NEGOTIATING SUSTAINABLE LANDSCAPE MANAGEMENT IN LAO PDR

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AUSTRALIA

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my research higher degree candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

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Statement of contribution to:

Jointly authored works contained in the thesis

This thesis contains six jointly authored published papers (two in press) and two jointly authored manuscripts that have been submitted for peer review. These papers are reproduced in full as chapters of this thesis. I conducted the majority of the work in chapters 4, 5, 7 including data collection, data analysis, interpretation, synthesis, drafting and writing. As part of a transdisciplinary project, this thesis includes collaborative papers. For chapters 2, 3, 8, I principally contributed to data collection, ideas, design and editing and to a lesser degree to data analysis and writing. Authors and co-authors contributions are indicated below the relevant citations.

Chapter 2: Guillaume Lestrelin, Jean-Christophe Castella, and Jeremy Bourgoin (in press) Territorializing sustainable development: The politics of land-use planning in the Lao People's Democratic Republic. Journal of Contemporary Asia

Lestrelin (50%), Castella (30%), Bourgoin (20%)

Chapter 3: Guillaume Lestrelin, Jeremy Bourgoin, Bounthanom Bouahom, and Jean-Christophe Castella (2011) Measuring participation: Case studies on village land-use planning in northern Lao PDR. Applied Geography 31:950-958.

Lestrelin (50%), Bourgoin (40%) Bouahom (2.5%), Castella (7.5%)

Chapter 4: Jeremy Bourgoin, Jean-Christophe Castella, David Pullar, Guillaume Lestrelin and Bounthanom Bouahom (in press) Towards a land zoning negotiation-support platform: 'Tips and tricks' of participatory land-use planning in Lao PDR. Landscape and urban Planning.

Bourgoin (80%), Castella (10%), Pullar (5%), Lestrelin (2.5%), Bouahom (2.5%)

Chapter 5: Jeremy Bourgoin, and Jean-Christophe Castella (2011) 'PLUP FICTION': landscape simulation for participatory land-use planning in Northern Lao PDR. Mountain Research and Development 31(2): 78-88.

Bourgoin (80%), Castella (20%)

Chapter 7: Jeremy Bourgoin, Jean-Christophe Castella, Cornelia Hett, Guillaume Lestrelin, and Andreas Heinimann (2011). Democratizing REDD through participatory land-use planning in Lao PDR. (to be submitted to Ecology & Society).

Bourgoin (75%), Castella (15%), Hett (5%), Lestrelin (3%), Heinimann (2%)

Chapter 8: Jean-Christophe Castella, Jeremy Bourgoin, Guillaume Lestrelin, Bounthanom Bouahom, Linkham Douangsavanh (2011) Engaging with local communities in designing their future landscapes: Promises and premises of participatory land-use planning in Lao PDR. (to be submitted to Landscape Ecology).

Castella (50%), Bourgoin (40%), Lestrelin (8%), Bouahom (1%), Douangsavanh (1%)

Statement of contribution of others to the thesis as a whole

Dr. David Lamb, Dr. Jonathan Newby, and Dr. Owen Powell contributed to the development of ideas and commented on several drafts.

Professor Ole Mertz provided advice on Chapter 7.

Statement of parts of the thesis submitted to qualify for the award of another degree

None.

Published works by the Author Incorporated into the Thesis

Chapter 2: Guillaume Lestrelin, Jean-Christophe Castella, and Jeremy Bourgoin (in press) Territorializing sustainable development: The politics of land-use planning in the Lao People's Democratic Republic. Journal of Contemporary Asia.

Chapter 3: Guillaume Lestrelin, Jeremy Bourgoin, Bounthanom Bouahom, and Jean-Christophe Castella (2011) Measuring participation: Case studies on village land-use planning in northern Lao PDR. Applied Geography 31:950-958.

Chapter 4: Jeremy Bourgoin, Jean-Christophe Castella, David Pullar, Guillaume Lestrelin and Bounthanom Bouahom (in press) Towards a land zoning negotiation-support platform: 'Tips and tricks' of participatory land-use planning in Lao PDR. Landscape and urban Planning.

Chapter 5: Jeremy Bourgoin, and Jean-Christophe Castella (2011) 'PLUP FICTION': landscape simulation for participatory land-use planning in Northern Lao PDR. Mountain Research and Development 31(2):78-88.

Chapter 6: Jeremy Bourgoin (2012) Sharpening the understanding of rural landscapes with participatory land-use planning in Lao PDR. Applied Geography 34:99-110.

Additional publication relevant to the thesis, but not forming part of it

None.

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This doctorate research has been conducted in Lao PDR under a complex institutional arrangement. I would like to thank both the Centre for International Forestry Research (CIFOR) and the IRD (Institut de Recherche pour le Développement) for having involved me in their Landscape Mosaics project and the CATCH-UP (Comprehensive Analysis of Trajectories of Change in the Uplands) Program. During field studies, I stayed at the National Agriculture and Forestry Research Institute (NAFRI, Vientiane-Lao PDR). I would like to thank Bounthanom Bouahom, Manithaithip Thepphavanh, Sangthong Phatsalin, Sayasith Phonphakdy, and Khamla Nanthavongfor their kindness, support and translations during field missions. Thank you for making my stay in your country an enjoyable and memorable one. In particular, I would like to thank Guillaume for his wonderful friendship and support during the two years of my stay in this research institute.
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This research would not have been possible without the encouragements and understanding of my family and friends in France, Lao PDR and Australia. Special thanks to Charlotte for her constant support and help in the editing process.

Preface

This thesis is presented, with the exception of Chapter 1 (Introduction) and 9 (General Discussion), as a compilation of interconnected published, in press, or in revision manuscripts. For the most part, the content of these manuscripts (Chapters 2-8) are presented as they were submitted or published and the relevant journals are acknowledged at the start of each chapter. Minor stylistic changes have been made to the manuscripts embedded in the thesis, for the purpose of maintaining consistency and logical flow throughout. For example, figures and tables within the chapters have been re-labelled, referencing styles have been standardised and individual chapter references have been collated and presented at the end of Chapter 9.

As Chapters 2-8 were written as stand-alone articles for peer-reviewed journals, there is some repetition between chapters. The plates presented at the start of each chapter are for illustrative purposes and are not an integral part of the thesis. They are not referred to in the text.

Abstract

Land-use Planning (LUP) has long been used as a tool for applying sustainable development discourses and accounting for both present and future needs of populations. In Lao PDR, like in many natural resource rich but population poor countries, successive land-use policies have been tested to respond to conservation-development challenges in relation to on-going land and forest degradation. Past land-use planning/ land allocation processes have been seen as counterproductive, exacerbating poverty and deforestation trends. An essential task of participatory action-research is therefore to address the gap between policy discourses and practice by involving scientists, planners and local communities in designing future landscapes.

The aim of this thesis is to investigate how land-use planning principles can be applied differently to better manage ecosystem-livelihood trade-offs through land-use negotiations at multiple scales and with multiple stakeholder groups. The functioning and development of an action-research project is illustrated through case studies in northern Lao PDR involving three main interrelated components and activities.

The first involves a multi-level diagnostic study aimed at drawing lessons from past experiences by identifying mismatches between (inter-) national discourses and the local implementation of land-use planning. By combining empirical studies with a comprehensive analysis of the land policy context, the research showed that, in a context of limited technical and investment capacity of implementation agencies, the reality of LUP in Lao PDR remains entangled with confused 'on-the-ground' issues and lacks integration with local knowledge and perspectives. The diagnostic study helps define a framework for innovation.

