned. Insufficient funds, unfinished semi-permanent dwellings, and limited land for housing were issues in most villages. Construction and repair of meeting rooms were urgently required for some villages. Kiou Kacham had been divided into 10 zones and had a population of 1053 villagers, and yet remained without a meeting room.

Many villages were without basic infrastructure and amenities, and looked to the government for provision for electricity, water supplies, roads, and to establish schools and medical centres. "Request to higher authority to establish schools in the village in order to have an opportunity for children to go to school regularly," said a male farmer. Problems and costs associated with road construction were daunting, and were often solved by community action and labour through work or food programs combining government and NGO assistance. Villages found it difficult to supplement the cost of road construction, as highlighted by the following quote from a headman:

> Difficult, don't have the road, very difficult. Don't have a plan to move the village. DAFEO say not to move but stay to work the land. They have plan with World Vision for 3 ton of rice, now they have plan to take additional money about 1 million kip from farmers to repair the road. Need to repair for motorbike track and cars to get goods to market. 200 million kip they need to pay for a tractor to repair the road. But there isn't a lot of money because of many poor families in this village."

Other infrastructure needs such as schools were sometimes sanctioned by community efforts. “We would like to have school up to 5 years, secondary school. We need to earn more money by farming more than before to make us be able to support children’s school,” said a committee member. Figure 25 shows some of the infrastructure and vessels used for trade and transport by villagers on the Nam Khan River.

6.4.4 Labour

Lack of farm labour was problematic for many villages, as choices in agricultural production were largely governed by availability of labour. The need for farm labour is seasonal and largely determined by the production of upland rice. Other activities fit into these seasonal work calendars, so competing production agendas with changes to cropping and livestock production was only undertaken with labour availability in mind. “Not enough labour to do other activity or to produce other things,” said a male resident.

Labour is of concern to aging residents and those with ill-health, “My worry is that I’m getting old and there is no labour for cultivation for the family,” said one woman Changes to productivity without appropriate labour proved difficult, “I am too old and I can’t work hard, that causes low house income. I can’t send my children to school, I am willing to raise animals but have no budget available to buy animal feed,” said a male farmer. Many villagers exchanged their labour, sold their labour, laboured on their own projects, and/or hired others to labour for them. Alternatives to farm labour were mentioned in terms of seeking professional jobs or off-farm activities, or involvement in trading and other services.

6.4.5 Ethnic tension and other social issues

Ethnic tension over choices in agricultural production surfaced at times during interviews. As in the case of one headman:

> Lao Loum have no problem, they use many activities. Lao Soung only produces upland rice. If harvesting finish, they stop and have no other activities, and then they have a rice shortage. After finishing rice harvesting they do nothing; therefore there is nothing to eat.

Opinions on certain ethnic group characteristics were often aired by respondents, suggesting that some groups remained poor because they were lazy and were not thinking ahead about their

future needs. In addition, a headman from a predominantly Lao Soung village voiced complaints about their situation and the effect of government policy:

> Here we have a big problem because the government plan is to stop shifting cultivation, but Lao Soung don't have paddy land and rice, don't have another job, no education, especially women, don't know how to make income for the family in another way.

The interviews showed that no community is immune from the vicarious behaviours of youth, particularly when they were situated close to the main road and proximal to larger urban areas. In some villages the women were concerned about youth safety, with some of the children riding their motorbikes very fast, drinking alcohol, and taking drugs. Drug addiction to opium was said to be problematic in some villages as it reduced productivity and resulted in rice shortages when people tended to cultivate only small areas of land. Petty crime was often associated with drug addiction. In communities where drug consumption and thieving was problematic, several community solutions were proffered (i) education, (ii) bringing offenders before the village authorities' (iii) village rules and regulations to punish, (iv) penalties according to the law, and (iv) payment of fines and reimbursement:.

Generally, village residents expressed their appreciation of and reliance on the social cohesion maintained in villages. Safety, peace, friendship, and community were words used to express village experiences, "No problem at all, people are very close to each other and help to solve the problems. I think that we need to strengthen the peoples' solidarity based on helping each other," said a community member.

For some villages production was especially difficult and in the absence of village solidarity people were walking off the land, particularly for Lao Soung inhabitants in higher altitude villages. They appeared to be proactively seeking alternative solutions to the production of upland rice. In light of shortening fallows and diminishing yields, they were choosing to seek suitable paddy land in the lowland or other provinces.

In several villages, immigration or relocation placed pressure on resources and caused dissent from villages who were attempting to comply with government regulations to reduce swidden cultivation Disenchantment over ethnic group immigrations were captured by the following comment by a headman:

> There is a problem with new families already, 7 households moving here. More coming, 13 households, plan to come here, all Lao Soung. They don't have land allocation; only have land far away from here. Currently, there are problems with swidden cultivation and upland crops, as not good soil fertility. New families don't have experience with cash crop. Don't have water supply for new family.

For those villages experiencing immigration, several strategies were planned; multiple cropping and introducing livestock. Villages experiencing relocation often used the village organisation to solve their production difficulties by combining their labour and planning communal enterprises together.

Immigration often caused problems of overuse of village reserves, further reducing cropping yields through more frequent cultivation. The government was not compensating by providing additional rice banks or other support. An example of the many problems associated with location policies was seen in Tin-pha village. Recently relocated from a more distant site, this village remained without road access and yet farmers from the lowlands have been relocated to this upland village by the government. In this area the cultivation of opium is common and village residents were said to have drug addiction problems.

6.4.6 Health and access to medical care

Illness and access to medical facilitates were issues of importance to villagers. Health concerns included disability and illness, such as colds, malaria, and diarrhea. Other medical concerns included medical assistance for childbirth, treatment for accidental injuries, access and affordability of medicine, and treatment and prevention of chronic health problems. When the villagers or their family were ill they were often without funds to buy medicine or other treatment. Chronic illness often led to impoverishment. Projects often provided water supplies, sanitation, hygiene advice, maternity clinics, health care clinics, and staff i.e., doctors and/or nurses. Health care remained of particular importance for women and children. Access to medical facilities tended to be especially problematic for remote villages, or for the poor without funds for medical assistance. Medical telephones and pharmaceutical supplies were available for information and the treatment of medical problems in some less accessible villages.

6.4.7 Education

Of great concern to villagers was the cost and accessibility of education for their children. A major difficulty was the financial cost and labour strain of sending their children to school, competing with other family expenses:

> We have low income and members in the family become sick almost every year. From this children have to stop to go to school as no budget for them to go to school, said a male farmer.

Other concerns about education included (i) distances to school, (ii) cost of transportation, (iii) the danger of crossing rivers or roads, and (iv) the quality of education that local schooling provides. Villages instated teachers by providing food and accommodation if there was a school on site, otherwise the child traveled to the nearest school. Schools varied from kindergarten, primary, and to larger secondary schools in central villages. Attendance was not compulsory, so children often remained at home to labour in the fields. Another issue was adult learning and knowledge:

> Want to make more income, but I do not know how and what to do, I would like to know how to do farming. People have very poor technique for using to produce, e.g., livestock. People don't have knowledge how to produce livestock and crops. Need to explain and supervise upland crop and livestock production, said a headman.

6.5 Strategies to address social and economic concerns

Some farmers expressed a despairing response to the seemingly insurmountable problems of isolation, inaccessibility, lack of development, lack of alternatives, poor market access, and ongoing livestock disease. Spiraling problems from insufficient cash, rice, and livestock were seen as insoluble. Residents often felt powerless to resolve issues such as low productivity, lack of infrastructure, drug addiction, and insufficient land for agricultural production. Problems with infrastructure are shown in Figure 25, illustrating the bridge used by villagers to cross the Nam Khan River in the dry season.

Figure 23 'Dancing bridge' across the Khan River, Xieng Ngeun District. Photo K Alexander

More proactive farmers indicated that they could 'self-action' solutions to their problems through diversification strategies, while others sought intervention assistance (Fig.26).

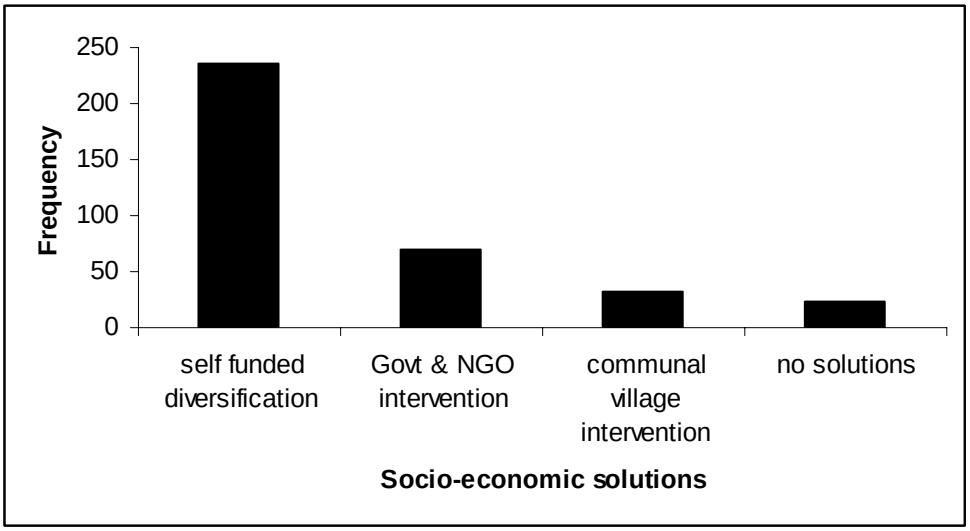

Figure 24 Initiation of solutions to socio-economic concerns among farmers in Xieng Ngeun District (N=202)

6.5.1 Diversification strategies

Farmers supported the concept of diversification of farming systems as a pro-active solution to the socio-economic problems encountered by villagers. Suggested changes to production included paddy rice production, cultivation of cash crops and garden vegetables, raising livestock, and providing livestock feed. Suggested cash crops included; Jobs Tears, maize, sesame, soybean, cotton, cucumber, bananas, pineapple, physanolaena, paper mulberry, cane sugar, and fruit trees. Forages, taro, and cassava were suggested for livestock feed. Planting second crops such as, "broom bush, mulberry trees, teaks, and aromatic trees (ketsana tree)," were also seen as options. Production of livestock, i.e., chicken, pigs, goat, cattle, and buffalo, was considered an important alternative. Farming system changes were dependant on the availability of suitable land, water, labour and time, and often required inputs such as fertilisers, fencing, machinery, and knowledge. In the following quote a headman suggested a variety of options to change production in his village:

> We would like a new activity for each household. Would like to stop swidden cultivation and find another activity to make more money, like banana production, for all year round sales. The trader buys and transports to Vientiane and Luang Prabang as there is not enough supply of bananas. We plant mulberry and vegetable for sale and produce livestock, also chickens and pigs.

Another headman outlined the village's need for paddy land, and new varieties of rice, and for technical innovations in upland fields. He expressed concern at the unsuitability of land for new cropping options, and the need to address soil fertility:

> Produce agriculture and livestock, need to see the market, plant crops to match the market, when the trader needs crop we can grow. Need land for paddy and upland rice and need to improve techniques of agriculture and a good variety of paddy rice to improve the yield. Land quality issues, we need to change to crop, soybean, for soil fertility, also using manure for soil.

Several approaches to income generation from marketable produce were suggested by respondents. Vegetables were being easily and quickly grown to supplement diets and sold at the market. Market vegetables such as tomatoes, pineapples, and bananas were cultivated on the river flats and in villages with road and market access. Upland vegetables, notably cucumbers, potato, gourds, ginger, and local vegetables were collected from the forest and provided

additional income. Farmers could then buy rice and/or engage in trading. Specialised crops of vegetables were grown and marketed in both the wet and dry seasons when water was available. This required manure to improve soil fertility. Caution over the success of changing to cropping was expressed by one headman, "People don't have enough rice. Some families change to another crop, sell for money but sometimes that is not enough."

Another suggested approach was to develop upland paddy fields as alternatives to swidden cultivation of upland rice. "We make rotated upland paddy field," said a female farmer. Plantations of teak trees were suggested as a source of reforestation and future wealth generation. NTFPs gathered for sale from the forest were often used to supplement incomes and for household requirements, "Catch small wild animal, make home garden leaving chicken for home consumption." NTFPs were viewed as components of the farming system, complementing cropping and livestock production. Mulberry and rattan were generally gathered from the forest, although they could also be cultivated. Income from gathering NTFPs and growing cash crops was often used to purchase livestock.

Livestock comprised small livestock, pigs, goats, and poultry and large livestock including cattle, buffalo and horses. Small animal production was more common. Livestock production provided a ready access to income and required less investment in labour when managed extensively. Many farmers were unwilling to invest in livestock as they could not afford to buy or supply livestock feed. One headman suggested that changing to cattle production was only possible with suitable grazing lands and improved grassland, "Problem about livestock and agriculture and the free-ranging livestock creating a problem with cash crops, having the freedom to eat the garden."

Villagers could not always afford to invest in ruminant livestock so most turned to cropping alternatives:

> Livestock good alternative, but don't have enough money to buy animals. Some households have money for livestock, but households don't have money, they plant soybean or maybe local crop variety, said a headman.

The change to market-orientated crop production was said to lead to greater business potential, creating income to buy rice to meet the needs of the family. "Will plant more cash crops and do business to earn more money, then buy rice and feed the family members," said a male farmer.

Another farmer considered, “I don’t know what will be the best agriculture to do. I am trying to now look at the market demand and will produce the one that has high demand to earn income.”

However, fluctuating market prices and crop failures have led to suggestions by farmers that they may in the future reduce cultivation areas for cash crops. Farmers were also concerned about return on their labour investment:

> We think we would like to have a contract with a private company, for cash crops, same price as a contract. They have a contract but not for a good price, said a headman.

Although the government encourages development of agricultural crops and livestock, households find it difficult to sell to traders at a good price, “Government give plan for upland crops and livestock, difficult to sell, nobody come to buy, but then only at a very low price,’ said a headman from a remote village.

Cash crops and livestock sold to traders or at markets provided an income to buy land for farming, pay for education, buy medicine, pay for medical treatment, and could be saved to buy large animals. Small enterprise activities have been suggested to supplement incomes and used for rice purchases. These activities included the production of bamboo rice trays, brooms, brewing alcohol, brick production, village shops, and small business trading, and handicraft production.

6.5.2 Government and NGO intervention

Farmers expressed the opinion that they were compliant and following the government strategy to improve their economic circumstance by planting cash crops and increasing livestock production. However, villages were expecting assistance from the government, “We would like authority to help and plan for development in our village,” said a woman. One headman expressed his dilemma suggesting that government action could alleviate some concerns:

> I don’t have an affluent relative with land. I don’t want to move as I work hard. Now the village needs electricity, needs water supply, and government help to improve plantation. Need to improve agriculture and improve upland crop for market, then maybe I will stay to improve my livelihood. Also I will try extension for forages for livestock.

Government policy directives were often stated in terms of the District Governor's plan, with mixed responses and only some resistance, as indicated by a headman:

> The Governor gives plan to change from upland rice to maize, cotton, mulberry, and sesame in 2005. Most of the people want to plant Jobs tears and upland rice. Some people change but most people don't want to change.

An innovative headman suggested solutions to these problems required government funding or support that may not be forthcoming in the short term:

> They had an idea from the headman, to use hydro-electricity from river opposite the village after their generator broke down. When they reported to the Governor of the district, they were told that they needed to wait, until the big road was built for a better electricity supply.

Villages expressed a perception that the government would provide advice and assistance to be delivered by the DAFEO. Direct requests for assistance were voiced, "Request district officer to assist in insect killing," said a woman. Farmers mentioned the need for technical staff to provide knowledge on animal vaccinations, new crop varieties, problem advice, and discussions on new techniques for agricultural production. Technical solutions and inputs were required such as pesticides, new seed varieties, fertilisers, and animal disease control. Some farmers felt the government should offer more assistance, "I'd like to ask the authorities to help in providing new crop varieties that are suitable to local conditions, as this will help the farmers to improve their income," said a male farmer. "Farmers should believe what the District Governor said, use land allocation and more activities and technology to improve every year and work on time in the season," claimed a headman.

Some villages expressed the opinion that the government needed to solve problems and implement planning, "Government needs to solve this problem; government needs to give the plan that the people need to do," Said a headman. Several villages indicated that they felt powerless to solve their problems and that it was the responsibility of the government to solve. "Leave it for the higher authority to solve," pleaded a woman.

Considerable frustration was often voiced by villagers, "Not easy to help these people, the government doesn't have a plan," said a headman. Criticism of the government plans were

offered, “Government give a plan for upland crops and livestock, difficult to sell, nobody come to buy but then only at a very low price,” said a headman. The need for land use resolution, planning, and allocation was often mentioned.

Of interest was the recognition by villagers of government propaganda, “Propaganda promotes for more farming especially to plant more cash crop and raising livestock,” and “market-orientated cropping is propaganda to farmer, to build up their family economics,” said by committee members. These quotes indicated that the farmers may not be taking this advice seriously.

Access to credit remained an ongoing problem that could be solved through credit arrangements with the bank and/or the government or NGO projects “Would like to ask the government to support credit fund, we will start from small to big as we can,” said a male farmer.

Although farmers entertained new ideas, they were often too poor to implement activities without assistance by government and/or projects. Sometimes they simply required credit. Villages expressed the hope that they would be chosen to cooperate and work with NGO projects:

> Need to give impact to the farmer. Change from upland rice and extension livestock. Specialist has analysed this land and it is very useful for maize. The village organisation goes to learn about government plan, then cultivate new variety of maize and have the technique for the new variety, said a headman.

6.5.3 Intervention by village organisations

The village headman has vested authority and is pivotal in the organisation of the village, as expressed by one headman, who offered several initiatives that his village would work towards collectively:

> The headman needs to advise parents to look after their children, good eating, drink boiled water, and sleep under mosquito nets, 100% households to have toilets. Needs cleaning in the houses and in the village, particularly for the Lao Soung. The headman needs to organise, help together and good family solidarity, organise labour exchange.

Villagers would often congregate at dusk to interact and complete tasks before nightfall (Fig. 27).

Figure 25 Villagers at dusk at Tin-pha, in the uplands of Xieng Ngeun District
Photo K Alexander

The following comment by a headman indicates village's preparedness to work towards changing crop production in league with markets and traders, to explore new markets for women, improve livestock productivity through vaccination, and take a visionary approach to new economic solutions:

> Need to organise the people to work and change upland rice to industry crop to produce for the trader. Handicrafts, women need to produce for the market. Livestock, vaccination, prevents disease. Need knowledge of market product and enough food and money, sixty percent of the population has enough money. Enough rice now, but we need more cash.

If a headman had difficulty finding solutions he would often discuss the problems with DAFEO and with the District Governor. "Headman's reporting to DAFEO and governor how to solve this problem," said a headman. "We need to find new techniques or technologies and adapt our system to suggestion from the village headman," said a woman.

Farmers worked together to provide solutions for the competing requirements of cropping and livestock production:

> The village organisation provides information to farmers; they go overnight to stay and plant upland market crop and raising small animals and chickens away from the village. Spend time outside the village, claimed a headman.

Other farmers suggested that the village should actively assist in land demarcation for the benefit of the group, "There should be location for animals or grazing areas, but not free grazing." Some villages lack funds to implement perceived solutions, yet other villages organised and planned for inputs, such as credit, "The village has plan for them to raise animals and plant crops to sell by using a loan from the agriculture extension bank," said a committee member. Other villages have developed their own credit systems:

> For the village credit scheme each family puts in 5000-10000 kip and village then has 5-10 million kip. This is used as a fund to buy village livestock, as well as for labour exchange. Payments are every month, and also have loan facility," said a headman.

However, new Lao Soung families in this village were not entitled to use this fund. Some groups within villages lacked funds, "Solve problem with the Lao Soung, if they finish upland rice, they should get into livestock production. Lao Soung want to do but don't have any money to buy," said a headman.

Farmers suggested that they needed to work together collectively using their own experiences and innovative approaches and learn from each other, "We need to learn from each other especially from the successful ones, so we can increase income from other activities such as livestock raising and cash crops," said a committee member. Other claims suggested that farmers were dynamic and actively engaged in many agricultural pursuits, yet assistance would be beneficial:

> Before people exchange labour, have money, cultivate next year. Need to help the people with health problems to continue working in upland rice. Need to join with the people and help them, said a headman from a village plagued by drug addiction.

6.6 Conclusion

Chapter Six explored the consequences of land use change farmers and the many factors influencing choices in farming systems and resultant livelihoods. Government land policy has affected these upland communities. Farmers' opinions indicated a variety of responses to government policy initiatives and implementation. Many farmers were satisfied with land tenure, land allocation, and land demarcations and were responding by changing land use practices. For other farmers, the consequence of these policies were compounding production problems, further exacerbating the difficulties these farmers face. The government's intention has been to promote productivity, specialisation, and the commercialisation of subsistence agriculture. This chapter has highlighted the difficulties in achieving these outcomes for resource-poor farmers. Farmers remained reliant on traditional subsistence farming, and were not necessarily moving towards more intensive farming production, but were diversifying their production choices.

Farmers were aware of the inherent environmental challenges they faced from land degradation and fluctuating water resources, and often felt disempowered and unable to deal with the consequences. Environmental concerns embraced problems with the water supply, deforestation, climate, and drought. Insufficient money, food shortage, and reduced land productivity were the most important social and economic issues faced by farmers in these villages. Other concerns were expressed over the lack of infrastructure, and access to health and education services. Choices over the deployment of farmers' labour remained critical to livelihood decisions.