The second component focuses on a landscape design approach that is generic and adaptive enough to be applied nationally in accordance with Participatory Land-use Planning (PLUP) guidelines developed by the government. This pilot action-research borrowed on the body of knowledge accumulated through the transdisciplinary ambitions of this thesis. Historical changes in landscapes and livelihoods were used to ground the development of the participatory platform in the local context.

Local practitioners were involved in a series of learning and design activities at the village level. After eliciting local knowledge related to landscapes and livelihoods, a role-play called 'PLUP Fiction' involved the villagers in a learning experiment of land zoning based on a virtual landscape. Additionally, a participatory 3D modelling approach was used as a 'boundary object' to visualise alternative landscape scenarios. Knowledge originated from different sources, i.e. different scientific disciplines, local practitioners and village communities was mobilized during land zoning

negotiations between stakeholder groups. A Geographic Information System (GIS) coupled with a cost/benefit analysis model parameterised by the villagers, could capture real-time information on the different areas of the land-use plan under discussion and present corresponding socio-economic and environmental returns. Through iterative design, the participants gradually refined their land-use plan and tested the introduction of innovative cropping and animal husbandry systems by changing the parameters of the simulation. An important part of this approach consisted of building capacity to gradually make local stakeholders (i.e. district planners and local communities) autonomous in landscape planning and engage them into a long term monitoring which is necessary to regularly revisit their plans and achieve their outcomes.

The third component explores the capacity of participatory land-use planning to translate global and national regulations into local actions was explored. Our innovative landscape design approach was brought up to the national and international debates on Reduced Emissions from Deforestation and forest Degradation (REDD). In a context of payment for ecosystem services, land-use planning scenarios were used to frame the local negotiations about benefit sharing and equity. Local practitioners and communities were engaged in land policy formulation, which helped reducing the policy implementation gap, i.e. land-use plans that are more realistic and context relevant have better chance to be actually implemented and to achieve impact.

The innovative approaches developed in this PhD demonstrate that landscape design can balance the development needs of rural communities against sustaining the natural environment. Furthermore improvements can be made by directly inviting local stakeholders to take part in the planning and decision-making process thereby promoting ownership and responsibility over sustainable landscape management.

Keywords

Sustainable land management, land-use planning, participation, geographic information systems, REDD+, Lao PDR.

Australian and New Zealand Standard Research Classifications (ANZSRC)

050104 Landscape Ecology (70%)

050209 Natural Resource Management (30%)

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Part 1. General Introduction

Chapter 1. Introduction

Plate 1. Children in the village of Phakok (Phonxay district, Luang Prabang Province)

1.1 Background

The rate of deforestation and forest degradation is a key issue in developing countries because it causes major crises for both biodiversity and forest-dwelling communities who rely on forest ecosystems goods and services (Lambin *et al.,* 2001; Rudel *et al.,* 2005; Lamb *et al.,* 2005; Chhatre and Agrawal, 2009). The international community included the growing concerns over degradation and over-exploitation trends within the 'sustainable development' paradigm, which ecological dimension was defined for the first time by the World Conservation Strategy report in 1980. Its popular definition comes from the World Commission on Environment and Development (WCED) or Brundtland Commission, defining the paradigm as an "economic and social development that meets the need of the current generation without undermining the ability of future generations to meet their own needs" (WCED 1987: 43). In developing countries, as rural poverty and remaining natural forest tend to share an overlapping space, it has been advocated by many that goals dealing with poverty and environmental sustainability should be approached in synergy (Adams *et al.,* 2004; McCarthy and Possingham, 2006; Nyberg *et al.,* 2006; Pfund *et al.,* 2008).

Over two decades, practitioners, scholars and politicians have striven to move beyond discourses about "sustainable development", linking environmental conservation with economic development, to actually design alternatives to mere economic processes that resulted from the Breton Woods institutions (Robinson, 2006). In this regard, Land-Use Planning (LUP) is considered as a key instrument for applying sustainable development discourses and accounting for present and future needs of populations (Box 1). Worldwide, planning approaches have evolved towards engaging multiple stakeholders groups in choosing desirable futures and anticipating potential threats to development. However, almost 20 years after the 1992 United Nations Conference on Environment and Development, many challenges remain at the policy-practice interface for land-use planning to achieve actual impact on sustainable development (De Wit and Verheye, 2003; Nassauer and Opdam, 2008).

In Lao PDR, successive policy instruments have been used over the last two decades to respond to conservation - development challenges in relation to on-going land and forest degradation (Lestrelin *et al.,* in press). One of the main goals of the Lao government is to remove the country from the list of the Least Developed Countries by 2020. To do so, in a country with 80% of the population living in rural areas, a clear priority was given to rural development by supporting the transition from subsistence to market-based agricultural practices, as well as protecting forested areas that are valued for their biodiversity and their importance for rural communities' livelihoods. A general consent credits land security to provide incentives for sustainable land-uses (Heltberg, 2002). Theoretically, tenure rights would increase the protection of forest lands with farmers shifting from extensive swidden agriculture to intensive and permanent crops. Extending from land rights principles, the Lao

government has been relying for the past two decades on land-use planning to promote economic development, poverty alleviation and biodiversity conservation.

However, land-use planning efforts have been described as ways to exert greater State control on resources and people (Boehmer-Christiansen, 2002). Critiques have arisen about the prescriptive implementation of land zoning, lacking (i) participative components and skilled district staff, (ii) extension activities to provide alternatives to swidden agriculture, and (iii) monitoring mechanisms to evaluate the outcomes of planning and readjust plans whenever necessary (Alton and Rattanavong, 2004). Some authors have even argued that land-use planning/ land allocation processes have been counterproductive, exacerbating poverty and deforestation trends (Ducourtieux *et al.*, 2005).

Box 1. Land-use Planning definition from the Food and Agriculture Organisation (FAO 1993), aligning with the sustainable development paradigm: "Land-use planning is the systematic assessment of land and water potential, alternatives for land-use and economic and social conditions in order to select and adopt the best land-use options. Its purpose is to select and put into practice those land-uses that will best meet the needs of the people while safeguarding resources for the future. The driving force in planning is the need for change, the need for improved management or the need for a quite different pattern of land-use dictated by changing circumstances".

As land-use planning remains the main land policy instrument in many developing countries, including Lao PDR, there is a need to highlight the caveats that hindered previous attempts and to propose alternative methodologies that effectively engage multiple stakeholder groups in negotiating trade-offs in conservation – development, i.e. improving both conservation of tropical forests and the livelihoods of forest-dwellers. The emergence of participatory approaches as a cornerstone of land management and development programs is linked to the wide recognition of the drawbacks in "intrusive land management strategies" (Agrawal and Gibson, 1999: 630) and the utmost necessity of recognizing the value of local perceptions and knowledge (Chambers, 1983; Gadgil *et al.*, 1993; Agrawal, 1995; Hage *et al.*, 2010). Described by the United Nations Development Programme as the "central issue of our time" (Craig and Mayo, 1995: 2), participation is recognized as the main lever to support policy dialogue and promote the voice of the powerless under the practice of 'community development' (Craig *et al.*, 1990). In addition, the integration of local complexity and priorities in the planning process is expected to facilitate further implementation through the empowerment of local communities (Craig, 2007; Neef and Neubert, 2011). However, certain means need to be defined to avoid rhetoric-only approaches and what Arnstein defined as "empty ritual[s] of participation" (1969: 216).

1.2 Thesis aim and objectives

In the context of Lao PDR, the main objective of my research is to investigate how land-use planning could be applied differently to better manage the ecosystems - livelihood trade-offs through landscape design and land-use negotiations at multiple levels and with multiple stakeholder groups. The thesis is framed by the three following research questions:

- What are the mismatches between international discourses and the local implementation of land-use planning in the uplands of Lao PDR?
- How to facilitate decentralized resource governance through the development of an innovative participatory land-use planning approach?
- What is the importance of land-use planning in translating global and national regulations into local actions?

This doctoral research has been conducted in Lao PDR under a complex institutional arrangement. During a two-year fieldwork I was supported by both the Centre for International Forestry Research (CIFOR) and the IRD (Institut de Recherche pour le Développement) under the Landscape Mosaics project and the CATCH-UP (Comprehensive Analysis of Trajectories of Change in the Uplands) Program. Both programs have been developed in partnership with the National Agriculture and Forestry Research Institute (NAFRI, Vientiane-Lao PDR). The three host institutions, CIFOR, IRD and NAFRI, share the common objective to advance human wellbeing, environmental conservation and equity by conducting research to inform policies and practices. As a member of the transdisciplinary team, I played a key role of catalyst in the project framework by focusing my research on integrating the overall information collected by the project and developing knowledge tools for action-research in PLUP. Throughout this thesis, I have often used the first person of plural ‘we’ to encompass the members of the research team that collaborated during two years of research. Applied research requires many interactions with people from many disciplines and the research network that was built within the team helped developing credible outputs and relevant solutions.

1.3 Thesis structure

A logical framework made of three Parts and seven Chapters was designed for this doctoral thesis to address the three research questions of this thesis (Figure 1).

Land use planning as instrument of sustainable development

The dissertation begins with a diagnostic study that scrutinizes the mismatches between discourses on the benefits of land-use planning and the actual implementation and outcomes of land-use planning in the uplands of Lao PDR. Land governance regimes are addressed at multiple scales, from international theory to national land policies and practices on the ground.

A first paper by Lestrelin *et al.,* (in press) presents the evolution of land-use planning paradigms at the international level before introducing the land policies that have been implemented in Lao PDR over the last three decades. The paper identifies the need for more informed decision-making and enhanced communication among stakeholders. It also calls for further work on designing a land-use negotiation platform.

A second paper extends this policy terrain analysis to provide a field diagnostic for two case studies in the northern uplands of Lao PDR. The main focus was to study how the evolution of village-level land-use planning practices influenced the level of participation of local communities (Lestrelin *et al.,* 2011). This publication also promotes a quantitative assessment of local participation through an innovative method. Finally, the authors propose ways of improvement and stress the need to design tools that can help increasing local participation while adding transparency.

These two publications contextualize the land-use planning issues in Lao PDR and put them in an historical perspective. The knowledge gathered from both national and local empirical studies provide the rationale for further work on designing a land-use negotiation platform.

A negotiation platform for enhanced participation in land-use planning

The second part of this research intends to improve land-use planning practices through action-research. This trans-disciplinary approach aims at overcoming the obstacles and shortcomings presented in the first part of the thesis. The development of a method combining a set of complementary tools leads to a negotiation platform aimed at enhancing participation to land-use planning.

Bourgoin *et al.,* (in press) describe the principles underlying land-use planning, namely, community participation and integration of scales, knowledge and multiple perspectives. The authors further stress the need to develop a boundary-spanning framework to concretely engage local communities in the governance of natural resources. Bourgoin and Castella (2011) propose a learning tool called 'PLUP Fiction' to train members of the village land management committee in land zoning. By providing a common knowledge to villagers that have limited planning experience, this tool avoids the pitfall of a process dictated by local elite. It also engages local communities and enables them to apply collective local knowledge during the planning process.

Finally, Bourgoin (2012) focuses on the importance to assess the quality of land-use planning outputs and to visualize the gap between planning objectives and their local translation into actual land zones. The author demonstrates that iterative land-use negotiations can lead to better informed decisions by land-use planners.

Beyond land-use planning

This section aims at broadening the scope of land-use planning in relation with on-going national and international debates.

Flourishing in the tropical forested countries, REDD (reducing emissions from deforestation and degradation) projects borrow on land-use planning to implement payments for carbon-based ecosystem services. Bourgoin *et al.*, use the negotiation platform developed in Chapter 3 to translate REDD policies into practice, i.e. in the form of carbon-sensitive land-use planning. The authors further study how forest dwellers may benefit from REDD by exploring different scenarios in term of land and carbon tenure rights.

Throughout the research project, field experience and empirical knowledge have been compared with theoretical frameworks and global debates on land policies. Castella *et al.*, conclude by describing the overall approach of participatory land-use planning as a model of science-practice-policy interface.

The thesis concludes (Part 5) with a synthesis of these research articles and a general discussion on the application of the knowledge generated through this study aimed at encouraging sustainable development through the application of action-based research.

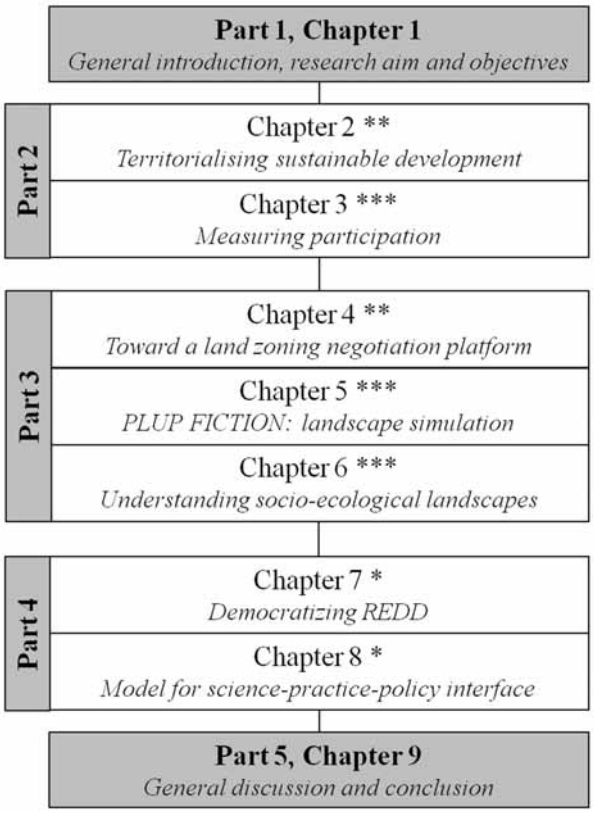

Figure 1. Schematic overview of the thesis structure.
White boxes indicate research article that individually address the main research questions of the study. * in revision, ** in press, *** published.

Part 2. Land-use planning and sustainable development

Chapter 2. Territorialising sustainable development: The politics of land-use planning in the Lao People's Democratic Republic

Chapter 2 is reproduced from the article in press:

Lestrelin G., Castella J-C., and Bourgoin J. (in press) Territorialising sustainable development: The politics of land-use planning in the Lao People's Democratic Republic. Journal of Contemporary Asia.

Plate 2. Morning landscape in the uplands of Phonxay district (Luang Prabang province)

2.1 Abstract

Since the emergence of the sustainable development paradigm in the late 1980s, land-use planning has become a key arena for political debates over society–environment interactions and, in practice, an important means for territorialisation projects. The paper reviews the main planning approaches that have been employed over the past three decades in the Lao People's Democratic Republic, a country that has long been a valuable policy testing ground for the proponents of sustainable development. It highlights three concurrent territorialisation projects that have shaped the history of land-use planning and have fuelled tensions between central and sub-national governments and local actors, national and foreign institutions, and land suitability and sustainability approaches. The paper argues that the latter tensions reflect an important dynamism and reactivity in the planning arena. It concludes that the capacity of land-use planners to adapt to specific contexts and evolving socio-environmental challenges should be harnessed in order to reconcile conflicting approaches to planning and, perhaps, to achieve sustainable development.