Many strategies to manage changes to land use were suggested. Commonly, diversification of farming systems minimised the inherent risk of intensification, and were used by farmers facing food and monetary shortages. Farmers indicated that they were keen to invest in market-oriented crops and livestock production. However, there was an expectation that government and NGOs would provide inputs and technical assistance to modify and improve production. Villages also managed to assist farmers in organising and promoting agricultural production and by providing security and solidarity for the inhabitants. At this point it remains difficult to determine whether agricultural policies are supportive of small-scale family farming practices.

Chapter 7
Impacts of new technology on farming systems

7.1 Introduction

Chapter Seven investigates the implementation by government and other agencies of new activities and/or technologies developed to improve farmers' livelihoods. Alternative livelihood options for swidden agriculture are delivered mainly by international donor organisations in collaboration with government staff, often through short term projects. Development projects set out to promote a choice of new technologies to diversify livelihoods and create options other than swidden cultivation. Multilateral and bilateral aid provides a substantial proportion of the revenue and capacity used to implement government policies. In addition to improving livelihoods, agriculture or natural resource management projects generally aim to improve the productivity of and/or regenerate natural resources, such as soils or forests.

Collaborative development of upland agricultural systems has continued to address the issues arising from the cultivation of upland cash crops (i.e., Jobs Tears, maize, sesame, cassava, physanolaena, and cotton) and improvements to livestock production. The government, local research institutes, development programs, and traders have introduced new crop varieties and addressed some of the cultivation issues. Research and development organisations have been assisting in the delivery of essential services such as livestock projects, vaccine programs, and extension advice to farmers.

Interviews of headmen, committee members, and farmers sought information on agricultural activities and new technologies introduced to the village by the government and other organisations (341 respondents). Farmers were questioned on the recommendations and activities that were adopted, and the usefulness of these activities and new technologies. Farmers were asked to specify whether they were aware of new activities and technologies and whether they were interested in trying them either now or at a future time (202 respondents). The interview format consisted of open-ended and closed questions. Descriptive and inferential statistics and a factor analysis of salient Likert scale statements reflecting farmers' attitudes to new technology were performed using SPSS (139 respondents).

7.2 Projects in Xieng Ngeun District

The information presented here has been collated from interviews. As there are no official records available, its veracity cannot be guaranteed, but this approach provided a platform for understanding development practice.

Interviewees mentioned a total of 202 interventions that had been introduced by government and/or project organisations. Twelve villages (39%) had up to 5 projects, 16 villages (51%) had between 6 and 10 projects and 3 villages (10%) had between 11 and 16 projects. Table 15 presents the distribution of projects within villages by location and accessibility. Lowland villages accessible by road were favoured with projects and there were fewer projects in villages with limited access.

Sixty five percent of village headmen claimed that new agricultural activities or technologies had been introduced to their village by government or NGO projects. The headmen, as official representatives, were more likely to be involved in village projects, whereas farmers participated through choice or through gradual initiation. Interestingly, 93% of villagers claimed they had prospered over the last 5 years. This suggested that prosperity was not directly linked to the introduction and uptake of new activities. Those farmers who felt that their livelihoods had not improved were resident in disadvantaged villages that were without road access and had experienced immigration and relocation.

Table 15 Location, access and projects in villages (N=31)

Village location and access	% Villages in sample	% Projects in villages
Lowland altitude (200-500m)	61	66
Highland altitude (501-1500m)	39	34
		100
Village access by vehicle	51	59
Village access by boat	26	25
Village access by walking	23	16
		100

Organisations and programs found to be working in conjunction with the Lao government are listed in Table 16. The number of projects implemented by each organisation is indicated in

Table 17. Commencement years which are shown in Table 18, reveal that 76% of all projects had been in progress since 2000 with 53% since 2003. This shows that many projects have been recently established and of limited duration. The data shows that there had been a dramatic increase in projects on shifting cultivation stabilisation programs initiated in the early 1990s (Appendix G).

Table 16 International organisations and programs working in the study villages

Agricultural Promotion Bank	Lao- International Rice Research Institute (Lao-IRRI)
American Development Organisation (ADO)	Lion's Club
Australian Aid program (AusAID)	National Agriculture and Forestry Institute (NAFRI)
BAFIS	Opium reduction program
Biodiversity Use and Conservation in Asia Program (BUCAP)	Quaker Service in Laos
Dam Cron	Rural development program
European Union (EU)	Saphanimit program
Farmer Irrigated Agriculture Training (FIAT)	Shifting cultivation program
German Agro Action	Swedish International Development Agency (SIDA)
German Friendly Society GFS	United Nations Children's Fund (UNICEF)
Handicap International/Action Nord Süd, Decentralised	
Irrigation Development and Management Project (DIDM)	United Nations Development Program (UNPD)
Human and Civil Rights Organizations of America (HCR)	Work for Food Program (WFP)
Integrated Pest Management (IPM)	World Heritage (WH)
International Centre for Tropical Agriculture (CIAT)	World Vision (WV)
Japan International Cooperation Agency (JICA)	

Table 17 Government and NGO projects operating in the study villages

Project	Number of projects
World Vision	54
Government	43
Commercial companies	31
Other projects	22
AusAid/CIAT FLSP	15
JICA	7
SIDA	7
UNICEF	6
Credit provision	6
European Union	5
Quaker Service	3
UNDP	3
Total	202

Table 18 Commencement of projects in study area

Year	Number of projects
1971-1989	7
1990-1999	41
2000-2005	154
Total	202

Table 19 indicates the type of activity implemented by the project organisations according to farmers (see Appendix G). Note that project infrastructure included the construction of water supplies, schools, electricity supplies, meeting rooms, irrigation, and roads. Components of heath care included general information on health issues, women's health care programs, vaccinations, a medical centre, emergency medical phones, medical pharmacy supplies, and drug control techniques. Many projects combined agricultural activities with health and infrastructural assistance.

Table 19 Project activity in five categories in the study area

Project activity	% projects
Cash crops	36
Livestock	20
Combined activities *	19
Infrastructure	17
Rice	8
Total	100

* Infrastructure, health care, rice, livestock, crops

Table 20 gives an example of the main interventions or activities delivered by four of the main providers: World Vision (27% of projects), the Lao government (22%), private companies (15%), and AusAID/CIAT with the Forages and Livestock Systems Project (FLSP) (7%). World Vision had several development programs operating in the district: Xieng Ngeun Area Development Program, Khan River Poverty Alleviation Project, and Xieng Ngeun Mother and Child Health Project (Internet directory of NGOs in Lao PDR 2006). National and private organisations and the government provided infrastructure, agricultural activities, credit, and contractual agreements. The main private company had been instrumental in introducing soybean cultivation to many villages within the district. Several other smaller operators also dealt in contractual agreements for soybean and maize, and other operators developed the

livestock trade. FLSP introduced approaches to livestock management using forage technologies and participatory research and extension during 2000-2005 (Horne 2004).

An assessment of the effectiveness of each project was well beyond the scope of this study. Rather, the objective was to understand farmers' perspectives on the activities they were exposed to and to evaluate the potential for agricultural change in light of their viewpoints and agricultural decisions on the uptake of new technologies. From these tables it is evident that there are many concurrent approaches to the development of rural livelihoods. Projects, activities, and programs, are implemented cooperatively with government approval and the assistance of district agricultural extension officers. Extension staff work with international development project officers to outline government production guidelines, instigate projects, and give advice to farmers. In doing so they provide essential information for farmers and actively facilitate farmers to consider changes to farming systems by assisting with the incorporation of new technologies and the introduction of additional inputs i.e., seeds, irrigation equipment, forage varieties, livestock banks.

Table 20 Interventions and/or activities by four main providers in the study area

Project	Activity
World Vision	Health care, public health for women, medical centre, medical phone, medical pharmacy, community help, meeting room, water supply, repair and increase irrigation, school construction and equipment, education programs, village veterinary worker (VVW) training, agriculture programs, agricultural extension, livestock production, livestock bank and revolving fund, fish culture, rice bank and revolving fund, new rice and soybean varieties, cash crops, garden, plantation, Jobs Tears, paper mulberry, forages, and forestry projects.
Lao Government	Land demarcation, electricity, water supply, medical phone, pharmacy, health programs, school construction, agricultural extension, cash crops, paper mulberry, cotton, sesame, Jobs Tears, soybean, trees, broom brush, sweet potato, new maize variety, revolving fund, and rice bank.
Private Company	Livestock production (cattle goat and pigs), new maize variety, soybean training and extension, Jobs Tears, and cotton.
FLSP	Livestock, extension, livestock production, livestock feed, forages for livestock, veterinary health, VVW training, and vaccination.

7.3 Provision of agricultural extension

The provincial agricultural office based in Xieng Ngeun had 26 staff to manage agricultural and forestry issues in Xieng Ngeun District, 19 of which were members of Agriculture and Forestry Extension Unit. This unit comprised 4 crops specialists, 7 livestock specialists, 6 forestry specialists, and 2 irrigation specialists (Khounsy, B. 2006 pers. comm., 17 March). Farmers indicated that extension staff were regular visitors to their villages, particularly in the growing season, despite access difficulties encountered during the wet season. Other personnel from various projects also visited the villages during a project's implementation. For those villages only accessible on foot or by boat, government staff visited less frequently, perhaps three times a year. Generally, farmers did not know when they would receive their next visit, which may in part reflect the communication difficulties these communities face. The photograph of Houay Sa Than village illustrates an example of a river access pathway from the Nam Khan River (Fig. 28).

Figure 26 Houay Sa Than village, Nam Khan River, Xieng Ngeun District Photo K Alexander

Extension staff were considered to be the main source of information for farmers (Table 21). They contributed approximately 70% of overall information on productivity issues, particularly

new activities and technologies, as well as providing market and trading information. Farmers suggested that NGO personnel associated with specific projects provided 6% of their information. When asked where their other information came from farmers believed that talking to other farmers provided approximately 10%, they contributed to their own knowledge 6%, and the headman and the village committee provided 4%. External sources of information from the radio, relatives, other villages, private companies, traders, markets, and veterinary workers amounted to a combined 4%.

Extension visits were very important to the farmers for technical information and advice about new seed varieties, disease prevention and treatment, and new production techniques. Farmers expressed an expectation that extension officers would provide high quality, successful varieties of seeds and technologies for trial to encourage farmers to try new activities. Technical advice appeared pivotal to the uptake of new activities. Often farmers attributed adoption failure to lack of information or demonstrations by technical staff prior to initiating an activity. Practical experiences through agricultural extension increased the likelihood of a trial and consequent uptake of new technologies. However, continued uptake of new activities was not predictable, but rather a result of the individual's experience and access to information and support. Figure 29 shows extension officers with the headman at Houay Thao village.

Table 21 Sources of information used by farmer respondents

Source	% Contribution of information	Source	% Contribution of information
DAFO	68.6	Radio	0.9
Farmers	9.5	Private company	0.9
Project	6.4	Trader	0.9
Self	5.5	Community group	0.3
Headman	3.3	Market	0.3
		Village Veterinary	
Relative	1.8	Worker	0.2
Other village	1.2		

Note: Data based on frequency of farmer mentioning various sources

Farmers suggested extension staff and projects could further support changes in agricultural production by:

(i) initiating, supporting, and providing technical advice for new activities

(ii) using trials, demonstration and training for new activities and technology

(iii) increasing the frequency of their visits

(iv) assisting with the cultivation of new crop varieties

(v) assisting with the improvement of livestock management

(vi) introducing new breeds of livestock

(vii) increasing veterinary assistance

(viii) instructing village veterinary workers

(ix) assisting in the improvement of livelihoods

(x) facilitating the use of new equipment

Figure 27 Extension officers and headman (front far right) farmers (back right) at Houay Thao village. Photo K Alexander

Information and support from project organisations via extension officers appears vital to the change process. The uptake of new technologies and changes to agricultural practice is likely to be hastened by the deployment of more extension officers who were familiar with new techniques, informed about the market economy, and aware of inherent stakeholder issues.

7.4 Response to agricultural recommendations

Farmers expressed notional compliance with government recommendations for the reduction of swidden cultivation of upland rice, yet they were affected by a myriad of agricultural production

issues that influence their ability to change practices. Changing agricultural production risked reducing their food security and farmers struggled to comply with recommendations under these circumstances. Analysis of the qualitative data revealed that government agricultural recommendations tended to be followed when these were accompanied by high yields and good prices, buffered by strong market demand. In addition, farmers were more likely to follow recommendations when assisted by projects. Villages without project assistance felt bereft. Remote villages had less interaction with project initiatives and experienced difficulty in establishing new crops and improving livestock production. For them, the distance and inaccessibility to the market also reduced the inherent benefits of changing agricultural practice. Farmers who had relocated to villages on the road continued to cultivate their original upland fields and the transport of agricultural products to market still posed many difficulties. For some the transition to agricultural intensification was too difficult and other livelihoods were sought, as illustrated by one farmer who said, "Changed to be a trader because in the past I used to plant upland rice but not enough rice to eat."

Products that were adapted to local conditions and easily sold at market tended to be readily adopted. When farmers were considering a new crop technology they valued the versatility of the product, whether it could be (i) used for multiple purposes, (ii) grown quickly, (iii) substituted as livestock feed, (iv) used for home consumption, or (v) sold for a good price. Products that were easy to plant and that grew in a wide range of soils were also considered desirable. Farmers with experience in livestock production claimed they would increase production when possible. As one headman emphatically stated, "When people have benefits they will adopt. They have lots of projects coming past. They only adopt good activities that work." Figure 30 depicts the communal upland cultivation of vegetables and other plants for consumption or use by villagers and for livestock.

Farmers were more interested in, and enthusiastically spoke of, activities that provided a successful and immediate benefit. One headman reported:

> Many projects come here and by planting crops, people now have a good income. Livestock are good, with extension advice on how to prevent disease and how to feed livestock. Extension staff advise on paddy rice varieties, and tell us to use manure for fertiliser. Now we need extension information on forages, we have to plan to change to livestock, and have fencing for livestock. Have new good livelihoods, from 2000, income for everybody. Try many years but good result.

Figure 28 Communal (long term) upland gardens in Xieng Ngeun District that have replaced swidden. Photo K Alexander

However, another farmer suggested that success may be short-lived and said many farmers were resorting to traditional agricultural practice after the projects had finished. He added, "…they will continue to try new technologies because the government will not allow us to do swidden cultivation, so we need to continue until we can stop swidden cultivation." This indicates that farmers inevitably face changes to agricultural production, certainly in the short term. It remains to be seen how sustainable and permanent these changes will be in the longer term.

Farmers were more likely to trial new technologies provided by projects and commercial organisations when contracts were in place. Commercial traders assisted with technical information, facilitated production, and set market contractual prices. The guarantee of commercial markets motivated farmers to continue production, even when faced with low yields, and damage by pests and diseases. However, farmers often encountered difficulties when contracting the sale of crops, as trading agreements were not honoured. Under these circumstances traders were more likely to commit to sales at the village only after production had expanded.

7.5 Production decisions

The data indicated that farmers'decisions to modify production was primarily influenced by the affordability and availability of resources, capital, and technologies. However, regardless of the potential suitability of the introduced technology, production decisions were also founded on enterprise productivity. According to farmers' responses agricultural productivity was depressed in some cases due to the following factors:

(i) soil infertility
(ii) unseasonable rain events
(iii) lack of water
(iv) climatic changes
(v) erosion
(vi) young fallow land
(vii) land unsuited to production
(viii) pests
(ix) weeds
(x) disease.

Farmers would often discontinue new activities when agricultural productivity was significantly lowered by these factors. According to farmers, productivity was influenced by additional factors including:

(i) unsuitable seeds
(ii) crop destruction by livestock
(iii) difficulty with harvest
(iv) unseasonable planting
(v) incorrect techniques
(vi) lack of experience
(vii) preference for traditional methods
(viii) unclear recommendations and instructions
(ix) theft
(x) labour intensive methods
(xi) poor management
(xii) small trial plots
(xiii) insufficient labour
(xiv) lack of commitment by farmers

Although farmers suggested they were keen to improve their livelihoods using new technologies, productivity issues were said at times to be insurmountable. Hence, it is vital that

new activities are tailored to the geographic environment and that farmers receive ongoing extension and project support if changes to agricultural practice are to be established.

7.6 Economic incentives

Farmers keen to try new activities were largely influenced by market forces. Market prices were the main determinant encouraging farmers to persevere even when agricultural production was disappointing. Situations of market demand accompanied by high prices greatly increased the uptake of an activity or technology. "Based upon the market demand, even if the yield is low but if the price is good then we need to produce it," claimed one woman. Production decisions were influenced by the ease of access to market or to a trader as farmers often experienced great difficulty taking goods to market, especially from remote villages.

The availability of credit provided incentives for farmers to try new activities. The most popular forms of credit that people considered using were an exchange of labour (37%) and the rice bank (31%). Revolving funds and livestock banks were also important options, providing farmers with immediate benefit and the capacity to repay in the future with juvenile livestock. Bank loans or money from relatives or friends were not as popular, and clearly people were looking for government or project fund assistance.

7.7 Adoption of new technologies

Farmers were asked to indicate their familiarity with and intention to trial new activities such as perennial crops, plantations, cultivation of NTFPs, soil management techniques, forages, livestock management, tourism, handicrafts, and service industry activities (Table 21).

Generally, farmers were familiar with these activities, although there were fewer farmers actually using them. The farmers expressed most interest in new field crops, horticultural plantations, and livestock production. Farmers were hopeful of new opportunities to raise livestock, using introduced breeds, and forages to supplement livestock feed. Livestock management including vaccination and using pens, were also popular. If farmers were not already using these activities, they predicted that they would be using them in the future. Some interest was expressed in the cultivation of NTFPs and supplementing incomes by hosting visitors for ecotourism experiences. A moderate interest was expressed in new upland rice varieties, vegetables, and fruit trees and in plants and techniques that would improve soil

fertility. Farmers placed almost no importance on new paddy rice varieties and off-farm service activities and they had limited handicraft opportunities.

Farmers were asked to indicate their familiarity with new activities and rank the relative importance. Table 22 indicates the effort to which farmers had heard about the activity (yes/no) and were using the activity or intended to trial the activity in the future. The frequencies of positive responses (yes) were then depicted as a percentage of total answers for 139 farmers. The importance of the activity was ranked (1-10) and the median value was converted to a percentage- to provide an Importance Score in column 7 of Table 22.

Many farmers who were interested in new activities claimed to have successfully adopted practices after the first trial activity. Other farmers required numerous trials before they were successful. The activities that farmers were prepared to keep trying included new varieties of soybean, Jobs Tears, sesame, maize, and fruit trees. Generally, when activities were not yielding the desired result, farmers were still prepared to continue the activity and adapt and trial it for several years on a small scale before they decided to stop production. “They make plan to try to do new technology. After 3 years, if they don’t have impact, they would like to stop. If they have more impact they would like to continue for a long time,” suggested a headman. The need for adaptation is further highlighted in the following farmer’s quote, “I would like to test again until I get better result in future. The reason is not clear from farmers’ observation. When they plant in good soil they get low yield and plant in low fertility soil they get better yield.” New activities often required several attempts for establishment of successful production, due in part to a lack of understanding and limited education, information, and experience. “Our traditional way of farming still does not have new technique, we need training on farming practice, knowledge in farming,” claimed a farmer.

Table 22 Farmer familiarity and relative importance given to various activities and practices

What activities do you use? (N=139)	% Heard about it before?	% Use it now?	% Tried it before?	% Use it next year?	% Like to try using it?	% Importance Score
Vaccination for livestock	96	75	78	87	74	90
New forages for livestock	87	35	36	72	80	80
New experience with livestock	92	73	73	81	74	80
Pens for livestock	93	74	73	87	76	80
Hosting visitors	80	73	71	71	58	80
New crops	89	62	64	74	74	70
NTFPs	89	62	63	74	65	70
Plantation	95	66	68	77	72	70
New breeds of livestock	72	19	20	53	70	60
Forages as hedgerows	58	11	13	47	63	50
Forages as living fence	60	11	89	45	63	50
Mixed cropping with new crops	66	21	22	50	60	50
Plants for soil fertility	71	31	32	57	65	50
Fruit trees	83	20	20	55	64	50
New upland rice varieties	42	24	25	40	50	40
New vegetables	73	15	18	45	60	40
New handicraft, weaving,	66	17	18	31	42	30
New paddy rice varieties	43	18	18	29	32	10
Paper mulberry	42	2	2	19	29	10
Service industry	45	18	27	27	37	10
Silk manufacture	29	13	13	18	22	0
Other	4	4	4	4	3	0

Often mentioned was the fact that people preferred to witness trials by early adopters, and if successful, they were prepared to invest time and labour into the new activities. Despite difficulties some farmers continued with unsuccessful activities due to (i) high demand for the product, (ii) personal interest, (iii) multiple uses for the product (livestock feed), and (iv) variability in seed quality (prepared to trial for a second season). Other farmers decided that the new activities were unsuccessful and discontinued them, concluding that they were no longer worth investment of time or labour. Poor yields, low prices, and the prevalence of damage to crops by livestock, disease and pests, often influenced the decision to stop an activity.