Keywords: land policy, land-use planning, sustainable development, territorialisation, Lao PDR.

2.2 Introduction

"Land-use planning is the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land-use options. Its purpose is to select and put into practice those land uses that will best meet the needs of the people while safeguarding resources for the future." (FAO, 1993)

Over the past two decades, the concept of sustainable development has gained important ground in the field of land-use planning (LUP) (Meadowcroft, 1997; Silberstein and Maser, 2000). As a future- and resource-oriented activity, LUP is inherently related to the concept of sustainable development, which concerns the environmental resources and services that humanity should safeguard for future generations (Owens, 1994; Rydin, 1995). As such, LUP has been recognized as a key instrument for achieving sustainable development ever since the concept was institutionalized (WCED, 1987; UNCED, 1992). In the 1960s and 1970s land-use planners were concerned with assessing land development potential and optimizing land allocation between different economic sectors (e.g., Klingebiel and Montgomery, 1961; FAO, 1976). However, with the emergence of the sustainable development paradigm and the idea that unregulated land development can affect essential environmental services (and, hence, threaten the future of humanity), their objective has shifted to creating a sustainable territorial balance between socioeconomic development and environmental conservation (e.g., FAO and UNEP, 1999; Randolph, 2004).

The emergence of global environmental discourses in the late 1980s and the recognition of the diversity of scales involved in the constitution and potential resolution of environmental issues have also contributed to reshaping the practice of LUP. Issues once considered national, calling for national policy intervention, such as deforestation and desertification, have come to be regarded as global environmental issues requiring international or transnational regulation and mitigation (Adger *et al.*, 2001; Meadowcroft, 2002). However, environmental issues remain consequences of socio-ecological processes and interactions, which occur at multiple scales and across scales. Thus, dealing with global environmental issues requires more comprehensive approaches to the various levels of social and ecological organization (Adger *et al.*, 2005; Cash *et al.*, 2006). In response to this growing complexity, LUP systems have rapidly evolved worldwide to include a wider range of scales and actors (Meadowcroft, 2002).

With this wider focus, LUP has become a key arena for political debates over society–environment interactions (Healey and Shaw, 1994; Myerson and Rydin, 1994; Owens, 1994; Hillier, 1999). As Whatmore and Boucher put it, LUP represents "an institutional terrain which is deeply implicated in policing the ontological divide between society and nature" (1993: 176), so that related discourses and policies not only attempt to regulate the way land-based resources are used by society but also reflect and contribute to broader efforts to redefine human relations with nature and reshape the meaning of

‘the environment’. Thus, the practice of LUP entails much more than the straightforward, technical exercise suggested by the opening quote from the Food and Agriculture Organization (FAO) Guidelines for Land-Use Planning (1993). Rather, it is concerned with the territorial projection of particular socio-environmental perspectives and values.

In that sense, LUP constitutes an important instrument for territorialisation projects. Through LUP, states “divide their territories into complex and overlapping political and economic zones, rearrange people and resources within these units, and create regulations delineating how and by whom these areas can be used” (Vandergeest and Peluso, 1995: 387). More generally, LUP assists the efforts of governments and other actors (e.g., development agencies, nongovernmental organizations [NGOs]) in putting into practice particular socio-environmental representations and projects, and assigning people and their activities to the ‘right place’ (e.g., Isager and Ivarson, 2002; Buch-Hansen, 2003; Sowerwine, 2004; Peluso, 2005). Thus, LUP is definitely part of the production and reproduction of the social relations of power, since the plans produced serve the dominant political economy as much as they challenge and reshape existing social configurations (Perry, 2003).
This conceptualization is useful as it moves away from normative representations – e.g., the FAO’s definition of LUP as a politically neutral exercise undertaken by well-intentioned experts – and reconnects the practice to the realities of social organization. It also emphasizes the dynamic nature of LUP and leaves scope for a critical approach to the rationales, discourses and social interactions underlying continuation and change in planning practices. As Perry puts it, “planning is always remaking itself as it is embedded in and responds to a world that itself is always in the process of being remade” (2003: 151). The emergence of sustainable development thinking and the associated paradigmatic and practical shifts in LUP are just one manifestation of these dynamic relations.

This paper applies this conceptual lens to better understand the evolution and current status of LUP in the Lao People’s Democratic Republic (Lao PDR). This country has a specific set of characteristics related to sustainable development which have important consequences for LUP. Firstly, natural resources are central to the livelihoods of much of the population. Urbanization is limited and the economy is still very rural, with 73% of the population living in rural areas (GoL, 2006a). In that sense, the interactions between society and nature can be considered more direct and ‘operative’ than in more industrialized countries (e.g. neighbouring China and Thailand), where significant sections of society have shifted towards non-agricultural activities and migrated to cities. Secondly, Lao PDR is ranked among the poorest countries of the world (UNCTAD, 2008) but is rich in ecological terms (UNEP, 2001; Carew-Reid, 2002). The country is considered a potential hotspot for a ‘poverty–environment nexus’ that links poverty and environmental damage in a mutually reinforcing relationship (Dasgupta *et al.*, 2005; World Bank, 2006). With natural resources as a key source of livelihood for a major part of the population and the threat of a downward spiral of poverty and environmental degradation, Lao PDR represents an ideal ‘laboratory’ for policy experimentation

aimed at both fostering socioeconomic development and preserving the environment. This situation has attracted a great deal of attention from the international community and, over the past two decades, the number of international development agencies (IDAs) and NGOs involved in rural development, natural resource management and LUP has increased rapidly.

Based on a review of policy documents and project reports and a series of interviews conducted with government officials and staff from IDAs, this paper highlights three successive stages that have characterized LUP from the establishment of the Lao PDR, in 1975, until 2010. It further describes how LUP practices in the country are shaped by tensions between different actors and competing approaches. In doing so, the paper shows that in Lao PDR LUP is a dynamic and reactive arena, and that related policies are constantly evolving to suit specific contexts and account for reported deficiencies. From there, the paper argues that the capacity of the LUP practitioners and policy makers to learn from experience should be harnessed to improve future implementation.

2.3 Land-use planning and territorialisation in Lao PDR: A historical perspective

Reflecting the general evolution worldwide (Meadowcroft, 2002), LUP efforts in Lao PDR have strongly intensified and diversified over the past decades. Starting at different times but extending to the present day, three main territorialisation projects can be identified, each one reflecting specific objectives, shaped by different sets of actors, and translated into different LUP initiatives (Figure 2).

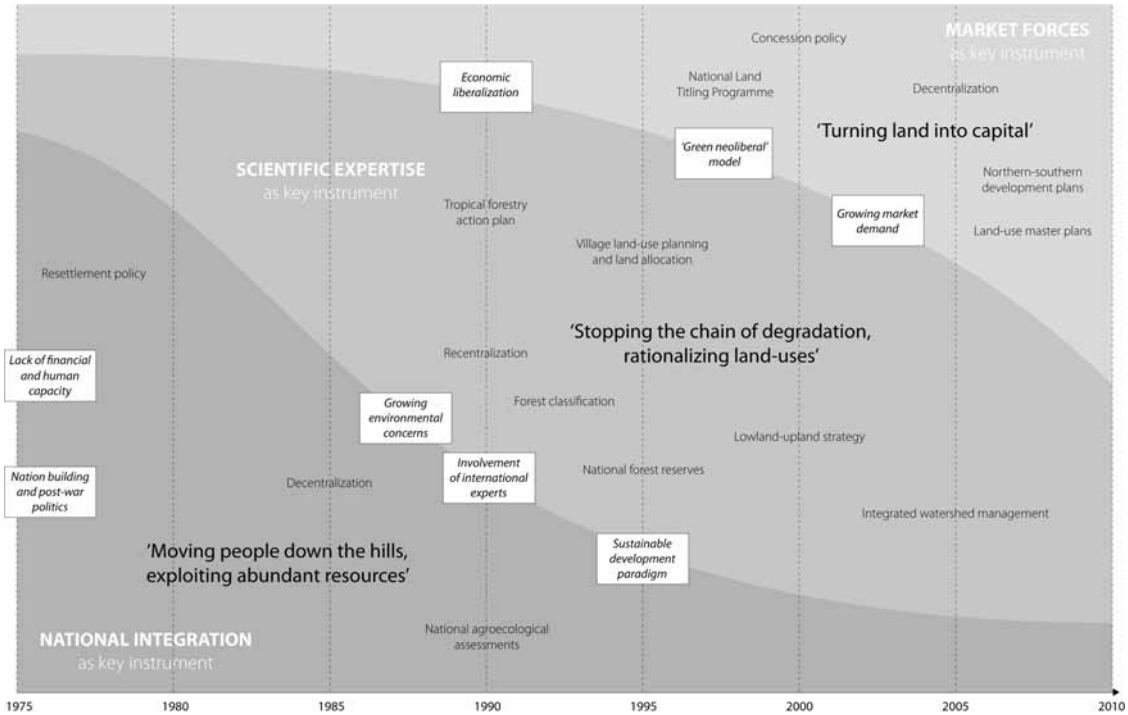

Figure 2. Territorialisation projects and key LUP instruments in Lao PDR (1975–2010).

2.3.1 Moving people down from the hills and exploiting abundant resources

In the immediate post-war period, LUP was highly reflective of a desire from the new political leaders to secure national territory, strengthen national integrity and reinforce State control over key resources (Stuart-Fox, 1997; Jerndal and Rigg, 1998; Goudineau, 1997; 2000). After years of armed conflict (1946-1954 and 1959–1975), the revolutionary government was facing a number of key challenges. The French colonial administration and the United States had exploited ethnic divisions in order to fight the North Vietnamese troops stationed in the country and the Laotian communist rebellion. The government urgently needed to increase political control over remote and potentially subversive populations. The creation of a socialist State also meant that disparate and often poorly connected ethnic minorities had to be gathered into a unique national project. To some extent, political leaders also had to fulfil the promises of development and social justice made to the upland minorities (who, in exchange, had played a key role in securing the victory of the communist rebellion). With very limited financial resources and human capacity,[1] the main strategy envisaged was that of internal resettlement. Thus, although no official policy was formulated before the late 1980s, from 1975 the Lao government started pushing remote upland communities to relocate along roadsides, river banks and other more accessible areas (Evrard and Goudineau, 2004).

Although displacement for security reasons became much less frequent with time, the resettlement strategy persisted as a means of speeding up nation building and cultural integration, facilitating State service delivery and market access, and limiting shifting cultivation and opium production (Goudineau, 2000; Evrard and Goudineau, 2004; Baird and Shoemaker, 2005; 2007). In 1989, the Village Relocation and Consolidation strategy was finally established (GoL, 2008), which advocated the displacement and merging of villages with less than 50 households and the development of State services (e.g., agricultural extension, schools, health centres, power and clean water) in the new sites. The strategy was later reaffirmed with the introduction of a 'focal site' approach in the 1998 National Rural Development Programme.[2] Over the past two decades, the pace of internal resettlements from the hills to the valleys and plains has remained steady. Yet, although the stated logic was to create development centres, due to an enduring lack of investment capacity, provision of State services has extended little beyond the gathering of remote populations into more accessible areas (Rigg, 2005).

Another key challenge also strongly influenced Lao PDR's early LUP efforts. With a peasant economy barely transformed during the colonial period, but seriously damaged by many years of war (Dufumier, 1980), the new political leaders were heavily dependent on economic aid from other socialist countries (i.e., the Soviet Union and, to a lesser extent, Vietnam). Failed attempts at agricultural collectivization did not improve the situation and, with the drying up of Soviet aid in the

[1] Around 300,000 people – including the majority of the country's intellectuals, well-qualified cadres and technicians – left the country in the few years following the 1975 communist takeover (Stuart-Fox, 1986).

[2] Through this ongoing process, 87 focal sites were expected to become the recipient for 1,200 villages and 450,000 people (12% of the country's rural population), half of whom would come from displaced communities.

mid-1980s, the government had to find other sources of revenue. This prompted a radical economic reform (*chintanakan mai* or 'New Economic Mechanism') that began the process of transforming the country into a market economy. By doing so, the government effectively gained access to new sources of funding, loans and revenue from international finance institutions and foreign investors (Stuart-Fox, 2005).

With the support of new 'development partners' such as the World Bank, the UN and various IDAs, the Lao authorities were also able to engage in country-wide assessments of natural resources (e.g., GoL, 1992; World Bank, 1993) and agroecological potential (e.g., FAO, 1986; 1989) which would constitute the foundation of the nation's socioeconomic development. Building on these assessments and a broader agenda put forward by the FAO, the United Nations Development Programme (UNDP), the World Bank and the World Resources Institute (WRI), the Tropical Forestry Action Plan (TFAP) was one of the first joint efforts of the Lao government and major IDAs towards LUP. The plan was shaped by the resolutions of the first national forestry conference, held in 1989 with support from the FAO, the World Bank, the Asian Development Bank (ADB) and the Swedish International Development Cooperation Agency (SIDA). The TFAP recommended the implementation of forest conservation and tree plantation measures over an area equivalent to 70% of the country. It also mentioned the planned resettlement of two thirds of the population engaged in shifting cultivation: an estimated 170,000 households (Evrard and Goudineau, 2004).

"The Import-Export Company No. 4 of Luang Prabang was created in 1985, when support from the Soviet Union receded, to export agricultural and natural products and balance importations from other countries. Three State companies (no. 1, 4 and 6) shared a common mandate for collection of agricultural products (e.g., soybean, groundnut, sesame) and non-timber forest products (NTFPs) (e.g., cardamom, benzoin, sticklac) in the whole northern uplands. These products would be exchanged against other goods in neighbouring China or Thailand via Burmese intermediaries. They were doing business in a barter economy. On the one hand, they were giving away seeds, barbwire and other inputs to local subsistence farmers against their agricultural products and NTFPs. On the other hand, they were exchanging these products against cement, steal, tractors or motorcycles with China. When possible, Thai Baht notes were welcome for payroll of government staff. There were not enough Lao Kip bank notes available at that time. Due to poor road and transportation quality, light products were preferred over heavy ones and local people spontaneously brought wildlife to the company's collectors. Wildlife was the only product paid for in cash. During the first years, Company No 4 could export annually about 300 deer antler, 4,000 tortoiseshells, 50 tonnes of pangolin scales, etc. to China, which provided about the same gross profit as vegetal NTFPs. Total profit from NTFPs (including wildlife) was about the same as from agricultural products. But after only a few years, the natural products became scarce and the company suffered great losses from agricultural product sales (e.g., Job's tear, soybean and groundnuts) because of poor management and storage facilities. Combined with the end of its monopoly on agricultural business, these issues led the company to reorient its activities towards other businesses (e.g., car sales) and finally to dissolve in 1991."

Former head of collectors at the Import-Export Company No. 4 of Luang Prabang (1986–1988). Interviewed on 20 August 2010.

Box 2. History of the Import-Export Company No.4.