Farmers also discussed projects that offered village infrastructure such as irrigation, roads, and medical centres. Comments indicated that there were issues associated with the implementation of basic infrastructure, e.g., road construction and water supply, “Every project is useful but not with good quality. Example, there’s a road but cannot be used all the time. Some paddy land cannot be used because the irrigation is not working,” said a female farmer. This suggested that some technical interventions were not always perceived to be satisfactory and/or successfully implemented.

7.8 Changes to agricultural production

The government has prepared general land use plans agricultural production developed through discussions with village headmen and district officials. The governor of the district oversees these arrangements.

7.8.1 New upland crops

New activities generally included the production of upland crops such as Jobs Tears, maize, sesame, cassava, cotton, soybean, maize, physanolaena, and fruit trees. Pumpkins, mushrooms, bananas, sweet potatoes, paper mulberry (can sell the bark of trees, use the tree for firewood, the leaves for pig feeding) were also mentioned. Paper mulberry was easy to collect and sold at market, pumpkins planted over a small area also yielded profits and reduced labour for the farmer. However, the introduction of hybrid maize, paper mulberry, and kaem (a grass that the flowers of which are used for producing a broom) were considered dubious by some. The government encouraged the planting of cassava and sesame although there were not adequate markets for these products. Farmers reported that fruit trees (bananas) could bear fruit all year round and with good market prices could supplement annual incomes. However, if the trees did not bear fruit but still required inputs of time and labour for weeding, farmers suggested they were reluctant to try again. The rice bank provided a supply of rice for farmers with insufficient rice and who required supplementation, or who wanted to invest their time and labour into other activities. Work for food programs supplemented rice, while the farmers used their labour for construction of infrastructure, e.g., roads, water supplies.

Paddy rice cultivation was introduced in appropriate geographical locations. Planting rice on time and the use of fertiliser (manure) improved production. However, paddy rice production was problematic for some farmers as they did not have experience or technical information on land preparation, fertilisers, and pest control.

Soybean production had been introduced to the villages in 2004 and had not proven to be very successful. The plants flowered but did not produce soybeans. Generally, farmers were unfamiliar with soybean, and throughout the district farmers experienced production difficulties with many deciding not to plant again. Other farmers suggested they were prepared to keep trying for 2 years or more, as they initially lacked understanding of the required techniques.

Compounding difficulties were mentioned in the following quote from a farmer:

> They have continued to try because the first time they don't understand and don't have the technique. Cultivate in July, and then farmers don't receive yield and no seed. Group cultivated in August, small yield, seed don't grow well, grow, but don't have seed, maybe wrong technique? The least successful activity is planting soybean, giving very low product.

This suggests that farmers were prepared to try new activities but that they required additional support and information from local authorities or commercial traders, to maximise production for new technologies. Their decision to continue was supported by a high market demand, although they were generally only prepared to try again for 2 years.

The cultivation of Jobs Tears was because of the prevalence of disease, pest damage, low productivity, and low market price. Farmers reportedly changed to other activities such as maize production or turned to new varieties of seed. One headman stated, "We have already stopped Jobs Tears after 2 years, but now they cultivate mulberry, rattan and local variety rice. They also plan to extend paddy land." Some farmers indicated their disappointment with new seed varieties and after trying many times, decided to stop production.

Maize was considered versatile, used for sale, home consumption, and as feed for livestock, "Taro and maize is used to feed animals when the price goes down, when the price goes up we can sell." Maize could often be cultivated on poor soil and farmers expressed their preparedness to trial new varieties. High yielding, new maize varieties, suitable to the local area, were widely adopted by farmers. Good prices at market, ease of planting, and technical advice and support from DAFEO contributed to the success.

Integrated cropping systems were trialed in some villages. These projects involved planting improved maize and paper mulberry, raising buffalo, and integrated pest management:

> We know how to protect our crops from insects using chemicals. Have buffalo to plough the land which reduces expenses from hiring the tractor. Almost all activities were successful in the first year, but planting paper mulberry took 2 years. We followed suggestions from trainers and managed the crops and animals very well, explained a farmer.

Farmers reported that they would substitute crop production after experiencing difficulties, and were concerned with their need to buy rice for household consumption if crops failed to adequately provide an alternative. Low yield, low market price, disease, damage to crops by livestock, and lack of interest were cited as deterrents to the continued adoption of new activities such as Jobs Tears, soybean, and mulberry. Although new varieties were trialed, some farmers resorted to using local varieties when they experienced production difficulties. Farmers were prepared to try new activities, as reported in the following quote:

> We try to move to a new activity and need to try for a good effect. Although we stop Jobs Tears production, sesame gets a good price, and cassava and maize can be used for feeding animal for livestock. Cotton, is another option, we need to do a little bit.

Farmers were more confident when they were experienced in the production techniques, and encouraged when the activity reduced labour demands. Some farmers reported that new crops gave a good yield every time they planted. However, crops sometimes required several attempts before they provided a successful yield. With repeated crop failures, farmers lost interest in the crop and resorted to other production alternatives. Opinions varied over the time a farmer would consider appropriate to continue to use a technology that was not yielding the desired result. The opinions varied between 1 and 10 years, although 2 years was most often mentioned.

As farmers were accustomed to seasonal variation in productivity they were often prepared to continue to trial less successful crops for several years, particularly when accompanied by high demand and good prices. However, fluctuating market prices forced farmers to reconsider production of the crop in the longer term. A farmer said: “Because they think every year crop market fluctuates, they would like to plant Jobs Tears, some years good, some years not so good but they try. Try to plant Jobs Tears, its expecting to get better price.”

Difficulties with new activities tended to reduce farmers’ interest, but some farmers said that failed crops often provided livestock feed. Seeds may be sourced from dubious sources and

farmers may trial activities purely from interest. Lack of alternative crops was cited as another reason for farmers to continue with failed activities although not successful.

7.8.2 Livestock

Several projects have focused on livestock production including Forages and Livestock Systems Project (FLSP), World Vision (WV), European Union (EU), and collaborative government and project research and development, Lao-Swedish Upland Agriculture and Forestry Research Program (LSUAFP). Projects were involved in provision of livestock through revolving funds, supplementing feed by growing forages and livestock management, using pens and controlling disease through vaccination. Figure 31 depicts a penned goats eating cut and carry forages.

Although livestock played a central role in every village, new techniques of intensive containment of livestock required breeding regimes, knowledge of nutritional requirements, and livestock health measures. One farmer expressed the difficulties encountered with new activities in livestock management, using pens and vaccination:

> Try only livestock. Keeping pigs in pen only makes pigs paralysed, no eating food, getting weaker then die. Raising chickens is not successful at all because all chickens died. Farmers have to give the money back. Some families are not able to pay back.

In this example the revolving fund supplied the livestock and in the event of livestock death, farmers were still required to repay the debt incurred.

When traditional free range methods were used livestock often died from sweeping epidemic diseases. Mortality in chickens and pigs was a primary concern to farmers. Chicken production in one village had so far failed because almost all chickens died, and there were no technical recommendations for farmers about diseases. Death in poultry was attributed to failure to vaccinate. Vaccination was generally accepted as an appropriate activity to prevent disease, although farmers were subsequently confused when livestock succumbed to disease. Nevertheless, farmers did not want to pay for vaccination and believed it was the government's responsibility to provide vaccination. Often projects provided these services free of charge. Advice on disease prevention and livestock feeding from DAFEO and training of village veterinary workers were important. In remote villages, farmers had less access to cold-chain vaccination, and these farmers had limited funds to pay for vaccination.

Figure 29 Penned goats feeding on forages in Phou Khoua village. Photo K Alexander

Farmers were prepared to continue raising livestock as they have always been economically important to their traditional production systems. A community member delightfully indicated the benefit of chicken production in the following quote, “Raising chickens is less successful. However, it is interesting because it can provide food for the family and for receiving guests.” The lack of suitable land for the grazing of livestock created further difficulties for farmers. In some villages agreements were established for crops and livestock interactions, with the provision of common grazing lands and communal care arrangements. In other instances, without adequate fencing, the introduction of livestock had to be negotiated and consensus reached. Land taxation has also been problematic and a deterrent to livestock production, as indicted by this farmer, **“**For grassland if they don’t charge the tax I will extend more wide area. If taxed, I will stop it.”

Farmers were familiar with livestock, though traditionally invested little time or effort into their maintenance. Food shortage for livestock was a main concern. Planting of forages for livestock was the most successful activity accepted by the villagers because they were, “easy to plant, easy to cut and look after and also saved time.” Forages provided quality feed; livestock were healthier and gained weight and were then sold for a good price for household income. The

farmer benefited as less labour was required for feed collection using cut and carry methods as forages could be located close to the village, thereby saving time for animal feed collection. This reduction in workload often directly benefited women, as they were usually responsible for feeding livestock. “Easy to cut and carry and feed to the animals. In the past it took 5-6 hours, now only 10-15 minutes to feed livestock. So people like this new activity,” said a headman. Additional benefits were mentioned as forages covered the soil, protected weeds from growing, and animal health could improve by using a pen for containment. Livestock that were successfully fed on forages grew faster than those grazing.

Technical details for forage production were simple and straight forward, and DAFEO instructed farmers on how to mix feeds for livestock, and how to take care of animal health. Success was often attributed to the FLSP project where, “people adopt who have livestock, then have a good result.” The FLSP project addressed seasonal growth of forages, planting regimes, and appropriate dietary feed mixes. The sale of livestock was used to buy rice and some farmers increased their livestock production (using forages) to become the main source of household income. To some extent forages provided a solution to the conflict between grazing land and crop production land. The close support from enthusiastic, trained technical staff encouraged farmers, and they often had successful trials. Farmers were prepared to trial several times for successful outcomes.

Farmers expressed their concerns over the adoption of forages as they did not have experience or prior knowledge of this activity. Several difficulties were raised including:
(i) livestock initially rejected the unfamiliar feed
(ii) salt was required in the new feed to improve palatability
(ii) problems with livestock mortality while fed on forages
(iii) small area of cultivation of forages
(iv) forages sown in the dry season (lack of rainfall) were not so productive
(v) soil infertility after repeated forage cropping
(v) damage to forages by wandering livestock, i.e., need to fence livestock out of forage areas
(vi) need for a unified village approach to cropping and livestock issues
(vii) farmers without livestock or financial resources could not benefit from forage production

Regardless of these difficulties many farmers said they would “Continue non-stop because they would like to improve the household’s livelihood as well.” Even if the impact failed to materialise in the first year, farmers were prepared to continue for several years. For one farmer forage production was not very successful, yet he still remained interested in livestock

production, “I also observe other family has more success than our family. This is main reason that I will continue to trial this activity.”

7.9 Facilitating agricultural production

Production decisions were heavily influenced by the village location and the ability to access the markets and traders. Farmers were often compromised by traders and offered lower prices than at market when difficulties in access to the market occurred. Lack of transport presented many difficulties when marketing crops, produce, and livestock. Fare paying vehicles; bus, tuk tuk, tak tak, and taxi were the most common mode of transport to market. Markets were also accessed on foot, by motorcycle, boat or bicycle or a combination of these modes of transport. Remote upland villages indicated that the change to commercial crops was not possible as transport was on foot. Farmers that had relocated to villages on the road continued to cultivate their upland fields, and transport of agricultural products still posed difficulties.

Traditionally farmers sought credit from or sold labour to another village when in need. Communities ensured productivity and availability of labour for harvest requirements through the support of labour exchange. Revolving funds and livestock banks were also considered important options. Revolving funds provided incentives for farmers to try new activities using buffalo, cattle, pigs, and goats. Revolving funds for livestock required that animals were returned to the fund after successful breeding, constituting a form of ongoing credit. The United Nations Development Project (UNDP) livestock bank contributed buffalo as draft animals in paddy fields, thereby lowering paddy rice production costs. Often livestock banks provided an opportunity for poorer people to engage in livestock production (usually swine). However, for some farmers when their scavenging pigs died, it was difficult to pay back the credit.

Bank loans or money from relatives or friends were not as popular, and clearly people were looking towards assistance in the form of government or project fund inputs. This would not necessitate a financial outlay from farmers, although this would influence an individual’s investment in labour and time. Financial loans were sometimes available, sometimes providing credit at 3% pa, but more often at higher rates of interest. The Lang Xang Bank provided credit for cattle production by developing a revolving fund, where the bank recouped the loan through continued livestock breeding.

7.10 Attitudes towards new activities and new technology

Farmers said they were more likely to trial new activities if they lived in strong, cohesive communities. Where the village authority showed good leadership and decision making, and considered new activities to be important, farmers were cooperative in trying recommended enterprises. Under these circumstances, farmers worked hard trying many times to succeed in new activities. Village authorities were able to coordinate activities successfully with the farmers, and build up solidarity.

Several personal characteristics influenced attitudes towards new activities. Farmers who considered themselves to be attentive, enthusiastic, diligent, decisive, and able to follow advice were keen to continue trialing new activities. Good advice from the extension officers increased their commitment. Inexperienced farmers expressed the desire to learn new techniques but often they required several trials prior to successful uptake of new activities. Activities were considered useful and worth time and effort when they had the potential to improve their livelihood. Generally, farmers started with small areas and increased investment of labour over time, implementing procedures in a step by step process to further improve success.

Where farmers did not take activities seriously, outcomes were compromised, and farmers attributed poor success to a lack of understanding, knowledge, and skills. Different attitudes of ethnic groups to new technologies were sometimes cited. Although some groups were familiar with the production of certain crops, other groups proved not to be, i.e., “I am Hmong (Lao Soung), it is not our tradition, we have never planted pineapple. We always see Lao Loum people plant it.” Another example of ethnic differences was reported with the introduction of cotton (a traditional Lao Theung practice) to a Lao Loum community. They indicated problems with low yields, low price at market and had difficulty restraining livestock from the crop.

Other farmers were disinterested in new activities and were largely concerned with rice sufficiency. Although 52% of farmers would like to try new agricultural approaches, 33% preferred to use traditional farming practice, with 15% undecided. These farmers did not want to try new technologies and did not want to experience change. When farmers were asked their opinion of the benefits new technologies would provide them, 61% suggested that new technology would not improve their life. Half the farmers were also disinterested in new activities when they were concerned at the cost and whether they had sufficient labour to try new activities. This relationship was highlighted by the Spearman’s rank-order correlation that indicated a highly significant negative association between a preference for traditional ways of

doing things and the extent of experience with new technologies, ρ =-.23 n = 136 p<.01. Not surprisingly, farmers that preferred traditional practice were not interested in new technologies.

Attitudes to the availability and suitability of new technologies were further explored using factor analysis based on 12 Likert scale statements (Appendix B, C & D). Using a maximum likelihood extraction with varimax (orthogonal) rotation the presence of two clusters was revealed, each consisting of three items. The first cluster contained three items and was associated primarily with the concept of the actual use of technology. The second cluster contained three items and appeared primarily associated with attitudes to technology. These factors presented in Table 23 explained 58% of the variance, and both Cronbach's alpha levels (0.64) indicated a satisfactory degree of consistency within each factor. These clusters have been identified, yet direct linkages and causality are not disclosed by this form of analysis. The interpretation of this analysis is that agricultural change is occurring as farmers acknowledge activities and new technologies are in use in their villages. Conversely, change does not occur where farmers are unable to access new technology for some reason.

Projects have been instrumental in the introduction of technologies and initial establishment of new activities in villages. The majority of farmers (52%) want to try new activities although not all farmers were convinced that their livelihoods would improve as a result of uptake of these activities. Those farmers with negative attitudes towards new technology remained unconvinced that they should invest time and labour into new activities. Rather, they continue with traditional practice. These attitudes are pivotal to the uptake of new technology; skeptical farmers are more likely to be influenced by the development of dependable markets and prices that support ongoing agricultural production. Consequently projects should take into account these attitudes when attempting to influence changes to production and demonstrate dependable, affordable and familiar agricultural activities for farmers to trial.

Table 23 Exploratory factor analysis

N=134	% Variance	Factor 1 Loading	Factor 2 Loading
1 Use of technology	29%		
Farmers are using new technologies		.839	
Farmers have experience in new technologies		.802	
New things and activities are happening in village		.597	
2 Attitude towards technology	29%		
Farmers can't afford to try new activities			.808
Farmers don't want to try new activities			.768
New technology will not improve my life.			.702

Note: SPSS software was used for the factor analysis

7.11 Conclusion

This chapter reveals numerous factors influencing agricultural change as indicated by the uptake of new technologies and activities promoted by the Lao government, NGOs and international organisations. The fieldwork demonstrated that resource-poor farmers in Xieng Ngeun District required advice, support, and information from extension officers and personnel specific to projects, combined with market opportunities and access to credit, to facilitate the adoption of new activities and/or technologies.

Farmers primarily showed an interest in the conceptually familiar, i.e., new crops, plantations, and livestock production. They were more interested in crops that gave immediate returns and had multiple purposes, were easy to plant and grew in a wide range of soils, were adapted to the local conditions, and easily sold at market. Farmers sought new opportunities to raise livestock by growing forages for cut and carry livestock feed, and using livestock management techniques with vaccination and the use of livestock pens. Consequently, provision of locally tailored technical interventions by the government and project organisations to support farmers is critical to sustainable agricultural change. Farmers' decisions to continue with new technologies were largely directed by market demand, where high prices greatly influenced the uptake of an activity.

Provision of tailored technical interventions by the government and project organisations are critical to the establishment of suitable agricultural alternatives. Decisions to adopt new technologies were based on the farmer's personal characteristics and situation, the village in which he/she resided, and the project interventions available for trial. Often farmers preferred to

witness success by other farmers prior to using new technologies. Other factors influencing adoption of new technologies included;

- attitudes towards new technologies
- level of experience and understanding of new techniques
- witnessing of success by other farmers
- ongoing opportunity to have practical experiences and trial and adapt new technology,
- labour availability, family cooperation, and resources
- project interventions available for trial
- assistance and demonstration by district or project staff
- fluctuations in seasonal agricultural productivity
- high prices and market demand for agricultural produce
- traders committed to sales at the village
- transport of goods to market

Farmers inevitably face decisions on changing their farming and many projects have assisted in the provision of a range of agricultural choices. Most of these projects in Lao PDR have been initiated only recently. Therefore, the sustainability, appropriateness, and permanence of these options, remain in question.

Chapter 8
Impact of the market economy

8.1 Introduction

This chapter explores the role of the emerging market economy as a primary factor influencing changes to agricultural production. The fourth research question focuses on how agricultural production is influenced by the market economy and how this may be facilitating improvements in farmers' livelihoods in upland communities. The government has implemented policies that have promoted the transition from subsistence production to an engagement with the market economy through the production of market-oriented crops and raising livestock for commercial purposes. This chapter appraises market and trading development and opportunities as the upland farmer faces environmental and economic uncertainty.

Details of agricultural production and perceptions of the role of markets and trade were obtained from interviews of headmen, committee members and farmers (341 respondents). Structured and semi-structured interviews and informal discussions were undertaken using a purposive sample of farmers, Lao government officials, DAFEO, and agricultural college students. Foreign consultants (N=10) working in Luang Prabang Province contributed viewpoints and experiences. Semi-structured interviews with traders (N=5) sought impressions of the farmers' propensity to trade and engage in the market economy (Appendix E).

8.2 Market development in Lao PDR

In Xieng Ngeun District in 2005 a monopsony market situation existed for the production and trade of numerous agricultural products. This is best illustrated by an examination of the trade of soybean. Trade occurred exclusively, with one company servicing all the district farmers (LSUAFRP 2005). This trading company dictated the price through contractual agreements with these farmers. If farmers refused to agree to the contractual price they did not receive the material and technological input. However, at harvest all farmers in Xieng Ngeun were obliged to sell only to this trader regardless of contractual participation. Farmers using their own local seeds or obtaining seeds from other projects were still required to sell only to this trader (LSUAFRP 2005).

This monopsony market situation provided minimal profit for the farmers, who risked production and financial losses. This situation reduced market efficiency and farmers were more likely to sell part of their produce to informal traders.

To protect the main trader's investment the market was regulated by a licensing system with taxes to provide a legal barrier for entry by other traders in the district. The main trader then had the legal rights to buy all the soybeans produced in Xieng Ngeun District, whether it was from contract or non-contract growers (LSUAFRP 2005). The trader paid for material and technological inputs for farmers who in turn provided the land and labour. All harvests were to be sold exclusively to the trader at an agreed contract price.

Furthermore, LSUAFRP (2005) states:

> Selling to other traders is considered illegal and offenders shall be fined 10 times the value of the products illegally sold. Likewise, farmers are obliged to sell to the company upon harvest and drying. Storage of their products is considered illegal. When found out, they shall be fined 10 times the value of the illegally stored products. If production is lost due to natural disasters such as flood, drought, pests or failed germination, this should be reported immediately to the DAFEO. If not, the company will not take responsibility. The farmers will have to payback the inputs loaned to them. Additionally, if production was lost because farmers did not follow the recommended techniques, farmers will be fined 5 times the amount of the credit they obtained.

The government plays a major role in determining agricultural production and significantly influences the functions of the market economy. Many market and trading situations in Xieng Ngeun District reflect monopsony, or monopsonistic competition rather than providing farmers with the preferred (perfect) market competition. As farmers attempt to integrate into the market economy they are subject to traders dictating price, minimal profits, greater risk of economic loss, and retain little bargaining power.