Limited human and financial capacities, poor infrastructure and the constraints on centralized resource control imposed by rugged topography pushed the central government to transfer some responsibilities to lower administrative levels in an effort to accelerate rural development and reduce socioeconomic inequalities between provinces (UNDP, 2002). Significantly, decentralization policy of the late 1980s redefined the provinces as strategic units for the elaboration of socioeconomic development plans. Districts were identified as responsible for planning and budgeting provincial plans, and villages were charged with implementation. Provincial governments gained significant power and autonomy as they were provided with greater control over budgets, revenues and development plans and given permission to pursue trade agreements with the private sector (Stuart-Fox, 2005). As a result, between 1986 and 1991, plundering of natural resources (especially timber and wildlife) became institutionalized by State companies and subnational administrations (Box 2). However, rapid depletion of natural resources, growing mismanagement, corruption and, in some extreme cases, a complete collapse of State services forced the central government to backtrack and engage in a radical recentralization process, through the 1991 Constitution.

2.3.2 Stopping the chain of degradation and rationalizing land use

As a reaction to both the previous period of rapid resource depletion and the growing involvement of IDAs in Lao PDR, the 1990s were marked by a transformation of the LUP arena. Although the TFAP was quickly aborted after being evaluated negatively in reports prepared by the FAO, WRI and various international NGOs (Sizer, 1994; Goldman, 2001), it introduced a new set of linkages that would characterize most LUP initiatives: IDAs became key partners of the Lao authorities in developing planning tools and land-use plans; and ‘scientific’ expertise replaced national integration as the main instrument for developing the country (Figure 2). Sustainable development became a key objective for policy-makers, following the evolving concerns of the international community (e.g., GoL, 1993; 1999; 2003).

This emphasis on LUP for sustainable development, however, was not only motivated by a simple desire to combine sustained social welfare with environmental preservation; it appeared imperative for dealing with an immediate threat. As described by Lestrelin (2010), the government and several key IDAs believed that Lao PDR’s development was threatened by a ‘chain of degradation’ stretching from upland shifting cultivation, population growth, deforestation and increased soil erosion to siltation of lowlands and reservoirs. While questionable, this narrative reinforced the importance of the sustainable development paradigm in mainstream development discourses and represented a key rationale for the intensification of LUP efforts throughout the country. As stated by a Ministry of Agriculture and Forestry (MAF) official:

“During the past 20 years thousands of hectares of forest have been cleared for agricultural expansion. Considerable pressure is thus placed on natural resources and forests to meet the increasing needs of

an expanding population and to satisfy governmental policy of improving living standards. Therefore, emphasis will be placed on ensuring proper land-use planning and sufficient land allocation for all rural people; protecting catchment areas to reduce erosion and ensuring a more even flow of water." *(Khamhung, 2002: 252)*

In other words, evading the assumed 'chain of degradation' and achieving sustainable development necessitated a 'rationalization' of land-use. In practice, this also required a delineation of eco-zones, balancing development and conservation purposes on the basis of scientific assessments (e.g., soil erosion risks, ecological degradation and recovery rates) (Goldman, 2001). Thus, the Prime Minister's Decree No. 169 (1993) established a village-scale land zoning system that divided land into five categories of forest: 'protection', 'conservation' and 'regeneration' forests, where economic activities are prohibited; 'production' forest, where limited logging and collection of forest products are permitted; and 'degraded' forest, which can be allocated for tree plantation, livestock farming or permanent agriculture.

Through the delineation of 'National Production Forests' by the MAF[3] and, more importantly, the Land-Use Planning and Land Allocation programme (LUPLA), this classification became the main instrument of an 'area-based' approach to development in Lao PDR (Rigg, 2005). First trialled in the early 1990s with support from SIDA, LUPLA became one of the main elements of the country's LUP system and a key mechanism in the government's efforts to eradicate shifting cultivation (Lestrelin, 2010). In its early form – often referred to as Land and Forest Allocation – the programme involved identification of village boundaries and demarcation of land to be conserved or regenerated as forest (LSFP, 1997). Village forest areas were further subdivided according to the five official categories of forest. The process became gradually more elaborate, involving the individual allocation of agricultural plots to village households and the zoning and mapping of village land (Figure 3) according to slope gradients and forest types (LSFP, 2001).

At the same time that the forest classification system was established, a protected area system of 18 National Biodiversity Conservation Areas was developed. The reserves were expanded to 20 areas (covering 12.5% of the country) in the late 1990s. Then, in line with the shifting concerns of major environmental organizations (i.e., from biodiversity to multipurpose conservation areas), they were renamed National Protected Areas in the early 2000s. The development of a national conservation strategy and the identification of the reserves involved direct support from international organizations like SIDA, the International Union for the Conservation of Nature (IUCN), the World Wildlife Fund

[3] Since the mid-1990s, the MAF – with support from the World Bank and the governments of Sweden and Finland – has delineated 106 national production forests covering about 3.2 million hectares. Half of these areas have been targeted by projects on participatory forestry and forest certification (GoL, 2005). According to an MAF official, delineation is based on a set of criteria related to slope, availability of water resources and potential for socioeconomic development (Khamphay Homsisavath, personal communication, 10 November 2009).

(WWF) and the Wildlife Conservation Society (WCS). During 1993–1994, 12 different international organizations were engaged in funding and managing the National Protected Areas (Fujita, 2004).

Figure 3. Village land-use planning map following LUPLA implementation (Paklao, Luang Prabang province).
Colour codes: dark green = national protected area; light green = village conservation forest; light brown = protection forest; blue = regeneration forest; grey = production forest; beige = allocated agricultural land; dark brown = reserved agricultural land.

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Finally, a number of governmental strategies were designed to serve as broad-scale frameworks for LUP in the country. For instance, the 1999 Strategic Vision for the Agricultural Sector promoted a two-tiered rural development strategy which, in the lowlands, emphasized farming diversification, credit development and the promotion of agribusiness while, in the uplands, favoured largely environmental conservation and poverty reduction through land zoning and community-based land management. In line with the objective of ‘rationalizing’ land-uses, the strategy contended that a key

step for achieving sustainable development in the country consisted in systematic "land-use and agro-ecological zoning […] based on biophysical, landform, erosion risk and other criteria" (GoL, 1999: 61). The lowland–upland differentiated LUP treatment was reiterated in the National Growth and Poverty Eradication Strategy, which focused on the 47 poorest upland districts of the country and aimed at "improving access to essential factors of development and strengthening a comprehensive, poverty-focused planning process at the district level" (GoL, 2003: 9).

2.3.3 Turning land into capital

The late 1990s marked another important shift for LUP in Lao PDR. Although sustainable development remained a central concern for planners, the relative importance of 'scientific' expertise and research-development projects as an instrument for change was reduced. With the 'green neoliberal' development models put forward by donors like the World Bank and the ADB (Goldman, 2001) and a growing demand from the (mainly foreign) private sector to gain access to the country's land and natural wealth, market forces have come to be considered another key instrument for facilitating sustainable development (Figure 2). Hence, the focus of LUP has shifted from 'rationalizing' existing land-uses to identifying 'empty' space or freeing space[4] for the development of large scale mining, hydropower, plantation and agribusiness concessions. Through this process, Lao PDR has effectively become a new 'resource frontier' for global capital flows and investment (Barney, 2009).