8.3 Governance

Marketing and trade in Xieng Ngeun District was influenced by senior government officials. Control was exercised through trader contracts that were approved by the Governor. The district enforced a quota system, set the price levels and approved access to four main traders. This ensured a taxable income for the government. One main provincial trader complained that:

> …after they pay a large sum to the province/district offices to get the exclusive right to trade in a district, little is done by the authorities to keep the 'illegal' competition out of their zones.

The regulation of trade was designed to provide an enabling environment for market development for the farmers. By increasing competition and allowing more traders, the prices for farmers should have been more competitive. However, exercising control over traders was required to improve product quality and to stabilise export market opportunities. Interviews with foreign consultants, district officials, and provincial traders outlined the complexity and problems of trade in the district. "The villagers complain that they are not free to sell to whom they want and they feel that they are forced to accept too low a price," comments one development specialist. The traders were operating for economic return and often impacted negatively on the farmer's ability to competitively market this produce. A more democratic approach taken recently by government officials had led to villagers being more vocal, allowing for discussions at least. People have been more open about problems of traders obstructing free trade in recent times. For the market system to mature, accountability and an understanding of the free market trade and ethics, by both traders and farmers is required.

8.4 Agricultural products

Xieng Ngeun river port and market was central to trade, although there were several other market venues at Phou Khoun, Kiou Kacham, and regional monthly markets. The most important domestic markets for the Xieng Ngeun District were located in Luang Prabang Province, Sayabouri Province and Vientiane. The main export markets were to Thailand, China, and Vietnam. Farmers traded the following products to small and larger scale enterprises (i) main crops (Jobs Tears, soybean, sesame, and maize); (ii) mulberry paper and fruit; (iii) small and large livestock; (iv) teakwood; and (v) NTFPs. Commercial traders operated nationally and internationally selling NTFPs, teakwood, Jobs Tears, soybean, and maize. Food security remained paramount when farmers considered changing production to marketable crops.

8.4.1 Jobs Tears

Jobs Tears is a cereal crop largely exported to Thailand to be processed into beer, sweets, and health foods. Although cultivation can be highly profitable, harvested products are subject to price fluctuations (Nakatsuji 2004). Farmers were complaining of a low market price for Jobs Tears in 2004. Apparently, Thailand was not buying the harvested product because of

unresolved quality issues with the middlemen who bought grains from farmers through the quota system. The moisture quality required to meet international standards was, “four times sun-dried, not including fungus and between 12% and 14% moisture” (Boomsma 2005 p. 10). Spoilage of the export crop occurred from contamination by moist grain. One respondent suggested, “This is typical of the volatile nature of cash cropping in the uplands of Laos PDR. Since I have been here we have seen several cycles like you describe, involving Jobs Tears and ginger.” As Jobs Tears is not required in large amounts by the domestic market, farmers relied on the higher volume export market; consequently quality control issues are very important to the future marketing of Jobs Tears.

8.4.2 Soybean

Soybean had good market and income potential, yet farmers reported crop failure and negligible yields for soybean. Surprisingly, government sources claimed 25% of district areas reported reasonable to good yields (Sodarak, H. 2005 pers. comm., 17 March). The seedlings flowered but failed to produce soybeans. Consultants advised that soybean should be sown late in season, which was ignored by many farmers and officials. While seed from the trader was promoted as a ‘big’ variety seed, local varieties provided medium or small variety seed. The outcomes of soybean trials by farmers were crop failures and subsequent debt.

Difficulties confronting the traders when attempting to convince the farmer to plant soybean included:
(i) disbelief
(ii) small areas of cultivation
(iii) inter-cropping with other crops i.e., sesame, maize
(iv) seed moisture and the threat of aflatoxin production
(v) reduced yield after drying crop
(vi) contamination by mixing dry and moist crops
(vii) crop spoilage after harvest (when not collected and dried by trader within one week of harvest and potential loss of sale for farmer)
(viii) small local market demand
(ix) market unable to cope with large yields
(x) trader agreements to buy produce were thwarted as farmers attempted to get a higher price on the open market.

Farmers were offered contracts by traders to supply larger quantities of soybean. Local market price may be higher than the contract price but there was less demand and little opportunity to influence sale prices. The Thai suppliers were known to set conditions on the purchase of seeds with traders monopolising district sales. Farmers were then positioned to be exploited, creating an unsustainable trading relationship. The trader claimed a good export future for the production of soybeans with a substantial market in Thailand. However, Lao PDR would have to produce soybean cheaply to compete with bulk supplies from Brazil.

8.4.3 Maize

Government officials have encouraged villagers to trial an imported hybrid maize variety from Vietnam in the forthcoming seasons. This variety was considered to be expensive and previous experiences have indicated the need for fertiliser and weed control, thereby increasing financial and labour inputs. The hybrid variety required annual purchase of seed stocks, further adding to financial costs. The price for maize remained relatively stable, yet the harvest weight and bulk of this crop was problematic for villages without direct access to affordable transport. Although China offers a large market, maize continues to contract low prices.

8.4.4 Other crops

Paper mulberry was harvested for the inner bark and is exported mainly to Thailand to be processed into paper. Paper mulberry secures a rather stable price and is easy to cultivate, but is rarely cultivated intensively because of its low profitability (Nakatsuji 2004). Cotton crops were introduced in some areas and sold to the domestic market that ensured a stable price. Sesame was generally considered a good crop, though some reported problems with disease. Cassava was useful for home consumption and used with maize for livestock feed. Mixed cropping interspersed with rubber trees had been introduced in the northern provinces and there was some suggestion that farmers would try this in Xieng Ngeun District. After 30 years of latex production, rubber trees were usually harvested as timber.

8.4.5 Livestock

Livestock rearing was favoured; although disease continued to be a major problem. Small ruminant livestock were raised close to the house or in a communal field system. For large livestock communal grazing lands had been organised, sometimes more than 100 ha was set aside. To increase the stocking rates of large livestock in Xieng Ngeun District there was a requirement for both natural resources, feed, and available land. Training in livestock management techniques for both small and large livestock was necessary. Nutritious livestock

feed, supplemented by forages and maize, good penning techniques with disease prevention were necessary for livestock management. The introduction of forages for livestock has made an impact in villages faced with feed shortages, providing an alternative or "good chance to stop swidden cultivation." Most households keep some form of poultry, usually in an extensive way and some projects promote more intensive rearing. E.g., chickens

The government had been targeting livestock development by committing funds to 27 villages for the purchase of livestock. Most of the investment was derived from development organisations and private banks in the form of loans for livestock purchases. The government and NGO groups funded small livestock; farmers usually have to fund large livestock, except in the case of revolving funds which involved cattle and buffalo banks. The agricultural bank remained 'poorly' organised and was very slow to loan money to farmers. Credit had high interest rates and generally farmers were not interested in applying for bank loans. Traders regularly visited accessible villages and farmers reported they were satisfied with the prices.

8.4.6 Non Timber Forest Products

Many forest products were difficult to find with some products already exhausted. NTFPs (mulberry paper, bamboo, and rattan) were generally harvested in nearby forests. Conservation of biodiversity was encouraged through the use of plantation cultivation to ensure ongoing supplies of natural products i.e., wild bamboo shoots were allocated to each household to encourage nursing and sustained growth. This policy was agreed to by farmers and village headmen, and supported through training initiatives and investment funds.

8.5 Future market opportunities

There appeared an increasing demand for soybean oil by both the domestic and export market. Thailand factories processing soybean required increasing supplies of the raw product, importing 1.6 million ton/year of soybean (Rama, P. 2005 pers. comm., 10 March). Yunan Province in China imports 0.5 million ton/year of soybean (Rama, P. 2005 pers. comm., 10 March). If the profit margin set by traders remained sufficient to provide a tangible profit for Lao farmers, an ongoing export opportunity for soybean production existed. The main trader introduced this crop in Xieng Ngeun District in 2004, competing with the production of Jobs Tears, sesame, maize, and rice. The main trader suggested that farmers could benefit several fold by growing soybean because (i) the estimated selling price was 3 million kip/ha (compared to rice at 1.5 million kip/ha), (ii) rice cultivation required slash-and-burn, field rotations, and suitable land was increasingly difficult to find, (iii) soybean as a legume improved the soil

through nitrogen fixation and does not require field rotation. Initially, the trader required at least 500 tons of soybean and then up to 1,000 tons for the local market in Luang Prabang and Vientiane. Projected supplies of soybean were to be scaled up to 10,000 ton/year over 3 years, creating sufficient supply to establish a soybean oil factory in Luang Prabang.

Increasingly, opportunity for ecotourism businesses and services for the general tourism markets were projected to provide incomes and jobs in the district. Xieng Ngeun District has natural features for the Luang Prabang tourism sector such as; waterfalls, trekking, caves, rivers, and cultural experiences that could be further developed. Kiou Kacham benefited directly from tourism by facilitating transport requirements, food, and accommodation for travelers on the road journey from Luang Prabang to Vientiane. The Nam Khan River area has the potential to provide tourism experiences, and several waterfalls were under investigation as potential tourism sites. Figure 32 depicts a young woman weaving silks destined for the tourism market in Luang Prabang city.

8.5.1 Market information and agricultural planning

There was an obvious lack of market information at the village level and farmers claimed information for seasonal cash crop planning was derived largely from government agricultural staff and traders. One headman pointed out:

> Government says we should plant more Jobs Tears because of good market. When harvesting, we get a low price, so I don't want to plant next year. Then I go back to upland rice because the market is no good.

Without knowledge of market information farmers were unable to negotiate a favourable sale price with traders

Figure 30 Silk and cotton weaving for the tourism market in Luang Prabang. Photo K Alexander

Several methods were used to inform farmers of market information on marketable products. Projects and extension staff often demonstrated and discussed the implications of new techniques and successful agricultural products with farmers. District workshops were used to explain market opportunities and provided technical information and new seed varieties. Experienced farmers working with the product were often taken to other villages to share information and to demonstrate to other farmers. Study tours were used to further facilitate and support information on agricultural development. Successful agricultural development and changes to production in these communities were inextricably linked to the markets they supplied. Figure 33 shows a diversity of activities and produce at the main market in Luang Prabang.

Figure 31 Entrepreneurs at the Phousy market, Luang Prabang. Photo K Alexander

8.5.2 Agricultural extension

Extension staff were considered to be the main source of marketing information for farmers. The extension service was expected to provide knowledge of current market systems and give appropriate and timely advice to farmers. Staff and farmers concurred that there was insufficient and unsubstantiated information for staff to extend to farmers. Some farmers had difficulty in understanding technical advice, so training and support by the DAFEO was necessary to aid community development. For example, with the introduction of forages for livestock, a male farmer wanted to know:

> Why they should keep cutting the 'weeds'? Then some families had impact, then after that the villagers can see the impact, then others started to plant and produce.

8.6 Conclusion

The emerging market economy was influencing farming system decisions and livelihoods. Current marketing was based on a transitional economy where free market forces were constrained by governance and trading restrictions. While Xieng Ngeun District continued to operate in monopsonistic competition, farmers are unlikely to embrace the new economy with any degree of confidence. Government control of trade and contractual agreements dictated prices and set minimal profits for farmers, with high attendant risk. The control of marketing and trade by the government and through traders impacted on market economics, free trade, and market maturity. For the market system to mature, traders, and farmers needed to have accountability for ethical contractual agreements and an understanding of their role in the trading market.

Market information on agricultural production was not systemically implemented and farmers remained reliant on governmental guidance and information from markets and traders in Xieng Ngeun District. Villages without market information derived advice on seasonal cash crop planning largely from government agricultural staff and traders. This further limited the farmers' ability to negotiate a favourable sale price with traders for their products.

Market information is necessary if farmers are to embrace the market economy and risk trialing new crops, diversify production or engage in intensive farming practices. The lack of market information reflected limited experience at the district level, and regulation of the market through governance and trading arrangements. The absence of information, linkages, understanding, regulations, and quality controls all impacted on the ability to establish dependable domestic markets and also integration into valuable export markets. This situation significantly limits changes to farming systems and improvements to livelihoods. Farmers struggled with the risk of venturing into the market economy and continued to focus on food security and traditional established farming practice. Governance reform and the establishment of market information systems in Xieng Ngeun District would be beneficial at all levels of the market economy.

Chapter 9
Implications of the findings for extension and development activities

9.1 Introduction

The purpose of the research has been to determine the response of upland farmers to land and forest allocation policy and the implementation of swidden cultivation stabilisation measures by governmental and international organisations. This chapter addresses the four research questions used to assess agricultural change and discusses the implications for extension and development activities. Firstly, changes to agricultural production have been quantified through overall production figures for the study district and by farmer's assessments of their projected productivity. Secondly, the many choices contemplated by farmers when making agricultural production decisions have been documented. Thirdly, this study informs research and development by unveiling attitudes of farmers and other stakeholders of their experiences with rural development initiatives and their opinions on factors facilitating successful practice.

Land and forest allocation policy and shifting cultivation stabilisation require land use intensification, however there is insufficient support for farmers adapting in this constrained resource environment. Modifications to farming systems have occurred in response to government land policy, intervention by international aid organisations, and a growing market economy. Farming systems are changing in response to agricultural production decisions but in the short term the sustainability of agricultural change remains questionable.

9.2 To what extent are farmers modifying their farming systems from a reliance on swidden cultivation of upland rice?

Rural development in Lao PDR is directed by government policy in league with international aid organisations to persuade upland farmers into changing traditional farming practices. Although traditional external factors are common to all producers i.e., market conditions and policies, this research has found that farmers remain primarily concerned with the production of upland rice for their subsistence. While some farmers are keen adopt new practices and modify their farming systems, risk adverse farmers remain skeptical and relatively uninvolved in the development process.

The research found that attention to improving traditional rotational systems will mitigate some of the risk involved when farmers modify farming systems, and allow farmers to better maintain

food security and livelihoods. Data from this study indicated that only 10% of farmers had sufficient rice each year, 71% of villages claimed they had insufficient rice for 2-4 months prior to harvest each year. Three percent of villages were without sufficient rice for 9 months of the year. This suggests that traditional farming systems cannot provide enough rice at present for the population. Continued pressure to reduce upland rice production and introduce rotational production with shortened fallows may collapse traditional systems, detrimentally affecting livelihoods. Land degradation and nutrient depletion further reduces the ability to maintain soil fertility and cope with rotational cropping, suggesting the emergence of the swidden-degradation syndrome as described by Raintree (2004).

Farmers appeared to be responding to government policies to stabilise swidden cultivation by investing labour and time for the production of upland crops, livestock, vegetables, and NTFPs. The research showed that farmers were modifying their systems and attempting to reduce upland rice production by some intensive and/or extensive approaches (as described by Scoones 1998). However, diversification strategies using a mixed approach were more common as farmers tend to be risk adverse, with insufficient savings and/or investments. Voluntary and involuntary migration was also occurring in response to land use policy. Farmers in this study expressed an expectation that village leaders, the government, and NGOs would provide inputs and technical assistance to modify and improve production.

Farmers were generally disappointed with the cash crops being promoted, especially low prices for Jobs Tears and the problems with soybean cultivation. While there was a keen interest in livestock production, disease continued to be a major deterrent to increased production. This suggested that farmers were prepared to balance production risk by diversifying into new enterprises. However, ongoing production problems with the introduction of new crops, livestock disease, and seasonal production fluctuations indicated that farmers would not greatly intensify production in the shorter term.

The linkage between social and technical development should be enhanced to further influence agricultural change. Scaling up successful technologies, enterprises, and practices using group-based activities would facilitate this process. Improving networking between and among local groups working in the same watershed area may also influence agricultural change. This will rely on the selection of robust technologies and practices and the use of participatory methods to successfully engage communities as has been suggested by Chambers (1988); Chapman (1998); Hansen (1998); Horne (2004; 1998); NAFRI (2004a); Natatsuji (2004); Peters et al. (2001); Stür, Gray &Bastin (2002); and Zivetz (1990).

9.3 What are the consequences of land use change for farmers?

The second research question explored the consequences of land use change. Issues such as governance, the implementation and affects of agricultural policy, and the management of environmental and socio-economic problems all impinge on production decisions (ADB 2001a; ADB 2001b; Bouahom, Douangsavanh, & Rigg 2004; Chanthasen, Ngophanxay & Bouaheng 2002; Connell 2003; Hansen 1998; Horne 1998; Nakatsuji, S. 2004; NPEP 2003; Raintree 2004; Rasul & Thapa 2003; Roder 1997, 2001; Sanderwell, Ohlsson, & Sanderwell 1997; Sanderwell, Ohlsson, & Sawathvong 2001; Stür, Gray, & Bastin 2002; UNDP 2001; Vandergeest 2003b). Government agricultural policies reviewed in Chapter Three have been designed to direct farming decisions and modify farming practices. The government's intention, through policies on land tenure and land allocation, has been to promote productivity, specialisation, and the commercialisation of subsistence agriculture (ADB 2001a; NPEP 2003; UNDP 2001). These policies seek to influence the transition in farming systems away from a reliance on traditional subsistence faming towards more intensive farming production. In addition, these policies affect the direction of agricultural research and training institutions, and also provide guidance to commercial companies developing new markets and ensuring future trading agreements.

9.3.1 Government policy for land allocation and land use planning

Global agricultural change has often been precipitated by changing land use, population pressure, and agricultural intensification. Land tenure, land demarcation, and land allocation policy in Lao PDR has been presented and discussed in terms of its implications and intended impact on farmers in Chapter Three. The effect of government policy on land allocation and land use planning was explored in Chapter Six. Farmers presented their opinions on government land policy, the problems of land allocation, and subsequent village land use decisions. A variety of opinions surfaced, some supportive of government intervention, however many opinions express disquiet and described continuing difficulties in the implementation and outcomes of land use policy.

Governments can be very influential in directing the use of land. Theoretically farmers change their production in response to the need to intensify production, but it remains debatable whether these policies are supportive and foster sustainability for resource-poor farmers in the uplands. When farmers are confronted by land tenure, planning, demarcation, or allocation, and when populations are purposely concentrated in a targeted area intensification is expected to occur (Boserup 1965). However, farmers cultivating marginal lands have few 'realistic' alternatives to production of upland rice (as described by Raintree 2004). In this situation where farmers reap largely subsistence livelihoods, low rice yields from restricted land use often lead to shortages and food insufficiency.

9.3.2 Farming systems and livelihood strategies

At this point it is difficult to determine whether current agricultural policies are supportive or detrimental to small-scale farming livelihood outcomes (Chapter 2). As 93% of villagers claimed they had prospered over the last 5 years, this suggests the rural situation is improving in most villages. Farmers who said that their livelihoods had not improved were resident in seriously disadvantaged villages that were without road access and had experienced immigration and relocation.

The research found that most farmers were unable to substitute paddy rice cultivation and consequently they continued upland rice cultivation with diminishing yields and resultant rice insufficiency. They were then forced to change their livelihood strategies and/or purchase rice and seek supplementary forest products. These behaviours impact on the forest biodiversity; cause changes in production to cash crops and livestock, and may introduce debt and/or changes to the staple diet. This study is in agreement with Raintree (2004) and UNDP (2001). The sustainable livelihood framework (Chapter 2) provided a guideline of factors to consider when measuring livelihood outcomes. The success of livelihood strategies is dependent on their taking into account the social implications of well-being, food security, and the continued ability of the natural resource base to support livelihoods. Government policies, institutions, and processes also impinged on the farmers' situation, significantly affecting rural productivity and livelihood outcomes (see DFID 2006). Within this context is the operation of marketing systems, market information flows, and institutions and policies that further impact on rural livelihoods.

In the villages, farmers qualified their productivity indirectly with references to issues of health and labour and a preference for traditional lifestyles. Income was related to production from available land and natural resources. Some farmers' lives were improving while farmers were faced with unmanageable problems requiring interventions and support from the governmental sector and international NGOs.

A foreign consultant chose to voice his impressions of changing rural production and livelihoods during a semi-structured interview with the researcher (2004):

> Livelihoods, do you mean in terms of livelihood strategies or do you mean in terms of improving deteriorating livelihoods? I guess what you observe are changes in livelihood strategies, but that doesn't necessarily mean that livelihoods, as such are necessarily being improved. For example, you see some change in actual cropping systems; you see a change from upland rice to maize, from upland rice to Jobs Tears, or from one crop to another. You see new incoming crops like rubber and tea, but as long as this isn't based on a systematic appraisal of existing resources, this doesn't necessarily mean that changes in

> livelihood strategies actually improve your livelihood. They do sometimes in the short term; say you enter into contract farming. But again if you do your contract farming in the wrong place, your short term gains will turn into serious long term loses in actual income and resource degradation. So, yes, you see changes to the actual livelihood strategies, and at times you also see that livelihoods do actually improve.

This statement provides an interpretation of the difficulties faced by farmers when they try to make agricultural decisions to 'improve' their livelihoods. Evaluations of farming systems need to be considered over a time period that takes into account productivity fluctuations, seasonal variation, overall sustainability, markets, and the actual environmental cost in the longer term. The foreign consultant considered that both changes to livelihood strategies and improvements to livelihoods may be occurring in the uplands of Lao PDR. He suggests that interpretation and evaluation of farming system changes that do improve livelihoods are purely speculative in the short term, because of sustainability issues.

The sustainable livelihood framework (Chapter 2) has been used to reflect on the contextual situation underpinning agricultural decisions and an understanding of the many difficulties faced by farmers has emerged in this study. Detailed social, economic, and environmental factors have been outlined in Chapter Six describing the livelihood assets farmers considered important, the vulnerability of agricultural production, and institutional factors constraining improvements to their livelihoods.

Farmers indicated they were aware of the inherent environmental challenges they face from land degradation and fluctuating water resources, and often felt disempowered and unable to deal with the consequences. Environmental concerns embraced problems with the water supply, deforestation, climate, and drought. Land availability and productivity were also primary issues. Insufficient money, food shortage, and land productivity were the most important socio-economic issues faced by farmers in these villages. These findings are borne out by several international studies by UNDP (2001) and ADB (2001b). Choices over the deployment of farmers' labour remain critical to livelihood decisions. Other concerns were expressed over the lack of infrastructure, and access to health and education services. Ethnicity issues and complex social interactions and dependencies and were also mentioned. Clearly, health problems and lack of provision of health services presented grave concerns, in agreement with ADB (2001).

9.4 How are farmers integrating new activities and/or new technologies into their farming systems?

The extent of agricultural change was investigated in part in Chapter Seven which summarised farmers' attitudes about the new technologies offered by government and NGOs. The chapter

explored the impact of government and project assistance on farming decisions and livelihoods. It was found that uptake of new technologies and activities promoted by the Lao government and international organisations was largely dependant on advice, support, and information from extension officers and personnel specific to projects. Extension staff and project personnel contributed over 75% of information about new activities and technologies, and provided market and trading information.

Farmers showed an interest primarily in the conceptually familiar, i.e., new crops, plantations, and livestock production. They were more interested in crops that gave immediate returns and had multiple purposes, were easy to plant and grew in a wide range of soils, were adapted to the local conditions, and easily sold at market. Farmers also sought new opportunities to raise livestock by growing forages for cut and carry livestock feed, and using livestock management techniques with vaccination and the use of livestock pens. Market opportunities and access to credit further facilitated the adoption of new technology. Farmers were prepared to invest in new farming activities if they regarded them as familiar, marketable, and suitable to their situation and affordable (monetary or labour investments). Binayee (2005), Hansen (1998), Raintree (2004), and UNDP (2001) support these findings.

The research indicated that decisions to adopt new technologies were based on the farmers' personal characteristics and situation, the village in which he/she resided, and the project interventions available for trial. Often farmers preferred to witness success by other farmers prior to using new technologies. Other factors influencing adoption of new technologies included (i) assistance from district staff, (ii) demonstration of technologies and practical experiences, (iii) fluctuations in agricultural productivity, (iv) preparedness to trial and adapt new activities, (v) preference for traditional practice, (vi) availability of labour, resources, and cooperation, (vii) market demand, and (viii) access to transport. Farmers' decisions to continue with new technologies were often directed by market demand where high market prices greatly influenced the uptake of an activity. This suggests that farmers are risk adverse but prepared to respond to interventions appropriate to their needs when delivered with assistance and support. Raintree (2004) warns of the difficulties faced when interventions are inappropriate, and without the necessary infrastructural and information support.

The forced migration of farmers through relocation policies has caused many additional social problems and there appears a limited capacity to meet the needs of the newcomers with good quality land and necessary infrastructure. The research described relocation programs resulting in village division with farmers still tending remotely located agricultural lands. This is a significant obstacle to the uptake of new activities and technologies with access to roads and markets remaining problematic.

The results suggest that project interventions would be more successful if proactive farmers with a positive attitude toward new technologies were targeted in the more progressive villages. Once successful trials were established, other farmers would over 2-3 years be more likely to adopt technologies. To take advantage of uptake, clusters of villages in proximity to the trial villages should be successively integrated, giving rise to experience and familiarity with new technologies. Farmer participation and collaboration in the adaptation of technology is essential, as borne out by the research. Cross-visits between villages for further dissemination of information would assist in persuading farmers to test recommended activities. There was evidence that informed technical advice and more government agricultural staff are essential for successful rural development, supported by ongoing projects, information, and training. Villages need consensus to manage and plan for future crop and livestock interaction and further participatory project support to assist with fluctuating agricultural productivity issues. Strong market demand and good prices at market will enhance uptake and the adoption of new technologies. Coordination of activities and collaboration between the government, local research institutes, traders, and international organisations are necessary to provide a more directed approach and ameliorate project intervention as suggested by Tripp (2006). This supports the second recommendation from the Sustainable Sloping Lands and Watershed Management Conference, to improve group-based processes with the scaling up of successful technologies and practices and improve networking between and among local groups (NAFRI 2006). The importance of selecting robust technologies and practices and the use of participatory methods to successfully engage communities are essential.

Provision of tailored technical interventions by the government and project organisations remain crucial to the establishment of suitable agricultural alternatives. Although projects have provided a range of agricultural products for trial, most of these projects have been initiated recently and are of limited duration. The sustainability, appropriateness, and permanence of many of these options remain questionable.

9.5 How is agricultural production influenced by the emerging market economy?

Where possible, farmers in Xieng Ngeun District with sufficient resources tried to balance risk by diversifying production and investing in crops and livestock. Production decisions tended to be stimulated by market stability, or better still, a guaranteed market. Moreover, contracted production agreements often initiated the trialing of new crops. Binayee (2005) emphasises the importance of marketing systems, market prices, and market information on farmers' production decisions (Chapter 2). LSUAFRP (2005) describes in detail the state of market development in

Xieng Ngeun District which favours the trader rather than the seller and the difficulties that trading rights impose on the market. According to LSUAFRP (2005), the continuance of a monosophy market situation implies that whilst there are minimal profits for farmers, the attendant risk of production and financial loss remains prohibitive to establishing new enterprises.

The emerging market economy remained constrained by governance issues and trading restrictions. While Xieng Ngeun District operates in monopsonistic competition, farmers are unlikely to embrace the new economy with any degree of confidence. Villages without market information derived advice on seasonal cash crop planning largely from government agricultural staff and traders. This further limited the farmers' ability to negotiate a favourable sale price with traders for their products. The trading situation significantly limited changes to farming systems and improvements to livelihoods. Farmers struggled with the risk of venturing into the market economy and continued to focus on food security and traditional established farming practice.

9.6 Importance of agricultural extension services

There are several possible entry points for the government and development organisations to assist farmers to achieve desired changes to farming systems. Extension staff are considered to be the main source of information for farmers. The extension service were found to provide knowledge of current market systems and give appropriate and timely advice to farmers. At present there appears to be insufficient well substantiated information for staff to extend to farmers. Knowledge, skills, and training are vital for district staff in the short term. Ongoing training and information on agriculture and livestock techniques and market information is required in the longer term. The National Human Development Report Lao PDR (UNDP 2001) supports these findings. Equipment and infrastructure will be necessary to enable district offices to facilitate knowledge management and market systems information.

Government and development organisations are required to assist in improving the training and skill levels of existing extension staff. Our research indicated this can be achieved by employing more staff, accessing students at the agricultural college, and by implementing agricultural training at school level. In addition, student practicum could provide on-farm experience, and ex-students could be employed to assist with information flows and play a role in agricultural development. Increased employment and training opportunities in the government, private sector, and with development projects would increase the capacity and expertise of staff and agricultural students. Agricultural student unemployment and under-employment raises serious

issues of losses in human resource potential that could be addressed by creating employment opportunities.

Government intention to provide essential services, promised infrastructure and high value extension advice is not always forthcoming. Training and additional infrastructure for district officers is critical to the delivery of useful information. Development of extension manuals in the Lao language would assist in this process. Data indicated there were problems with under-funding, under-employment, low morale, absenteeism, corruption, privileges of kinship, inequity, gender discrimination, poor pay and conditions. The limited uptake of agricultural students into the government service further dampens the capability and effectiveness of the extension service. Long term capacity building and institution strengthening are required to enhance rural development, as suggested by Tripp (2006).

9.7 Assessment of agricultural change

Factors precipitating agricultural change in Xieng Ngeun District developed from the literature, using the sustainable livelihood framework, and research findings are summarised in Table 24 and elaborated in Table 25 as a force field analysis. The literature suggests continuous improvement in rural development generally occurs when social environments, access to basic infrastructure and services, government policies, and institutional factors favourably affect communities, and these factors are further clarified by DFID (2006) and UNDP (2001). When deteriorating situations arise (described as the swidden-degradation syndrome by Raintree 2004), there are negative consequences to rural development. Table 25 lists the main issues emerging from this research that are involved in agricultural change outcomes. These findings are listed using the main factors emerging from the data, i.e., government policy, environmental and socio-economic issues, available technology and the state of the market economy. The research found instances of both rural improvement and situations of rural deterioration evident in the 31 sample villages.

Many farmers reported on issues contributing to improvements in rural development. However, other farmers outlined the negative consequences of rural development occurring in their villages (Chapter Six). Resource-poor small-holders farmers were found to be most at risk when pressured to make changes to their farming systems and were not supported by actions that facilitated continued improvements in rural development (Tables 24 & 25).

Table 24 Summary of issues surrounding agricultural change

Source	*Agricultural change*
Information from literature	**Precipitating factors for change**
Literature review	▪ changing land use ▪ population pressure ▪ agricultural intensification ▪ politics, policies, laws, institutions ▪ social circumstance ▪ cultural traits ▪ economic interests ▪ macro & microeconomic forces ▪ private sector ▪ requirements of introduced technologies
Information from research findings	**Precipitating factors for change from research findings**
Government land policy	▪ land allocation ▪ land use planning ▪ land tenure ▪ land demarcation
Environmental issues	▪ water supply ▪ deforestation ▪ climate ▪ drought
Socio-economic issues	▪ communities ▪ wealth ▪ food security ▪ infrastructure ▪ land productivity ▪ land availability ▪ labour ▪ ethnic and social problems ▪ health ▪ education
Impacts of new technology	▪ new technology ▪ provision of agricultural extension ▪ response to recommendations ▪ attitudes towards new technology ▪ production decisions ▪ adoption of new technologies ▪ changes to agricultural production ▪ introduction of upland crops ▪ introduction of livestock ▪ agricultural marketing issues
Impact of the market economy	▪ market development/future market opportunities ▪ agricultural products ▪ trading rights/ governance ▪ risk

Table 25 Force field analysis of factors leading to rural improvement or rural deterioration

Driving forces for rural improvement	*Restraining forces causing rural deterioration*
Factors leading to continued improvements in rural development	**Factors leading to negative consequences of rural development**
Government policy	
▪ sufficient land ▪ well implemented policies ▪ agreement on land use planning ▪ solving land disputes ▪ conservation of protected land ▪ voluntary relocation/migration ▪ successful intensification ▪ use of inputs to sustain fertility	▪ insufficient land ▪ poorly implemented policies ▪ misappropriate/covert use of land ▪ ongoing land disputes ▪ covert use of protected land ▪ forced relocation ▪ increased weeds, pests, disease ▪ land degradation from over-use
Environmental issues	
▪ managing environmental issues ▪ village intervention ▪ government and NGO intervention ▪ diversification strategies ▪ market-oriented crops and livestock production	▪ no environmental management strategy ▪ inappropriate, unsuccessful interventions ▪ no assistance from government or projects ▪ unsuccessful diversification strategies ▪ crop failure & livestock disease, poor prices
Socio-economic issues	
▪ cohesive supportive communities ▪ wealth creation ▪ reduced rice cultivation & strategies to purchase rice ▪ access to & improvement of infrastructure ▪ productive arable land ▪ sufficient land ▪ sufficient labour, ability to hire labour ▪ ethnic harmony, solutions to social problems ▪ access to medical & health facilities ▪ good quality education	▪ divisive community conflicts ▪ ongoing poverty ▪ rice insufficiency ▪ absence of infrastructure ▪ unproductive in-arable land ▪ insufficient land ▪ insufficient labour, no strategies ▪ ethnic tension, no strategies ▪ inaccessible, unaffordable & limited health facilities ▪ difficult access, unaffordable education
Impacts of new technology	
▪ provision of appropriate technology ▪ good quality support from extension service ▪ positive response to agricultural recommendations ▪ positive attitudes towards new activities/ technology ▪ innovative production decisions ▪ adoption of new technologies ▪ successful production strategies ▪ successful experiences with upland crops ▪ successful experiences with livestock ▪ market supports production	▪ inappropriate technology ▪ limited support from extension service ▪ negative response to agricultural recommendations ▪ negative attitudes towards new activities/ technology ▪ traditional production decisions ▪ non-adoption of new technologies ▪ unsuccessful production strategies ▪ unsuccessful experiences with upland crops ▪ unsuccessful experiences with livestock ▪ non- supportive market
Market economy	
▪ risk management strategies ▪ market information ▪ agricultural planning ▪ adequate agricultural extension ▪ facilitating trade	▪ poor risk management strategies ▪ lack of market information ▪ inappropriate agricultural planning ▪ inadequate agricultural extension ▪ inhibiting trade

Note: Force Field Analysis is a method for listing and evaluating the various forces for and against a proposed change.

9.8 Agricultural strategies

In Chapter Five the changes to farming systems were investigated. Conceptual theories emerging from the data from Chapter Five, Six, and Seven have contributed to the design of the model in Figure 35 depicting the impact of the forces of political, social, economic, and environmental change. These are the main influences on farmers when they make production decisions. The concepts included in this model have been derived from the literature, interview, data, and an exploratory factor analysis of Likert scale statements. The model describes the basic components of upland farming systems and changes in the production strategy.

Farming decisions are filtered via the farmer's attitudes and personal circumstances (Fig. 35). Ethnicity, gender, family size, characteristics, health, stage of life cycle, village location, wealth, and access to essential goods and services affect these decisions. Land is viewed in terms of the agricultural productivity of available cultivatable land and is linked to the forest biodiversity that some farmers can appropriate to supplement diet, as a source of income and as a balance to the ever present risk of rice insufficiency. The farmer's perception of his/her socio-economic situation is referenced to a traditional system of income generation in a largely subsistence livelihood, and/or the new approaches to income generation that may be initiated by government or project intervention.

Farmers reflect on new activities and/or new technology in terms of their experience, exposure to, and current use of technology options. Enthusiasm, curiosity, knowledge, and prospects of a good price at market further influence their decision to trial or continue to modify and use new technology. Some farmers are not interested in technological options and consistently indicate negative attitudes to system integration. Finally, the affect of the market economy is framed in terms of availability of affordable credit, assistance by the government and NGO projects, and the ability to access and engage in the trading economy (Fig.34).

Farmers mentioned alternative production approaches of agricultural intensification, extensification, diversification, or migration (also described by Scoones 1998). Intensification requires an increase in capital and/or overall productivity, while extensification requires more land under cultivation and/or more labour. However, diversification strategies were most commonly used. Voluntary and involuntary migration was also occurring in response to changing land availability due to government land use policy, and also traditional migratory habits. Those farmers attempting small-scale intensification and diversification strategies were often interested in new technologies including changes in management. Modifications to

farming systems were then combinations of intensification, extensification, diversification, or migration (Fig. 35) (Scoones 1998).

Farmers were generally unable to substitute to paddy rice cultivation, and consequently they often continued upland rice cultivation (also described by ADB 2001b, Raintree 2004, and UNDP 2001). When food insecurity from reduced or insufficient rice yield forced these farmers to purchase rice this, (i) impacted on the forest biodiversity, (ii) changed production to cash crops and livestock, (iii) introduced debt, and/or (iv) forced changes to the staple diet. Where farmers were interested in using technologies to change to a market-oriented livelihood strategy, they required improved access to markets and traders, improved extension support, and access to affordable credit. The market economy appeared to be influencing agricultural production decisions and farmers indicated they would be using traders in future transactions more than the actual marketplace. As villages in Xieng Ngeun District were experiencing land degradation whilst diversifying their farming systems (Chapter Six); this would suggest that unsustainable livelihood outcomes will result.

In order to facilitate further agricultural change of the cropping and livestock farming components, investment and other support is necessary. Access to credit, market opportunities, market information and market systems, and improved extension are all required. Only under these conditions do the farmers preferred options of upland cash cropping and increased livestock production become more viable.

Changes to farming and livelihood can only occur by addressing short term primary and secondary agricultural production constraints. Some management of cropping and livestock interactions is essential, and remains a major obstacle to changing practice. Advice, suggestions, and solutions to resultant land degradation, weeds, pests, and disease is needed by farmers. Land degradation resulting from increased production will require additional fertility enrichment and pest control inputs to maintain productivity. This can be partially achieved through the continued promotion by the extension service and an ongoing commitment to capacity building of extension staff by the government and NGOs. Farmers often use an innovative and iterative approach to testing government and project recommendations and undertake repeated trials when using new technology. Further support for farmers is required by employing additional DAFEO staff and providing them with access to high quality training in extension and agriculture, and reliable information.

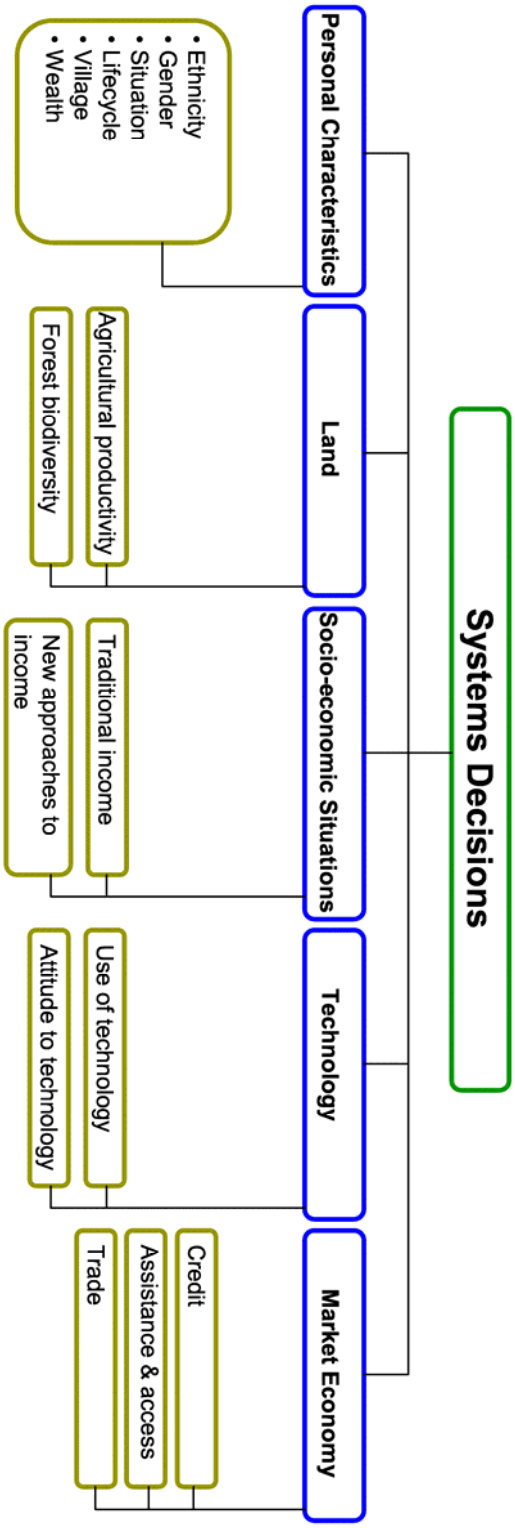

Figure 32 Factors affecting farming systems decision making on farming systems in Xieng Ngeun District, Lao PDR

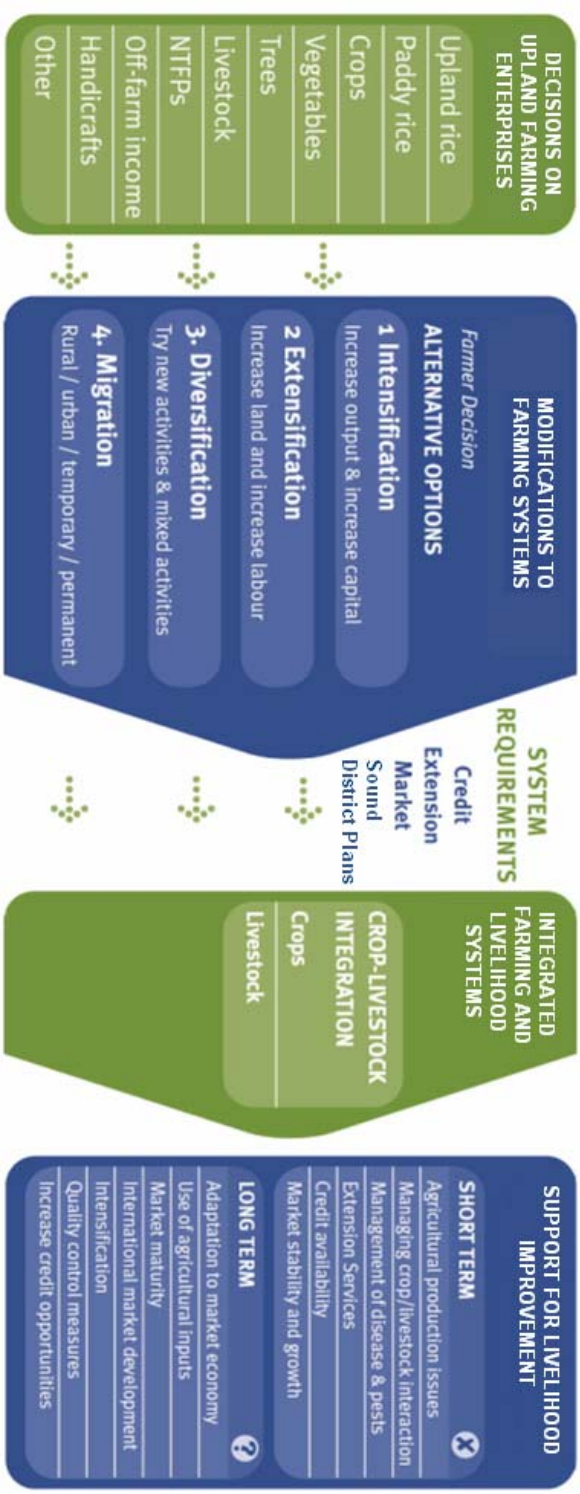

Figure 33 Forces of political, social, economic, and environmental change

Credit availability would mitigate some risk as farmers' test new technologies and implement diversification strategies. The evidence indicates that access to credit services such as loans, livestock banks or rice banks, and food for work programs are essential to promote changes to agricultural productivity in the short term. Without access to credit, poor farmers cannot contemplate moving from subsistence rice production to cash crops and market activities as a primary source of income, and an alternative to growing rice.