A first step in this process was the establishment of a National Land Titling Programme in 1997. Supported by the World Bank and AusAID, the Programme was aimed at allocating secure land titles in urban and peri-urban areas and, thereby, providing incentives for land holders to invest in productive and market-oriented land-uses (Dixon and Lunnay, 2010). The project yielded positive results in terms of legal and administrative capacity building. However, by the mid-2000s, it reached an institutional stalemate as the very specific objectives and approach put forward by the World Bank had become less and less in line with the broader vision of the land sector adopted by the Laotian government (see below). At the same time that the Land Titling Programme was implemented in and around urban centres, in rural areas, granting land concessions became a key policy instrument to make supposedly unutilized or underutilized land productive while achieving goals in other stated government policies (Hanssen, 2007): (i) to eradicate shifting cultivation by allocating swidden land to (mainly foreign) companies that would invest in modern and more productive technologies; (ii) to aggregate small and remote villages closer to main roads while allocating large tracts of remote land to more profitable industrial plantation projects; and (iii) to provide opportunities to upland ethnic minorities to develop or 'civilize' (La-orngplew, 2010).

[4] Both practically (e.g., resettlements) and figuratively (e.g., policies that define shifting cultivation land as idle after 3 years of fallow).

In 1994, the Prime Minister's Decree No. 186 conferred to district administrations the power to authorize land leases up to 100 ha of State forest land. Provincial administrations were made responsible for land leases of up to 1000 ha, while larger concessions would require the approval of the National Assembly. In many cases however, these regulations have been ignored, with concessions of thousands of hectares granted by provincial governments. As a result, in May 2007, the Prime Minister announced a moratorium on the granting of all new large-scale land concessions. Serious concern had been voiced by senior government officials about the fact that very little of the income supposedly generated by land concessions ended up in State coffers. In addition, a growing number of reports highlighted negative socioeconomic and ecological impacts of land concessions (Dwyer, 2007). Reasons for inadequate implementation of land policy were found in a lack of capacity within responsible State institutions, on the one hand, and a perceived lack of incentives to correctly implement the rules and regulations, mainly among provincial and district authorities, on the other hand.

The National Land Management Authority (NLMA), created four years earlier in 2003, really emerged as an operational agency after the moratorium, and took the lead in systematically inventorying State land leases and concession contracts passed with private companies. As an outcome of this process, a decree was made in 2009 that aimed to provide clear guidelines about how to 'turn land into capital' (Prime Minister's Decree No. 136). It stressed the need to refine existing rules by establishing a proper filing, monitoring and reporting system, to harmonize the price of land rent across the country, and to monitor the implementation of regulations. It also made the NLMA responsible for classifying potential concession areas, based on biophysical indicators such as soil and vegetation types. Under the decree, concessions are only allowed to plant industrial crops deemed suitable for each parcel of land. A number of provincial land-use master plans were thus designed by the NLMA to identify potential land available for concessions and provide guidance to the overall territorialisation project (GoL, 2010). At the national level, the Ministry of Planning and Investment, with support from the Province of Yunnan (China) and the ADB, also developed two regional southern and northern master plans for industrial economic development (e.g., Shi, 2009).

At the same time that land concession policy and practices were revisited, the 'p' of 'participation' was added to LUP to create a new approach called Participatory Land-Use Planning (PLUP). Drawing lessons from reported deficiencies in LUPLA and reflecting concerns over concession development and land seizures (Lestrelin *et al.*, 2011), PLUP includes several major innovations. It pledges to better coordinate intervention of governmental organizations; to facilitate the integration of land-use plans developed in villages, village clusters and districts; and to improve the collection, management and storage of spatial data (MAF and NLMA, 2009). The possibility of communal land titling is also introduced as a tool to preserve existing land management systems and prevent land seizures.

Looking at the broad picture, Lao PDR's LUP system appears to have evolved towards an increasingly complex structure that is expected to facilitate sustained socioeconomic development and poverty reduction, while allowing for the preservation of forest, soil, biodiversity and water resources. Yet, the rapid pace at which new concepts and policies have been developed in response to emerging issues and goals raises important questions as regards to the actual functioning of the overall system: Is this system constituted by a coherent and unified set of actors and approaches? Do different territorialisation projects coexist without generating particular conflicts of interest? The following section addresses these questions and highlights a number of tensions – between stakeholders, policies and paradigms – that play key roles in shaping the way LUP initiatives are designed, interpreted and implemented on the ground.

2.4 Managing trade-offs in land-use planning: An emerging complexity

2.4.1 Tensions between central and sub-national governments and local populations

The decentralization and recentralization processes of the late 1980s and early 1990s have had significant impacts on central–local relations. While decentralization provided provincial and district governments with significant power and autonomy, the ensuing recentralization seriously reduced local democratic participation and the power of local governments (Stuart-Fox, 2005). With the abolishment of the elected people's councils and administrative committees (at village, district and provincial level), district and provincial administration became the exclusive responsibility of corresponding Party secretaries. The newly appointed provincial governors were then brought into the Party's Central Committee, while district governors were charged with drawing up short lists of acceptable candidates – generally Party members – for the election of village chiefs. With a return to centrally allocated budgets, provinces and districts were deprived of financial autonomy. At the same time, however, the authority and influence of the provincial governors grew significantly with their integration into the Party's Central Committee. As a main outcome of this decentralization-recentralization processes, the Party effectively strengthened its political power and involvement in administrative matters at the subnational level.

A decade later, under the influence of IDAs like the UN and Sida, the tide turned back again to decentralization. After the publication of official instructions and recommendations by the Prime Minister's Office, a Law on Local Administration was promulgated in 2004 which established a legal basis for decentralized governance. In particular, it allowed for setting up popular elections of local government bodies in urban areas and provided for the emergence of consultative bodies at the village and district levels (Braathen and Sköld, 2004; GPAR, 2004). The law also reiterated the governance structure advocated in the late 1980s (i.e., provinces as strategic planning units, districts as planning and budgeting units, and villages as implementation units). Through this process, provincial, district

and village authorities regained significant autonomy and power. A move was also engaged towards more democratic governance at the local level.[5]

As a consequence of these administrative reconfigurations, the current patterns of rural development in Lao PDR are, broadly speaking, driven by objectives and strategies set at the central level and largely reinterpreted at the subnational level on the basis of existing economic opportunities and constraints and the perspective of provincial and district leaders. The case of rubber concessions illustrates this point. In particular, the way companies' demand for large-scale concessions are dealt with is significantly different at national, provincial and district levels. As suggested by Dwyer (2007), the small number of concessions in northern provinces is linked to the preference of provincial authorities for contract farming or smallholder production.[6] In contrast, in the south, Vietnamese companies may negotiate concession agreements directly with the central government and put pressure on provincial and district officials to gain access to extensive tracts of land for large, private rubber concessions (Baird, 2010). Subnational governments and agencies can thus play a key role in shaping the way rubber production contracts and concessions are negotiated between farmers and companies (Fox and Castella, 2010). Hence, they greatly influence local land-use patterns.

Yet, this perspective should not mask the capacity of local populations and their leaders to resist, negotiate and reinterpret plans defined at higher levels. The relationship of local populations with the authority of district and provincial agencies is imbued with everyday forms of resistance such as passive noncompliance, foot-dragging and deception (Scott, 1985). Although they do not directly challenge the planning process, these practices certainly compromise the integrity of the plans. In the case of LUPLA, resistance often materializes through disappearing village land-use maps and registries or through collective reinterpretations or 'memory losses' in relation to land-use regulations.[7] Thus, explicit land-use maps may well be designed with local representatives and posted at the entrance to villages (Figure 3), but the reality of land-use often reveals significant differences from the plans (Lestrelin *et al.*, 2011).

Resistance, however, is not the only way for local actors to have an effect on plans. As argued in the introduction, rather than an independent top-down process, LUP is influenced by all sorts of social relations. Local actors can build on their social networks and political alliances to weigh on decisions taken at higher levels and, in particular, push land-use planners to account for local claims. Perhaps

[5] This move remains to be confirmed on the long term. As a matter of fact, if decentralization figured as an important theme in the Sixth National Socio-Economic Development Plan (2006-2010), it appears to have moved to the background (if not completely disappeared) in the Seventh National Socio-Economic Development Plan (2011-2015).