Market stability, growth and resilience, with a dampening of boom and bust economic cycles are necessary to convince the farmer to adhere to government recommendations. Favourably priced contractual agreements for crops are needed to promote the uptake of alternative cropping regimes.

In the longer term, farming systems need to adapt to the market economy to ensure the transition in production occurs. Market maturity, moving from phases of a monopsony market situation to monopsonic competition and then towards perfect market competition is required to ensure that farmers increase confidence and understanding (Chapter 2). Farmers require a favourable market economy to mitigate the risk of growing crops to replace upland rice cultivation. At present farmers are operating from an unfavorable trading position, often in a total monopsony market situation. To enhance market opportunities not only are secured, fair trading, domestic markets essential, but also competitive engagement with international markets for the sale of agricultural produce, crops, and livestock is needed. Increasingly, agricultural intensification is envisaged, leading to larger areas of monoculture production with assured contracted yields. To fully engage the international market, quality control measures, information and regulations need to be enforced by the state. Meanwhile, many farmers will only be able to contemplate changing agricultural production by engaging in cropping and livestock enterprises if credit is made available.

The issue of swidden cultivation production of upland rice is complex. The system is seen as destructive by farmers and actively discouraged by the government, yet remains the main agricultural production activity in the uplands, with few 'alternatives' for rice production for poor farmers over the predominantly marginalised lands of upland regions of Lao PDR..

Personal communications with foreign consultants (Victor, M. 2006 pers. comm., 1 April; Lefroy, R. 2006 pers. comm., 4 April) indicated that recent development initiatives into rubber plantations would necessitate an influx of labour from Vietnam and China (with their families following) to cultivate rubber in targeted provinces. This suggests that future agricultural

activities may be governed by new and external forces, as the government trades the country's natural resources, intensifies agricultural productivity, and promotes the influx of external migratory labour.

9.9 Implications of international development in Xieng Ngeun District

There have been (according to the district farmers) 202 development projects (1971-2005) undertaken in Xieng Ngeun District. Details of governmental and NGO projects are displayed in Tables 16, 17, 18, 19 and 20. An assessment of the effectiveness of each project is well beyond the scope of this study. However, from these tables it is evident that there are many concurrent approaches to the development of rural livelihoods operating in the district. The precise nature of development 'practice' used by NGOs involved in research and development in Xieng Ngeun District has not been investigated. Rather, this study informs research and development by documenting farmer and stakeholder attitudes and experiences with rural development initiatives and their opinions on factors facilitating successful practice.

In Xieng Ngeun District the research has found that efforts by international organisations are not well-coordinated or linked. Aid is delivered as specified by the donor and often embraces the establishment of vital infrastructure such as water service infrastructure, education and basic health services (Tables 16, 17, 18, 19 and 20). The research has also shown that aid organisations are involved in multiple activities, including establishment of infrastructure, as well as modifying agricultural production (largely aimed at rice, crops, and livestock production). Other organisations have specialised in specifically tailored agricultural activities. Rural development is undertaken by small projects that are more concerned with practice than grand theory. Research projects in Xieng Ngeun District often indicate they use participatory approaches, without detailing the practical method adopted. The research suggests that rural development is conducted using an integrated approach, ultilising local knowledge, and adapting to suit the geographical and cultural situation.

The research has shown that most of the project activities in Xieng Ngeun District are dependant on international aid and are of limited duration. In addition, the development initiatives and successes may not be supported by future projects. The momentum of change is often lost and facilities are dispersed, appropriated and/or stolen (Connell, J. pers.comm., 17th Jan 2005). Consequently, this affects those government officers benefiting directly from the project and those indirectly benefiting from the project (Senior government official, J. pers.comm., 23th Jan 2005). This also becomes a major obstacle to the promotion of ongoing

relationships. Farmers witness a steady stream of development specialists arriving at their villages, and providing advice on the best agricultural practice without sufficient monitoring, evaluation and dissemination of research results (Village headman pers.comm., 28th Jan 2005). An additional problem occurs as government staff tend not to be familiar with a new project's organisational system at commencement of each project, and have to learn general processes (Connell, J. pers.comm., 11th March 2006). These practices bring into question the concept of 'participation' as practiced by development groups. This concept of participatory development has often evolved prescriptively following writings of authors such as Robert Chambers (1983) and is currently espoused by development organisations (NAFRI 2006). The practice of participation continues to be ill-defined in practice even when very well defined in literature.

The government is a recipient of international aid (over 50% of GNP) and wary of international groups working together, possibly influenced by concerns of past experiences with colonialist control (Mossberg, C. pers.comm., 9th Sept 2005). The government tends to allocate separate areas and districts for international groups as they are suspicious of the integration and power of international organisations. These actions tend to undermine the effectiveness of international aid as a collective.

Some organisations working in Xieng Ngeun District are trying to alleviate poverty rather than focus on rural development per se and often rely on less effective, sometimes piecemeal approaches, with difficulties in planning, administering, and/or executing operations in the field. Larger organisations may not have the scope to tailor their interventions, due to organisational and philosophical constraints. Religious ideology is embedded in some international aid organisations, and conversion of participants is a primary objective, rather than focusing on rural development. Consequently, projects can moderate benefits to participants.

Often international groups speak only the language of their country of origin, which further disadvantages Lao people trying to communicate their situation and reduces their ability to inform the project. English is the common international language, yet past colonial organisations often used French or Russian language (Evans 2002). Concerted efforts to improve communication would be beneficial to all involved in international development.

The linkage of development research with policy and practice has recently been explored in the Sustainable Sloping Lands and Watershed Management Conference, Luang Prabang, Lao PDR, December 2006. Attention focused on the linkages of (i) land degradation and modeling processes in sloping lands, (ii). watershed management planning and implementation processes,

and (iii) social issues and technical options to improve upland livelihoods (NAFRI 2006). One of the main recommended actions to improve the linkage between social and technical issues was to;

> Build upon indigenous knowledge so as to gradually improve traditional rotational systems to ensure they do not collapse before farmers can develop appropriate transitional pathways to move to sustainable sedentary-based systems. This is important to ensure food security and local people's livelihoods in the face of the rapid changes occurring in the uplands.

The statement supports the recommended current development practice for use in rural communities is integrated rural development with a participatory approach. Inherent in the recommendations is the need to involve communities and for research groups to effectively communicate their intentions to extension officers and farmers.

Chapter 10
Conclusion

10.1 Introduction

The purpose of the research has been to determine the response of upland farmers to land and forest allocation policy and the implementation of swidden cultivation stabilisation measures by governmental and international organisations. The preceding chapters have dealt with the conceptual, theoretical, and methodological aspects of the research and its findings. Literature on development theory, theories of factors precipitating agricultural change and the use of sustainable livelihood frameworks to analyse livelihood strategies and outcomes has been reviewed and synthesised to inform the research process. Data have been presented, analysed, interpreted, and discussed, from within the dominant (naturalistic) paradigm and supported by the less dominant (positivist) paradigm. This chapter concludes the research through reflections on the key findings and contributions of the study and contemplation of issues that continue to affect farmers while subject to government policy and international development aid.

10.2 Key findings

The research unveiled the pragmatic nature of the farmers in Xieng Ngeun District; they were continuously striving to better their circumstances when faced with adversity. The key findings contributing to this conclusion are that farmers were modifying their farming systems and attempting to reduce upland rice by diversifying production, supplementing diets and income with forest products, or migrating to other areas. Those continuing upland rice cultivation in rotational plots of young fallow have lower yields and consequent rice insufficiency. The changes to farming systems occurring in this district were largely an increase in production of cash crops and a greater interest in livestock production. However, current agricultural practice continues to be dependant on forest biodiversity, and often leads to land degradation and deforestation.

Changes to farming systems are dependant on the availability of suitable land, water, labour and time, and often require inputs such as fertilisers, fencing, machinery, and knowledge. Where farmers were interested in using technologies to change to a market-oriented livelihood strategy, they required improved access to markets and traders, improved extension support, and access to affordable credit. Whilst there are significant numbers of development project activities

occurring, coordination of activities and collaboration between the government, local research institutes, traders, and international organisations is necessary to provide a more directed approach and to enhance project intervention.

Market reform through governance and policy intervention is required for farmers to have sufficient confidence to make significant changes to their agricultural production decisions. Monopsony market situations limit changes to farming systems and livelihoods. Whether government policies are supportive and foster sustainable outcomes for resource-poor farmers in the uplands remains contested.

10.3 Development in the uplands of Xieng Ngeun District

Donor countries and international aid agencies are struggling to deal with the complex social, political, and institutional problems that reduce efficiency, productivity and welfare of traditional smallholder farmers. Although swidden cultivation can be considered an environmentally sound practice when there are long fallow periods, only subsistence livelihoods result from the low return per unit of land and labour in upland Lao PDR. Swidden cultivation population densities range from a low 12 persons/km^2 per in northern Lao PDR. It seems likely that swidden will continue to meet the staple needs where there are still relatively low population densities, only if forests are available to supplement diet and incomes. Agricultural productivity problems are occurring in districts adjacent to larger cities, where populations concentrate and land is cultivated more intensively. The need for integrating successful 'alternative' agricultural activities is pronounced in these districts. The emergence of commercial and tourism markets encourages changes to agricultural production. However, agricultural changes to production will be largely facilitated by growth of a competitive market economy and the engagement of stakeholders in the marketing process.

Farmers involved in rural development initiatives in Xieng Ngeun District are cultivating marginal lands and have few 'realistic' alternatives to production of upland rice mainly because of lack of other land types and poorly developed markets. Chapters 5, 7 and 8 investigated opportunities for farmers struggling to establish crops and find dependable markets as only 2% of land in Xieng Ngeun District is suitable for paddy. The combination of subsistence livelihoods and low production yields from restricted enterprises resulted in ongoing poverty and rice insufficiency for many families. Poor tropical soils do not support investments in labour-intensive agriculture, and inorganic fertilisers are expensive and inaccessible. Short fallow rotational cropping will not provide a suitable enterprise in the longer term. Areas with

growing populations, such as Xieng Ngeun District, will experience deforestation and will increasingly be pressured to find alternatives to swidden agriculture. While farmers are responsive to favourable price and market incentives they tend to adopt and adapt appropriate new activities/technologies only under acceptable risk conditions. Farmers require a supportive institutional and socio-economic environment to reduce the inherent risks of changing their agricultural practices. Farmers expressed notional compliance with government recommendations for the reduction of swidden cultivation of upland rice, yet they were negatively affected by a number of agricultural production issues. Changing their agricultural enterprise endangered food security and farmers struggled to comply with recommendations under these circumstances

For long term success, policy dialogue and the development of more effective monitoring of the impacts of interventions in rural livelihood systems is required. The study agrees with UNDP (2001) that better donor coordination and risk management strategies are essential when assisting resource-poor farmers. For sustainable development to occur there is a need for (i)an increase in the local capacity for resource management, (ii) new ideas on ways to flexibly adapt to changing conditions and (iii) new partnerships in generating and managing knowledge.

10.4 Contribution

The unique contribution of the present thesis is the exploration of stakeholders' views within agricultural development and the changes to agricultural production and livelihoods. An extensive search of the literature failed to reveal research exploring farmer perceptions of current change in agricultural systems and agrarian transition occurring as a consequence of land use policy.

The thesis has identified the main factors influencing communities to make significant changes to their farming systems within Xieng Ngeun District in Lao PDR. The information is necessary to inform the future development strategies of government departments and non governmental organisations. Development policies and projects can use this information in their attempt to enable farmers to develop sustainable production systems.

The research has provided information for government departments and NGOs on the activities, significance, and extent of agricultural change occurring in farming systems in this district in the uplands of Lao PDR. Many factors influencing communities to make changes to their farming systems were identified. Information adds to the body of knowledge available to

government departments and NGOs planning future upland development strategies. Another contribution of the research has been to determine the activities/ new technologies and processes that assist farmers to develop and improve their livelihoods. Information was also gathered on the influence of the emerging market economy on change, and the marketing information systems required to assist farmers in making agricultural production decisions.

Making conclusions on development is not straightforward, because of the complexity of the data required in any one context, and the many factors influencing rural development. Aggregated development impacts are not easily modeled in a systematic fashion and it is very difficult to attribute development impacts without attention to all positive elements of causation.

The research allowed each respondent to reflect on their unique situation and describe pertinent rural development outcomes and the effect on their lives and communities. The results offer contributions to the bodies of knowledge in both development theory and practice. The thesis has contributed to the theory of intensification of land use; i.e., low population densities and risk aversion are leading to diversification rather than intensification strategies (Chapter 6 and 7). Government land use policy may be inappropriate and negatively affecting some farmers' ability to generate sustainable livelihoods now and in the future (Chapter 6).

The situational context of the research site in the uplands of Lao PDR, in Xieng Ngeun District, Luang Prabang Province precludes the theoretical conclusions from being generalised to other parts of the country or to other countries. However, conclusions on the effectiveness, appropriateness and implementation of new technologies by governmental and NGOs may have wider applicability.

Tables 24 summarises the issues surrounding agricultural change and the considerations that influence the sustainability and suitability of rural development initiatives. A force field analysis of factors leading to rural improvement or rural deterioration is presented in Table 25. Figure 34 presents the main factors of systems decisions analysis formulated through compilation of qualitative accounts from various stakeholders in the research field. Figure 35 is a conceptual representation of main forces of political, social, economic, and environmental change acting on farmers in Xieng Ngeun District. The model describes the basic components of upland farming systems influencing changes to the farmers' production strategy.

Numerous theoretical areas have informed the explanation of farming systems issues explored in the thesis. Included are theories on pragmatic aspects of development theory rather than

grand theory of economic and social change. The implementation of land use policies has led to agricultural change and to the use of diversification strategies by farmers when changing agricultural practice. In this research the 'swidden degradation syndrome' was found to be influencing agricultural decisions and practice. Integral to change is the selection, adoption, diffusion, and management of new activities/technologies in project villages. Largely, the effects of a monosopic market situation hindered risk adverse farmers in the uplands of Xieng Ngeun District from making significant changes to their agricultural activities.

Further research is recommended to determine the pathways to successful technological adoption and to monitor and evaluate the ongoing assistance that farmers require to facilitate a sustainable agricultural future. Establishment of a market information system in Xieng Ngeun District would be beneficial at all levels of the market economy. Scrutiny of the intention of the government to provide essential services, promised infrastructure and high value extension advice is necessary.

In conclusion, there are numerous agricultural production changes occurring in response to governmental policy and the implementation of infrastructural and agricultural projects by NGOs. The sustainability and longevity of these changes being led by forces in NGOs are contestable. Governance issues of land allocation, land availability and trading rights have significantly affected production decisions. Government and non-government programs have the propensity to facilitate or limit farmers' livelihood opportunities in the face of agrarian change. The growing influence of the market economy and increasing trade opportunities will promote agricultural diversification as well as intensification strategies by farmers.

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Appendix A

Semi-structured interview guide

Interview questions for key informants Sept 2004

(**Bold text** indicates the main questions used for interviews**)**

Background Information

How many years have you worked in Laos/Development/Government?

What are you doing now?

What is your background and experience?

Swidden cultivation agriculture in the uplands

- Are farmers still practising traditional swidden cultivation in the uplands?
- **What are the problems with swidden cultivation agriculture?**
- Do farmers want to stop shifting cultivation of upland rice production?
- How **are villages responding to increasing pressures**, such as population, land ownership, land degradation, land restriction, access to forests, droughts, government policy?
- What are the **alternatives to swidden cultivation?**
- Will farmers gain improvements to their lives through access to roads, markets, health, education and income opportunities?
- How are changes affecting farmer's traditional and spiritual life?
- What are farmer's future aspirations?

Household livelihoods and land use patterns in the uplands

Livelihoods

- Farmers choose from a mixed production of rice, livestock, vegetable gardens, fruit trees, plantations, and forest produce, cash income. Can farmers still meet their **requirements of rice sufficiency** and grow/gather enough to meet their expenditure needs?
- Will these livelihoods be sufficient for the future?
- Are farmers seeking **off –farm opportunities as alternatives**? Is there a need for more cash/income in villages?
- **What infrastructure and inputs are necessary to improve livelihoods?**
- Can farmer's access credit if they need to?
- Are some people improving their livelihoods while others are getting poorer?
- **Are people migrating or moving to urban areas to improve livelihoods?**
- What will happen for the next generation?

Land

- Is sufficient land available in villages?
- Are people using their land as intended by the government?
- **Do farmers own their land and how does this affect how are farmers are using their land?**
- Has **land allocation** been implemented in the uplands?
- How is the land distributed or allocated by the village?
- Is **the forest** used to supplement livelihoods and income or as a safety net?
- Are traditional ways of life practiced in the uplands?

Traditional and new technologies

- What are the traditional farming methods? Are traditional technologies the main method used, such as different rice/crop varieties or cropping practice, animal management, NFTPs?
- **Are new technologies used in the uplands?** Which farmers are using new technologies? How successfully would you rate this uptake?
- **Are any new technologies making impacts to farming practice by changing the system of farming?**
- What could improve or encourage uptake? What inputs are required to facilitate greater uptake of technologies? Are other inputs such as veterinary assistance required before uptake accelerates?
- **Do the farmers see the new technologies as too' risky'? Are they appropriate and affordable?**
- Do **markets and transport** affect the technologies a farmer might decide to use?
- Is agricultural extension occurring and is it adequate? How effective is **extension in solving problems** and assisting change?
- What is the **role of government staff,** their resources and extension capacity to deliver a range of technology options? Are there sufficient resources for their work?
- What do new technologies do to work loads?
- What do you see as the barriers to new technology?

Government and non-government interventions

Government

- How does the government affect the lives of the farmers?
- **What government policies are affecting farmers in the uplands? Are they having a positive or negative affect? Will these policies encourage alternative systems of agriculture?**
- Who is benefiting from government inputs?
- Is the Government allocating **sufficient resources** to implement policy successfully in the short term or in the long term? Is this the best plan for the future?
- What is needed **in terms of infrastructure** i.e. access to markets, transport, health services, education, economic incentives, credit?
- How will the forest be managed to facilitate better catchment management, village use and government policy and use?

NGOs

- How do the non-government organisations **and projects affect the lives of the farmers?** Are they having a positive or negative affect?
- Are the changes influencing production?
- Will credit be available in the future for farmers?
- Are there village co-operatives working effectively in the uplands?
- What do you predict will happen in the future for farmers involved in swidden cultivation?
- **Is there sufficient international aid going to the villages and how is it used to benefit farmers in the uplands?**
- What crops, livestock, fruit trees, agro-enterprise businesses are you aware of?

Appendix B

Headman survey

CHARLES STURT UNIVERSITY	**Interview ID** **Date** **Interviewers** **Type of Interview**

VILLAGE HEADMAN INTERVIEW RECORD

Name of village		**Village population**	
Name		**Households**	
Years in village		**Number of men in village**	
Age		**Number of women in village**	
Ethnic group			

Question 1

Have you always lived in this village? **YES** ☐ **NO** ☐

A If answer is NO, write in reason_____

_____

_____

_____

B. If you moved to this village, which village did you move from?

_____

_____

_____

C How many families in the village have Hai?_____

D How many families have Na? _____

E How many poor families in the village? _____

SECTION 2: Village Situation

Question 2.

We are all here today to understand more about how your village works together for a prosperous future. First of all we are interested in the many activities you do in your village, what your village is growing, collecting and raising and what is sold. To make this easier for you we are asking questions in several ways and would like you to help us with the answers if you can. Your answers about your village are important to us and we thank you for helping us today.

A. Does the village grow paddy rice and/ or upland rice? If so, how much does the village cultivate each year?

Upland rice *Hai* _____

Paddy rice *Na* _____

B. Over the last 5 years has there been enough rice for the whole village?

YES ☐ **NO** ☐

If not, on average, how many **months** in a year are villagers without rice?

Months _____

Question 3

A. Could you share with us the concerns you have about the forest, land and water for your village? What are the difficulties in the village right now?

_____

_____

_____

_____

B. How do you think you are going to address these concerns and overcome difficulties?

_____

_____

_____

_____

Question 4

A. Could you share with us the concerns you have about your village wealth and if people have enough food and money. What are the difficulties in the village right now?

_____

_____

_____

_____

B. How do you think you are going to address these concerns and overcome difficulties?

_____

_____

_____

_____

Question 5

A. Could you share with us the concerns you have for your village community? What challenges are facing the village right now?

_____

_____

_____

_____

B. How do you think you are going to meet these challenges?

_____

_____

_____

_____

Question 6

How has land allocation and land use planning affected your village?

_____

_____

_____

_____

Question 7

Think about all the changes to the land you use including government policy, relocation and current land available for you to use.

Who mainly determines how you use your land?

_____

_____

_____

_____

SECTION 3: Swidden-based Agriculture

Question 8

A. What is the **best** thing about growing upland *Hai/Na*?

_____

_____

_____

_____

B. What is the **worst** thing about growing upland *Hai/Na*?

_____

_____

_____

_____

Question 9

Can you think back to what your village was like when you were 15 years old

A Do you do grow **more upland rice** *Hai* nowadays, the same or is there **less upland rice** *Hai* in this village?

MORE ☐ **SAME** ☐ **LESS** ☐

B. What are the reasons for this?

_____

_____

_____

_____

C. Try and think ahead in 5 years time, do you think you will be growing **more upland rice** *Hai*, the same or **less upland rice** *Hai?*

MORE ☐ **SAME** ☐ **LESS** ☐

D. What reasons will account for this prediction?

_____

_____

_____

Question 10

A. Can you think back to what your village was like when you were 15years old. Do you do grow **more upland crops** (not rice) nowadays, the **same** or are there **less crops** in this village?

MORE ☐ **SAME** ☐ **LESS** ☐

B. In 5 years time, do you think you will be growing **more upland crops**, the **same** or **less upland crops***?*

MORE ☐ **SAME** ☐ **LESS**☐

C. What influences this decision?

_____

_____

_____

_____

Question 11

If your village has been relocated has the village continued to grow the same type of upland crops as it did in previous village location? **YES** ☐ **NO** ☐

Comments_____

_____

_____

_____

_____

___

Question 12 **for road access villages only**

Since the road has been constructed there has been **more upland rice** *Hai*, the **same** or is there **less upland rice** *Hai?*

MORE ☐ **SAME** ☐ **LESS**☐

Thank you for sharing your opinions and views with us today. We would now like to discuss your agricultural activities in more detail.

SECTION 4: Agricultural Technologies

13Question

A. Has the government or NGO projects introduced new agricultural activities or technologies to this village? **YES** ☐ **NO** ☐

Item	Projects	Years	Organisations	Activities/Technologies
B1				
B2				
B3				
B4				

C. Did it make a difference to your village?

C1_____

C2_____

C3_____

C4_____

14 Question

A. In the last 10 years, can you name new things/activities the government or a project recommended that your village **has adopted**?

_____

_____

_____

_____

B. How have these things made a **difference**?

_____

_____

_____

_____

C. Are you still using them?

_____

_____

_____

_____

D. Did it work the first time or did you have **to try several times** to get success**?**

_____

_____

_____

_____

E Can you think about the many people in your village? In general, why do you think people take on new activities?

_____

_____

_____

_____

 **DAFO Tell the headman that not everything that is recommended will work well in his/her village. Could he/she please take a moment to think of some activities that really didn't work as well as they may have hoped? We really value his/her personal opinion and honest answers. It is OK to tell us of activities that have not worked as well as was hoped for in your village.**

Question 15

A. Of these new things/activities which you have tried and are **still using**, which are the **least useful?**

_____

_____

_____

_____

B. How many **years** are you prepared to keep trying new things/activities before you decide to **stop** trying**?**

_____

_____

_____

_____

C. If these things are **not useful**, could you please explain why they interest you and you are still prepared to continue trying these activities?

_____

_____

_____

_____

Question 16

A. Of these new things/activities which you have tried and disregarded as not useful, what was the **strangest thing** that you tried?

_____

_____

_____

_____

B. Why didn't it work?

_____

_____

_____

_____

Question 17

A. In the last 10 years, can you name new things/activities the government or a project recommended that your village has **not adopted**?

_____

_____

_____

_____

B. Why did your village **not adopt** these recommendations?

_____

_____

_____

_____

Thank you for sharing your opinions and views with us today. We would now like to discuss your views on changes that you believe may be affecting your village.

SECTION 5: Village Future

Question 18

Can you think about the past, the last 5 years?

A. Is your village better off now than when it was then?

YES☐ **NO☐**

B. If yes, why?

_____

_____

_____

_____

C. If not, why?

_____

_____

_____

_____

Question 19

A Think about your village in the future, in 5 years time.

Will your main village activities **change** much in the **next 5 years**?

Ask if they can think about a score between 1and10. Give each activity a score with 10 very important, down to 1 not important
Write in the score beside the answers

Changing Activities	**Use for family** **Score 1-10**	**Sell in our village or to other villages** **Score 1-10**	**Sell at market** **Score 1-10**	**Sell to trader** **Score 1-10**
Upland Rice *Hai*				
Paddy Rice				
Crops				
Vegetables				
Trees, fruit, teak, rubber				
Livestock				
NTFPs				
off farm income				
handicrafts				
Other				

Question 20

Think about your village in the future, in 5 years time.

How will new activities/technology affect the village?

✍_____

_____

_____

_____

SECTION 5: Access to Credit and Markets

Question 21

Does your village use any form of credit or benefit?

Ask if they can think about a score between 1and10. Give each source of credit a score with 10 very important, down to 1 not important

☐	Revolving fund	Ranking _____
☐	Rice or crop bank	Ranking _____
☐	Livestock bank	Ranking _____
☐	Bank loan	Ranking _____
☐	Money or loan from relative or friend(gift)	Ranking _____
☐	Exchange labour	Ranking _____

Question 22

A How long does it take the villagers to get to the road?

DRY _____ **WET _____**

B . How do your villagers get to the market?

Place a tick ✓ in the answers that apply

Own car	Motor cycle	Tuk tuk	boat	walking	bus	taxi	Long car	Friends car	Tractor	Tak tak	Bicycle
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

C. How long does it take the villagers to get to the market at Xieng Ngeun

DRY _____ **WET _____**

D. How long does it take the villagers to get to the market at Luang Prabang?

DRY _____ **WET _____**

SECTION 6: Personal Views

Question 23

DAFO

Think about your life, which statements best reflect your opinions of the way you feel?

On a scale of 1 to 5 could you indicate whether you agree?

1=strongly agree **2**=moderately agree **3**=neither agree nor disagree

4=moderately disagree **5**=strongly disagree

CIRCLE the number which indicates your opinion ❍

23 Personal statements	☺	☹

Item	**Statement**	**Strongly**	**Strongly**

		Agree				Disagree
23A.	I prefer to do things the traditional way	1	2	3	4	5
23B.	I feel I can create a future for myself and my family	1	2	3	4	5
23C.	I have control over my life	1	2	3	4	5
23D	I am very innovative	1	2	3	4	5
23E.	I see myself as able to take risks	1	2	3	4	5
23F.	I like innovation	1	2	3	4	5
23G.	Traditions are very important to me	1	2	3	4	5
23H	It is difficult for me to convince people to try new things	1	2	3	4	5

Question 24

In this District, which village do you see as the most progressive?

_____

_____

_____

Question 25

Compared with your village, are your neighbouring villages very progressive and trying new things?

_____

_____

_____

Question 26

Do your neighbouring villages face the same challenges or difficulties as in your village?

_____

_____

_____

Question 27

Thank you very much for giving up your time today to answer so many questions for us. Have I forgotten to ask you anything which is really important and I have not thought to ask you?

VILLAGE DETAILS

Information	Details
Location GPS/altimeter/time	
Distance	
Time	
Interview ID	
Date	
Interviewers/translator	
Others present	
Name of village	
Age of village	
Name of Headman	
Years in village	
Duration of leadership	
Ethnic Group	
Ethnic groups in village	
History of village	
Village statistics	
Village Area (HA)	
Land allocation yes/no	
Organisations in village	
Wealth of village	
Infrastructure: water, electricity, schools, medical (year)	
Market access (Luang Prabang market or local market)	
Market details	
Trader details	
Road/river access	
Track conditions (wide, small, wet weather)	
How many vehicles	
Bus running	
Frequency of vehicles	
Boats	

Any special features	
DAFEO visit	
Cross visit	
Extension	
Fallow time	
Household livestock	

Appendix C

Farmer survey 1

CHARLES STURT UNIVERSITY	**Interview ID** **Date** **Interviewers** **Type of Interview**

FIRST INDIVIDUAL INTERVIEW RECORD

Name of village		**Male/Female**	
Name		**Married/single**	
Years in village		**Number of men in HH**	
Age		**Number of women HH**	
Ethnic group		**Number of children in HH**	

Question 1

A. Have you always lived in this village? **YES** ☐ **NO** ☐

DAFO **If answer is NO, place a tick ✓beside the answer below**

or write in other reason

B Reason_____

_____

_____

_____

C. If you moved to this village, which village did you move from?

_____

___

SECTION 2: Village Situation

Question 2.

We are all here today to understand more about how you all work together for a prosperous future. First of all we are interested in the many activities you do in your village, what you are growing, collecting and raising and what is sold. To make this easier for you we are asking questions in several ways and would like you to help us with the answers if you can. Your answers about your village are important to us and we thank you for helping us today.

A. Do you grow paddy rice and/ or upland rice in this village? If you, how much does the village cultivate each year?

Write in the rice yield

Upland rice *Hai* _____

Paddy rice *Na* _____

B. Over the last 5 years have you grown enough rice?

Place a tick ✓beside the answer **YES** ☐ **NO** ☐

If not, on average, how many **months** in a year are you without rice?

Months _____

Question 3

A. Could you share with us the concerns you have about the forest, land and water for your village? What are the difficulties in the village right now?

_____

_____

_____

_____

B. How do you think you are going to address these concerns and overcome difficulties?

_____

_____

_____

_____

Question 4

A. Could you share with us the concerns you have about your village wealth and if people have enough food and money. What are the difficulties in the village right now?

_____

_____

_____

_____

B. How do you think you are going to address these concerns and overcome difficulties?

_____

_____

_____

_____

Question 5

A. Could you share with us the concerns you have for your village community? What challenges are facing the village right now?

_____

_____

_____

_____

B. How do you think you are going to meet these challenges?

_____

_____

_____

_____

Question 6

How has land allocation and land use planning affected you?

_____

_____

_____

_____

Question 7

Think about all the changes to the land you use including government policy, relocation and current land available for you to use.

Who mainly determines how you use your land?

DAFO **Place a tick ✓ in the answers that apply**

Government decides how I use the land	District decides how I use the land	Village headman decides how I use the land	Village decides how I use the land	I decide how I use my land
☐	☐	☐	☐	☐

SECTION 3: Swidden-based Agriculture

Question 8

A. What is the **best** thing about growing upland *Hai*?

_____

_____

_____

_____

B. What is the **worst** thing about growing upland *Hai*?

_____

_____

_____

_____

Question 9

Can you think back to what your village was like when you were 15 years old

A Do you do grow **more upland rice** *Hai* nowadays, the same or **less upland rice** *Hai*?

Place a tick ✓ beside the answer

MORE ☐ **SAME** ☐ **LESS** ☐

B. What are the reasons for this?

_____

_____

_____

_____

C. Try and think ahead in 5 years time, do you think you will be growing **more upland rice *Hai***, the same or **less upland rice** *Hai?*

MORE ☐ **SAME** ☐ **LESS** ☐

D. What are the reasons for this?

_____

_____

_____

_____

Question 10

A. Can you think back to what your village was like when you were 15 years old. Do you do grow **more upland crops** (not rice) nowadays, the **same** or less **crops**?

MORE ☐ **SAME** ☐ **LESS** ☐

B. In 5 years time, do you think you will be growing **more upland crops**, the **same** or **less upland crops***?*

MORE ☐ **SAME** ☐ **LESS** ☐

C. What influences this decision?

_____

_____

_____

_____

Question 11

If you have relocated to a new location, are you still growing the same type of upland crops that you were before you moved? **YES** ☐ **NO** ☐

Comments_____

_____

_____

_____

___

Question 12 **DAFO for road access villages only**

Since the road has been constructed do you grow **more upland rice** *Hai*, the **same** or **less upland rice** *Hai?*

MORE ☐ **SAME** ☐ **LESS** ☐

Thank you for sharing your opinions and views with us today. We would now like to discuss your agricultural activities in more detail.

SECTION 4: Agricultural Technologies

Question 13

A. Have you been involved in government or NGO projects which have shown you new agricultural activities and technologies?

Place a tick ✓ beside the answer **YES** ☐ **NO** ☐

If YES please list details

Item	Projects	Years	Organisations	Activities/Technologies
B1				
B2				

B3				
B4				

DAFO refer to projects and list comments in same sequence

C. Did it make a difference to you?

C1_____

C2_____

C3_____

C4_____

Question 14

A. In the last 10 years, can you name new things/activities the government or a project recommended that **you have adopted**?

_____

_____

_____

_____

B. How have these things made a **difference**?

_____

_____

_____

_____

C. Are you still using them?

_____

_____

_____

_____

D. Did it work the first time or did you have **to try several times** to get success**?**

_____

_____

_____

_____

DAFO Tell the farmer that not everything that is recommended will work well in his/her village. Could he/she please take a moment to think of some activities that really didn't work as well as they may have hoped? We really value his/her

personal opinion and honest answers. It is OK to tell us of activities that have not worked as well as you had hoped.

Question 15

A. Of these new things/activities which you have tried and are **still using**, which are the **least useful?**

_____

_____

_____

_____

B. How many **years** are you prepared to keep trying new things/activities before you decide to **stop** trying**?**

_____

___

C. If these things are **not useful**, could you please explain why they interest you and you are still prepared to continue trying these activities?

_____

_____

_____

_____

Question 16

A. Of these new things/activities which you have tried and disregarded as not useful, what was the **strangest thing** that you tried?

_____

_____

_____

_____

B. Why didn't it work?

_____

_____

_____

_____

Question 17

A. In the last 10 years, can you name new things/activities the government or a project recommended that you have **not adopted**?

_____

_____

_____

_____

B. Why did you **not adopt** these recommendations?

_____

_____

_____

_____

Thank you for sharing your opinions and views with us today. We would now like to discuss your views on changes that you believe may be affecting you.

SECTION 4: Village Future

Question 18

Can you think about the past, the last 5 years?

B. Are you better off now than when you were then?

Place a tick ✓ beside the answer **YES ☐** **NO ☐**

B. If yes, why?

_____

_____

_____

_____

C. If not, why?

_____

_____

_____

_____

Question 19

Think about your village in the future, in 5 years time.

Will your activities **change** much in the **next 5 years**?

DAFO

Use the Flipchart and 10 tokens

Ask if they can think about a score between 1and10. Give each activity a score with 10 very important, down to 1 not important

Write in the score beside the answers

Changing Activities	**Use for family** **Score 1-10**	**Sell in our village or to other villages** **Score 1-10**	**Sell at market** **Score 1-10**	**Sell to trader** **Score 1-10**
Upland Rice *Hai*				
Paddy Rice				
Crops				
Vegetables				
Trees, fruit, teak, rubber				
Livestock				
NTFPs				
off farm income				
handicrafts				
Other				

Question 20

Think about your village in the future, in 5 years time.

How will new activities/technology affect the village?

✍_____

_____

_____

_____

SECTION 5: Access to Credit and Markets and Land

Question 21

Does you use any form of credit or benefit?

DAFO

Ask if they can think about a score between 1and10. Give each source of credit a score with 10 very important, down to 1 not important

- ☐ Revolving fund Ranking _____
- ☐ Rice or crop bank Ranking _____
- ☐ Livestock bank Ranking _____

☐ Bank loan Ranking _____

☐ Money or loan from relative or friend(gift) Ranking _____

☐ Exchange labour Ranking _____

Question 22

A. How long does it take the villagers to get to the road?

DRY _____ **WET _____**

B. How do you get to the market?

Place a tick ✓ in the answers that apply

Own car	Motor cycle	Tuk tuk	boat	walking	bus	taxi	Long car	Friends car	Tractor	Tak tak	Bicycle
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

C. How long does it take the villagers to get to the market at Xieng Ngeun

DRY _____ **WET _____**

D How long does it take the villagers to get to the market at Luang Prabang?

DRY _____ **WET _____**

SECTION 6: Personal Views

Question 23

DAFO

Think about your life, which statements best reflect your opinions of the way you feel?

On a scale of 1 to 5 could you indicate whether you agree?

1=strongly agree **2**=moderately agree **3**=neither agree nor disagree

4=moderately disagree **5**=strongly disagree

CIRCLE the number which indicates your opinion ❍

23 Personal statements	☺	☹

Item	**Statement**	**Strongly Agree**	**Strongly Disagree**

23A.	I prefer to do things the traditional way	1	2	3	4	5
23B.	I feel I can create a future for myself and my family	1	2	3	4	5
23C.	I have control over my life	1	2	3	4	5
23D	I am very innovative	1	2	3	4	5
23E.	I see myself as able to take risks	1	2	3	4	5
23F.	I like innovation	1	2	3	4	5
23G.	Traditions are very important to me	1	2	3	4	5
23H	It is difficult for me to convince people to try new things	1	2	3	4	5

Question 24

In this District, which village do you see as the most progressive?

_____

_____

_____

Question 25

Compared with your village, are your neighbouring villages very progressive and trying new things?

_____

_____

_____

Question 26

Do your neighbouring villages face the same challenges or difficulties as in your village?

_____

_____

_____

Question 27

Thank you very much for giving up your time today to answer so many questions for us. Have I forgotten to ask you anything which is really important and I have not thought to ask you?

_____

___

Thank you for completing this survey.

Appendix D

Farmer survey 2

CHARLES STURT UNIVERSITY	**Interview ID** **Date** **Interviewers** **Type of Interview**

SECOND INDIVIDUAL INTERVIEW RECORD

Name of village		**Male/Female**	
Name		**Married/single**	
Years in village		**Number of men in HH**	
Age		**Number of women HH**	
Ethnic group		**Number of children in HH**	

Question I

DAFO Use the Flipchart and 33 tokens so farmer can show the importance of each activity

We are interested to know how important activities are to you. You have 33 tokens and we like you to place these in the activities showing their importance to you. There are several questions and we will show you how to help us.

Can you show us how important these activities are and the time and labour used for these activities. Can you also tell us what you sell at market?

a) Most important for family use?

b) Most important activities for income?

c) Time taken for activities?

d) Labour taken for activities?

e) What is sold at market?

f) What is sold to a trader?

Importance	**Upland Rice** *Hai*	**Paddy Rice**	**Crops** Upland maize **Cash crops** Jobs Tears sesame maize soybean	**Vegetables** Tomato asparagus Chilli pineapples	**Trees** Fruit trees oranges Teak, rubber	**Livestock** Buffalo Cattle Pigs, goats horses, poultry fish ,frogs	**NTFPs** Bamboo mulberry paper	**Off-farm income Labour Enterprise** Eg Shop guesthouse trader, tuk tuk	**Handicrafts** Weaving bamboo products clothes wood carving silversmith	**Other** Lao Lao river rocks
most important for family use										
most important income										
time taken for activities										
labour taken for activities										
what is sold market										
what is sold to a trader										

Are there any other reasons that are important and <u>you</u> must think about before you make your farming

decisions? ✍_____

_____

_____

_____

<u>Question II</u>

We would like to ask you several questions about the many **activities** and ways you have generated **income** over the last 5 years. We are interested in the activities that you have used and particularly the activities that have changed the way you do things **Place a tick ✓ next to** the activities you know about and are interested in either now or may be interested at a future time. There is no right or wrong answer, we would like to hear your opinion and we are interested in what you are doing and the way you hear about new things.

DAFO

Place a tick ✓ next to the activities

Ask "who told you about it? then ✍ onto form

Score the importance of each activity. Ask if they can think about a score between 1and10.

Give each activity a score with 10 very important, down to 1 not important. Point to the number on the flipchart

What activities do you use?	Have you heard about it before?	Do you use it now?	Have you tried it before?	Will you use it next year?	Would you like to try using it?	Who told you about it?	Score 1-10
New forages for livestock							
Forages as hedgerows							
Forages as living fence							
Mixed cropping with new crops, e.g. pineapples, legumes							
New paddy rice varieties							
New upland rice varieties							
Plants for soil fertility e.g. legumes							
New crops e.g. Jobs tears, cassava							
New vegetables e.g. tomato, asparagus							
Fruit trees, plums, oranges							
Gathering or growing NTFP's							
Plantation, e.g. teak, rubber							

New experience with livestock e.g. frogs, fishpond, turkey, cattle, pigs							
New breeds of livestock							
Pens for livestock							
Vaccination for disease							
Hosting visitors							
New Handicraft, weaving, wood carving							
Paper Mulberry							
Service industry eg tools, labour for new activity							
Silk manufacture							
Other							
Other							

Question III

DAFO: Show the smiley face card to the person and explain the differences and how you will write their answers on the form after they point out their opinion.

We would like you to think about the following statements and tell us how you feel about them**.** The DAFO will show you a card depicting a range of opinions. Can you point to the answer that you feel represents your opinion?

If you were to try new things how important would the following be?

On a scale of 1 to 5 could you indicate whether you agree?

1=strongly agree **2**=somewhat agree **3**=neither agree nor disagree

4=somewhat disagree **5**=strongly disagree

CIRCLE the number which indicates your opinion ❍

III ENABLERS		

Item	Statement	Strongly Agree				Strongly Disagree
III	Farmers need to have farm equipment like tractors, pumps, or mills before they can try new technology	1	2	3	4	5
III B	Farmers need irrigation installed for paddy rice production before they can grow paddy rice	1	2	3	4	5
III C	Farmers need to manage the soil better with fertilizer or manure before they can try new crops.	1	2	3	4	5
III D	Farmers do not need access to credit, rice bank, cattle bank, or project money for handicrafts before I can try new things	1	2	3	4	5
III E	Farmers need to try out the new technology and change it to suit myself before I can be happy that it will work	1	2	3	4	5
III F	Farmers prefer to sit back and wait and see how other farmers are succeeding before I do new things.	1	2	3	4	5

Question IV

DAFO: Show the smiley face card

Think about your village today.

How is your farming practice **changing**?

The following statements may show how farming practices are changing/have changed in your village. On a scale of 1 to 5 could you indicate whether you agree?

1=strongly agree **2**=somewhat agree **3**=neither agree nor disagree

4=somewhat disagree **5**=strongly disagree

CIRCLE the number which indicates your opinion ❍

IV LAND USE		

Item	**Statement**	**Strongly Agree**				**Strongly Disagree**
IV A	Government land use changes forces me to look to different activities	1	2	3	4	5
IV B	Farmers am using more forest land for grazing and collection of forest products	1	2	3	4	5
IV C	Our village will always be able to support my family because I have enough land for the future	1	2	3	4	5
IV D	Farmers grow enough rice now to meet the needs of my family	1	2	3	4	5
IV E	Forest products are harder to find now than in the past	1	2	3	4	5
IV F	Farmers prefer to grow paddy rice rather than upland rice	1	2	3	4	5
IVG	Farmers need to grow new things to have enough food and money for the future	1	2	3	4	5
IVH	Farmers need to grow more crops to feed my family and livestock because there is not enough rice.	1	2	3	4	5
IV I	There is enough land for everyone to grow paddy rice	1	2	3	4	5
IV J	Farmers can grow other things instead of rice to feed my family	1	2	3	4	5
IVK	Farmers can always find more to hunt in the forest	1	2	3	4	5

IV L	Fallow times are becoming shorter	1	2	3	4	5
IVM	Our village has more problems with weeds & pests, soil fertility, soil erosion now than in the past	1	2	3	4	5

Question V

We have just spoken about your use of land. Is there something you feel is important for us to know?

_____

_____

_____

_____

Question VI

Could you please give your opinion on the following statements?CIRCLE the number which indicates your opinion ❍

VI TECHNOLOGY		

Item	**Statement**	**Strongly Agree**				**Strongly Disagree**
VI A	Farmers are using new technologies	1	2	3	4	5
VI B	Farmers have enough land to try new activities	1	2	3	4	5
VI C	Farmers are busy and I don't have enough labour to try new activities	1	2	3	4	5
VI D	Farmers cant afford to try new things	1	2	3	4	5
VI E	New things and activities are happening in village	1	2	3	4	5
VI F	New technology will not improve my life.	1	2	3	4	5
VIG	Farmers want things to change in my village	1	2	3	4	5
VI H	Traditional ways of doing things are better	1	2	3	4	5

VI I	Farmers have experience in new technologies	1	2	3	4	5
VI J	Farmers don't want to try new things	1	2	3	4	5
VIK	Women are more prepared than men to try new things	1	2	3	4	5
VI L	Farmers like projects coming to the village	1	2	3	4	5

Question VII

We have just spoken about activities and technologies you may use. Is there something you feel is important for us to know?

_____

_____

_____

_____

Question VIII

Could you please give your opinion on the following statements?

CIRCLE the number which indicates your opinion ❍

VIII INCOME		

Item	Statement	Strongly Agree				Strongly Disagree
VIII A.	Farmers are selling more cash crops and vegetables than I was 2 years ago	1	2	3	4	5
VIII B.	More people are wealthier now than I was 2 years ago	1	2	3	4	5
VIII C.	Our village is trying new ways more than other villages	1	2	3	4	5
VIII D.	Farmers are selling more handicrafts than 2 years ago	1	2	3	4	5
VIII E.	Today farmers are selling more NTFPs than I was 2 years ago.	1	2	3	4	5

VIII F.	The same people in the village are always getting wealthier or better off	1	2	3	4	5
VIII G	Relatives are sending me more money than 2 years ago	1	2	3	4	5
VIII H.	2 years ago farmers were selling more of their labour	1	2	3	4	5
VIII I.	Our village is more wealthy than our neighbouring village	1	2	3	4	5
VIII J.	I am making more off farm income than I was 2 years ago	1	2	3	4	5
VIII K.	I am selling less livestock than 2 years ago	1	2	3	4	5

Question IX

We have just spoken about activities and wealth. Is there something you feel is important for us to know?

_____

_____

_____

_____

Question X

Could you please give your opinion on the following statements?

CIRCLE the number which indicates your opinion ❍

X COMMUNITY		

Item	**Statement**	**Strongly Agree**				**Strongly Disagree**
X A	A lot of people are living in this village.	1	2	3	4	5
X B	Households are growing larger these days	1	2	3	4	5

X C	Our village only has people from the same ethnic group	1	2	3	4	5
X D	People are working longer and harder	1	2	3	4	5
X E	People work more together now than they did 2 years ago	1	2	3	4	5
X F	More people are leaving this village than those that are coming in the last 3 years	1	2	3	4	5
X G	Village groups help represent the village at government meetings	1	2	3	4	5
X H	Our village needs to try new things	1	2	3	4	5
X I	Our community is very traditional	1	2	3	4	5

Question XI

We have just spoken about your village community. Is there anything else you would like to tell us

about?_____

Question XII

Think about your situation today and the changes that might be happening.

The following statements may be reasons why you may be changing your farming practice. On a scale of 1 to 5 could you indicate which reasons are important to you?

1=very important **2**=moderately important **3**=doesn't affect importance

4=not really important **5**=not important

CIRCLE the number which indicates your opinion ❍

XII MARKET and SERVICES		

Item	**Statement**	**Very Important**				**Not Important**
XII A	Government land policy affects me	1	2	3	4	5
XII B	Government assists and benefits me	1	2	3	4	5
XII C	The village organises special projects to come to the village to assist me	1	2	3	4	5

XII D	Traders come to the village and buy my goods at higher price	1	2	3	4	5
XII E	Better access to markets will increase production and consumption in the village	1	2	3	4	5
XII F	The village can send my children to a school close by	1	2	3	4	5
XII G	Commercial traders come to the village to set a high price for my cash crops	1	2	3	4	5
XII H	Electricity is connected to my house	1	2	3	4	5
XII I	Projects coming to the village will make things happen for me	1	2	3	4	5
XII J	When DAFO staff talk to me they discuss lots of new information	1	2	3	4	5
XII K	Better road access for village will encourage me to grow more cash crops	1	2	3	4	5
XII L	The village has many benefits if water is connected and accessible for everyone	1	2	3	4	5
XII M	Farmers can get highest prices at the market	1	2	3	4	5
XII N	The village has access to a good medical centre	1	2	3	4	5
XII O	Technology will increase production in the village	1	2	3	4	5
XII P	Rice bank in village helps the poor farmers	1	2	3	4	5
XII Q	Livestock is improved if a cattle bank is available in the village	1	2	3	4	5
XII R	Credit to buy rice is available to me after a bad season	1	2	3	4	5
XII S	Money or loan from relative or friend is readily available to in our village	1	2	3	4	5

XII T	We often exchange labour in my village or with another village	1	2	3	4	5
XII U	Access to a road network limits my preparedness to try new things	1	2	3	4	5

Question XIII

Do you think there are other reasons? If so, what are they?

✍_____

_____

_____

Thank you for completing this survey.

Appendix E

Exploring market opportunities for farmers in Xieng Ngeun District

Research Questions

1. What are the most important markets that lowland farmers are selling their produce to? What are they selling?

2. What are the most important markets that upland farmers are selling their produce to? What are they selling?

3. What are the most important marketplaces in Xieng Ngeun?

4. What are these markets used for?
    - small trade
    - both small and big trade
    - bigger commercial livelihoods

5. Where are these products going to?

6. What products are the big traders buying?

7. Where are these traders from?

8. What are the new products farmers are talking about that they want to try?

9. Tell me what you know about products that might be considered:

    - High growth products (= or > 6% per year)
    - Scarcity products
    - Imported products
    - Competitive advantage products
    - Environment-friendly products
    - Traditional products (might be in association with nostalgia or fair trade markets)
    - Also indicate the level of scarcity and market trend of each product.

Appendix F

CURRENT FARMING

group1 = hai, group2 = paddy, group3 = crops, group4 = vegetables, group5 = trees, group6 = livestock, group7 = NTFP, group8 = off farm, group9 = handy crafts, group10 is other

number.of.observations:

1	2	3	4	5	6	7	8	9	10
973	973	973	973	973	973	973	973	973	973

group.medians:

1	2	3	4	5	6	7	8	9	10
1	0	5	0	0	6	2	0	0	0

Kruskal-Wallis rank sum test

Kruskal-Wallis chi-square = 1977.069, df = 9, p-value = 0
alternative hypothesis: two.sided

pairwise.significance.comparisons:
logical matrix: 10 rows, 10 columns.

	1	2	3	4	5	6	7	8	9	10
1	F	T	T	T	T	T	F	T	T	T
2	T	F	T	T	T	T	T	F	F	T
3	T	T	F	T	T	T	T	T	T	T
4	T	T	T	F	T	T	T	T	T	T
5	T	T	T	T	F	T	T	T	T	T
6	T	T	T	T	T	F	T	T	T	T
7	F	T	T	T	T	T	F	T	T	T
8	T	F	T	T	T	T	T	F	F	T
9	T	F	T	T	T	T	T	F	F	T
10	T	T	T	T	T	T	T	T	T	F

FUTURE FARMING

group1 = hai, group2 = paddy, group3 = crops, group4 = vegetables, group5 = trees, group6 = livestock, group7 = NTFP, group8 = off farm, group9 = handy crafts, group10 is other

number.of.observations:

1	2	3	4	5	6	7	8	9	10
804	804	804	804	804	804	804	804	804	804

group.medians:

1	2	3	4	5	6	7	8	9	10
1	0	5	1	1	5	1	0	1	0

Kruskal-Wallis rank sum test

Kruskal-Wallis chi-square = 1910.819, df = 9, p-value = 0
alternative hypothesis: two.sided

pairwise.significance.comparisons:

	1	2	3	4	5	6	7	8	9	10
1	F	T	T	F	F	T	T	T	T	T
2	T	F	T	T	T	T	T	F	T	T
3	T	T	F	T	T	F	T	T	T	T
4	F	T	T	F	F	T	F	T	T	T
5	F	T	T	F	F	T	F	T	T	T
6	T	T	F	T	T	F	T	T	T	T
7	T	T	T	F	F	T	F	T	T	T
8	T	F	T	T	T	T	T	F	T	T
9	T	T	T	T	T	T	T	T	F	T
10	T	T	T	T	T	T	T	T	T	F

Appendix G

Data on projects operating in villages

Projects operating in the study villages in Xieng Ngeun District in 2005.

Village	Project	Start Year	Finish Year	Activity
Borum Or	European Union	1987		village veterinary worker
	Private company	2004		new maize variety
	Private company, Phet Rama	2004		soybean project
Ensavan	JICA	1998	2003	school
	UNICEF	2002		water
	Government	2002		electricity
	FLSP	2003	2005	forages for livestock
	Saphanimit project	2003	2004	planting soybean
	Wet season crops	2005		tomatoes in wet season
Houay Fai	UNICEF workshop			drug control
	Government revolving fund	2001		rice bank
	Private company, Phet Rama	2004		soybean production
	Maize production	2005		starting 2005
Houay Khong	Fund Loan	1979		credit
	Private company, Phet Rama	2004		planting soybean
	Health care			children vaccination
Houay Pheng	World Vision	2005		rice bank from Taiwan organisation, chickens
	Work for Food Program (WFP)	2003	2005	road construction for rice
	District Governor	2002	2004	water supply
	District Governor	2005		medicine phone, pharmacy
	Work for Food Program (WFP)	2003	2004	new paddy land
	World Vision	2005		water & medical supplies
	Private company	2004		soybean
	Livestock bank	2000	2005	cattle
Houay Sa Than	World Vision	1995		village veterinary worker (VVW) training
	World Vision	2000		water supply
	World Vision	2003		medical phone, livestock

				bank , rice bank revolving funds
	Private Company	2004		soybean training with DAFO
Houay Thao	Private (Som Sak)	1994	2005	cattle raising
	FLSP	2004		forages for livestock
	Private Company (goat & pig production)	2004		household groups
	Government	2004		water supply
	World Vision	2003		soybean
	Credit from bank	1994		cattle production
Houay Yen	Quaker	1991	1992	irrigation rice, fishpond, another crop
	FLSP	2002	2005	forages for livestock, livestock extension
	BAFIS	2003	2004	vaccination program, water supply, school
	JICA	2003	2004	soil analysis
	UNICEF	2003	2004	health & sanitation
	World Vision (WFP)	2003		increase paddy area
	Government	2004	2005	extension
	JICA	2005		building schools
Khone Vai	American ADO	1971		construction
	World Vision	2002		water supply, pigs, medical pharmacy rice bank, livestock bank, revolving fund
	World Vision	2003		medical phone
	World Vision	2004		soybean
	Private company Phet Rama	2004		soybean planting
	Health care	2001		medical revolving fund
	Water supply	2001		water supply
	Government	2001		cropping
Kiou Gna	World Vision	2004		health, agriculture
	European Union	1994		disease prevention, livestock extension
	FLSP	2001		VVW training, forages, vaccination, planting forages for livestock
	Government	2004		farmer extension, cash crop project

	Saphanimit project	1991		birth control
	Saphanimit project	2001		health centre & school, supporting rice
	EU	2003		livestock, credit for pigs, chickens
	JICA	1999		school building
	Saphanimit project	2004		soybean
	UN	2005		supplying rice
	Private company			soybean
Kiou Kacham	JICA	2000		school
	World Vision	2002		water supply
	UNICEF	2004		women & children's health
	Saphanimit project	2000		schools
	World Vision	2000	2002	water supply, building schools, health centre
	Private company Phet Rama	2004		soybean
Kiou Ta Loum	FLSP	1997	2005	forages for livestock, forages & animal health, pig raising
	Private company	2004		soybean
	World Vision	2004	2005	health
	World Vision			soybean
Long Leuad	World Vision	2000		plant mulberry
	FLSP	2004	2005	forages for pigs & cattle, livestock extension
	Shifting cultivation project	1987		cash crops, sweet potatoes
	Saphanimit project	2001		livestock, crops, paddy rice, credit, animal raising
	planting	2004		farmer extension
	Private company Phet Rama			maize & soybean
	SIDA			mulberry paper trees
	World Vision	1997	2005	forest & agricultural extension
	Work for Food Program (WFP)	2003	2004	cultivating new paddy
	SIDA	1994	2000	stop slash & burn for Hai
Long Or	FLSP	2000	2005	forages, sweet potato, cassava for livestock
	Cash crops	2000		tomatoes & chili
	FLSP	2003	2005	livestock extension, forages for livestock, pigs,

	vegetables	2003		mushrooms
	planting sesame	2000		sesame
	Hai crops	2004		new maize
	Soybean project	2004		soybean
Na Kha	World Vision	1995		water supply, rice bank buffalo fund
	European Union	2003		pig raising
	Private Company	1993		sell Jobs Tears to Thailand
	Private Company Phet Rama	2004		soybean
	Quaker	1986	1987	establishing irrigation
	World Vision	1995	1999	agriculture
	Work for Food Program (WFP)	2003	2004	maintain irrigation
	SIDA	1994	1999	stop shifting cultivation
	BUCAF	2002		working with farmer
	District soybean project	2004		planting for sale
	cotton project	1992		
	Vayo Company	2004		cotton plantation
	World Vision			fund for buffalo
	Buffalo production project	1995		raise buffalos
	SIDA	1998		fund for raising chickens
	World Vision	2002		fund for raising chickens
Nam Mok	World Vision (EDP)	2003		water supply
	FLSP	2003		stylo, sweet potato, cassava, forages, livestock extension
	Private Company	2004		soybean
	GFS	2004		water supply
	Private Company	2004		soybean
Nong Khouay	Work for Food Program (WFP)	2003	2004	rice for working on the road construction
	Work for Food Program (WFP)	2003	2005	road construction
	Private Company Phet Rama	2004		soybean
	Government	2005		medical phone, pharmacy
	World Vision	2005		drug supply unit
	Maize production project	2004		maize for market
	Water supply			pipe
	Production land & forest	2004		forest & land demarcation
	FLSP	2004		forage

Pak Bak	World Vision	1998		water supply
	World Vision	2001		Jobs Tears
	World Vision	2002		medical centre
	World Vision	2003		new variety rice
	World Vision	2004		new variety soybean
	World Vision	2004	2005	rice bank, livestock bank, water supply, health care, revolving fund
	Vilay Khoune Company	2004		soybean
	World Vision	2004		forages
	World Vision	1999	2005	health care centre, water supply, cash crop, livestock production
	World Vision	2004		rice bank, livestock bank health centre, water supply
Pha-Liem	Government	2004		soybean
Phone Sa At	JICA	2000		teak
	FLSP	2000	2005	forages for livestock
	UNICEF	2002	2003	water supply
	JICA	2000	2002	school
	Lions Club	2004	2005	kindergarten
Phone Savang	UNDP	1996	2000	mulberry, school, rice mill,
	DIDM	2003	2004	paddy rice variety
	BUCAP	2004	2005	paddy rice & rice variety development to increase rice yield
	FLSP	2004	2005	forages & livestock
	World Vision			household raising buffalos
	Maize production			new seed varieties
	EU	1998		village veterinary worker
	Private company Phet Rama	2003/4		soybean planting
	World Vision			school, water supply, meeting room
Phone Xai	UNDP	1991	2005	school, water, meeting room buffalo, rice mill health, Jobs Tears
	FLSP	2004	2005	forages for livestock
	Agricultural promotion bank	1995	1996	livestock

	World Vision	1992		poultry, meeting room, water supply, school
	Lao- IRRI			integrated cropping system
	World Vision	1992	2005	Buffalo, revolving fund
	Soybean			soybean technical knowledge from DAFO
	Sweet potato			sweet potato technical knowledge from DAFO
	FLSP	2004		forages, technical knowledge from DAFO,
	World Vision	1993		fish culture
	Private company Phet Rama	2004		soybean
	Phonechaleun	2004		maize
Phou Khoua	FLSP	2004		forages
	Government	2004		water supply
	WFP	2003	2004	road access
	Govt project	2003	2004	water supply
Sa Mouay	World Vision	2002		rice bank (8 ton)
	Agro action			
	World Heritage	2005		maps, tourism speculation
	HCR	2002	2004	rice support in drought
	Government	1999	2000	school
	UNICEF	2003		medical supply
Senodon	FLSP	2004	2005	forages for livestock forages & animal health
	Government	2003		health, water supply
	Dept food & drug	2004		medical phone
	stop Opium	2001	2004	stop opium, livestock
	Rural development	2002	2003	water supply, clean water
	Goat production	2002		credit for goats' extension project
	Private company Phet Rama	2004		soybean
	Agriculture promotion bank			goat production
	District governor			Jobs Tears plantation
	Maize production			
Silaleck	World Vision	1991		water supply, education, livestock fund
	SIDA/NAFRI	1996		extension livestock
	FLSP	2003	2004	forages & veterinary help

	Private company Phet Rama	2004		soybean, maize
	World Vision	1995	2004	water supply
	SIDA	1994	1999	stop shifting cultivation, revolving fund
	World Vision			cattle production
	SIDA	2002		hedgerow, fruit trees & annual crops
	Xieng Khamdy	2002		maize
Sop Choun	Teak	1980		
	mulberry	1995		paper mulberry
	Government	2003	2005	clean water supply
	Government	2003	2004	school
	DAFO	2004	2005	paper mulberry, cotton, sesame, broom grass
	Rural development	2004	2005	water supply
Thin	World Vision	2002		revolving fund
	District Governor	2001		change from rice to Jobs Tears
	DAFO	2003		Jobs Tears & soybean training
	World Vision	2003		chickens & rice revolving fund
	World Vision	2003		water supply, medical phone
	World Vision	2002		repair water supply, revolving fund
	Lion Club Na Koya	1999	2000	water supply
	Government	2004		build school
	World Vision	2004		garden
	World Vision	2004		water supply & school
	Raising pigs	2002		traditional method
Thine Keow	World Vision	2000	2003	plantation cash crops, livestock, community help
	FLSP	2004	2005	forages for livestock, vaccination
	IPM CAP	2003		natural production NAPOC research centre
	SIDA	1994	2000	agriculture
	World Vision	1995	2005	meeting room, agriculture, public health for women

	Phet Rama	2004		soybean
	BUCAP	2001		increase rice production
	BUCAP Dam Cron	2003 1990	 2005	rice yield, forages buffalo, water, rice mill
	World Vision	2001	2005	meeting room, school tables & chairs
	Social welfare project	1997	2005	rice bank
Tin-pha	Government	2005		new maize variety
Xieng Ngeun	World Vision	1984		water, schools, repair irrigation
	Private company	2003	2004	soybean, new variety maize corn
	Agriculture Bank	1995		loan to many households
	District staff			paper mulberry, trees, broom brush
	Private company Phet Rama			soybean maize
	World Vision	1990	1995	agricultural & forestry, irrigation
	Welfare project	2003		raising pigs
	WFP	2002	2003	building
	FIAT	1997	2000	training farmers