[6] Generally under the form of 2+3 agreements, where villagers provide land and labour and the companies provide inputs, technical knowledge and market channels.

[7] 'Improving data storage and retrieval systems' is recurrently mentioned as an important objective for land-use planners in Lao PDR (e.g., LSFP, 2001; MAF and NLMA, 2009).

more importantly, implementers frequently adapt the plans in order to account for both perceived local constraints and past experiences of failure. For example, during an interview conducted in 2003, the director of Luang Prabang's District Agriculture and Forestry Office acknowledged that, in some cases, his agency did not implement national land regulations because they were considered 'unrealistic'. Discussing the case of an upland village researched by one of the authors, he mentioned a new regulation that would prohibit agriculture on slopes steeper than 30%. "If we had implemented such a regulation there", he said, "the villagers would not have any land left for agriculture".

Overall, LUP in Lao PDR is far from straightforward and is very much contingent on the way central policies are translated into plans that fit the perspectives and interests of provincial and district officials and that are further reinterpreted, resisted and negotiated locally. Hence, as Li argues, while broad-scale planning schemes play an important role in moulding the general conditions for local decision making (e.g., closing or opening up opportunities for livelihoods), the actual outcomes of such schemes are largely determined by local "practices of compromise and collusion [that] fill the gap between project plans and on-the-ground realities" (2005: 391).

2.4.2 Tensions between national and foreign institutions

Another set of tensions has emerged in relation to the growing involvement of the international community in the planning sector. From the outset, the development of this sector has been a case of "mimetic institutional isomorphism" (Lambin and Meyfroidt, 2010: 115). Initially modelled on examples found in neighbouring Vietnam (Stuart-Fox, 2005), planning institutions have rapidly evolved under the influence of Western development agencies. In 1986, a critical and enduring lack of funds pushed the Lao government to implement wide-ranging reforms towards a progressive liberalization of the domestic economy. In order to facilitate the process, foreign experts were sent by international organizations like the World Bank, the International Monetary Fund (IMF) and the ADB to contribute to the drafting of regulations and strategies in various sectors.[8] In the field of environmental planning, the UNDP and the World Bank directly contributed to the design of the TFAP (1989) and the first National Environmental Action Plan (1993). They have also strongly influenced the creation of laws and decrees on environmental management – e.g., Prime Minister's decrees No. 67 (1991) and No. 169 (1993), the Forestry Law (1996) and the Environmental Protection Law (1999). Similarly, through bilateral and multilateral projects, international organizations have become involved in the operations of various ministries. In 1999, the Forestry Department of the MAF was thus hosting at least 50 international projects, including the Lao-Swedish Forestry Programme, the Lao-ADB Commercial Tree Plantation Project and the World Bank-Government of

[8] Reflecting the influence of the international community, the set of reforms introduced through the 'New Economic Mechanism' follows closely the principles established by the 'Washington Consensus' of the World Bank, the IMF and the US treasury (Rigg, 2005; 2009).

Finland Forest Management and Conservation Project (Goldman, 2001). Accordingly, financial assistance from multilateral and bilateral development agencies gradually increased from the early 1990s to constitute 92% of the central government expense in 2007 (Table 1).

	1985	**1990**	**1995**	**2000**	**2005**	**2006**	**2007**	**2008**
% of GNI	1.7	17.2	17.5	16.9	11.7	10.9	9.6	9.3
% of central government expense	-	-	41	50	67	87	92	84
US$ per capita	10.8	35.4	63.8	51.9	51.3	60.8	65.0	79.9

Table 1. The portion of foreign aid in the Lao economy.

Note: estimations of central government expense include the total remuneration, in cash or in kind, payable to employees of central government agencies in return for work (IMF 2001).
Sources: DGCD (2002); GoL (2006b); World Bank (2010)

Due to the heavy presence of IDAs in ministry departments and the strong reliance of the development sector on foreign support, many policy decisions – including LUP initiatives – have to be negotiated with donors. In this regard, the principal subject of contention is the question of internal resettlement. As described by Baird and Shoemaker (2005) for instance, organizations like the Japan International Cooperation Agency (JICA) and SIDA – two of the country's largest donors – have taken a strong stand against resettlement, raising awareness among other donors and attempting to influence policy making on this issue. As has become usual in the world of development, conditionality is also employed, with donors imposing their procedures and values as preconditions for grants, loans and investments (Jones and Hardstaff, 2005). These forms of negotiation – over resettlement, food security, environmental planning and management issues – culminate in the case of large-scale infrastructure projects. For instance, the World Bank's guarantee for a US$ 1.45 billion loan for the Nam Theun 2 hydropower project was made conditional upon the commitment of the Lao authorities to issue and revise a number of laws, establish new government agencies and facilitate participation of the affected populations in planning and monitoring activities (Singh, 2009).

The significant economic and bargaining power of IDAs does not mean that the role of the Lao government is one of simple obedience. As Stuart-Fox describes, responses to international pressure can sometimes be simple demonstrations of good will which engage the government only superficially:

"Discussions take place, usually with middle-level technocrats who speak English; arguments for change are laid out; there is agreement over likely benefits – and then nothing is done. Or perhaps something does happen. A new law is promulgated, new regulations are introduced, and a presidential or prime ministerial decree is announced. […] But nobody takes any notice. Implementation is minimal, but the government can point to its good intentions." *(2006: 72)*

The relationship between the Lao government and IDAs, therefore, does not follow a simple top-down diffusion model; neither does it imply bilateral negotiation. Another consequence of the significant influence of IDAs is that a multitude of actors have emerged in relation to new planning scales and issues. In 1993 for instance, the establishment of the Science, Technology and Environment Organisation (STENO) was attendant with the drafting of a National Environmental Action Plan by World Bank consultants. With significant support from UNDP and SIDA, STENO was later reformed as the Science, Technology and Environment Agency (STEA) and moved into the Prime Minister's Office. Although the autonomy of agency was significantly reduced, it remained a key institution responsible for guiding environmental policy and planning, and pushing related legislation through the National Assembly – including the UNDP-supported Environmental Protection Law. In 2007, STEA was restructured again and became the Water Resource and Environment Agency (WREA). Under the encouragement of UN agencies, and reflecting concerns about the impacts of large scale private concessions (GoL *et al.*, 2009), the mandate of the agency was widened to include environmental and social impact assessment and issuance of licences to companies involved in mining, hydropower and plantation.

The emergence of a national 'land concession issue' has also had significant repercussions for land administration. In 2001 for instance, the Department of National Land-Use Planning and Development (DONLUPAD) replaced the National Land Management Committee, which had been established in the mid-1990s in relation to the World Bank and AusAID's Land Titling Programme. One of DONLUPAD's main objectives was "to advise the Prime Minister on the need for cancellation or suspension of land concessions and land leases previously authorized by provincial governors" (Prime Minister's Decree No. 237, Article 3, 2001). The creation of the department reflected central concerns over provincial autonomy and the 'uncontrolled' development of private concessions. In 2004, DONLUPAD merged with two departments of the Ministry of Finance and was renamed the National Land Management Authority (NLMA). At the same time, an amendment to the Land Law made the organization responsible for handling land management issues and designing national land-use master plans.

In a largely foreign-funded development sector, these new institutions – the NLMA and WREA – compete with each other and with the more 'traditional' recipients of foreign support like the MAF. They also put forward different agendas which give value to land through different processes (e.g., individual land titling, nationwide zoning of potential for land concessions, environmental certification). In addition, IDAs themselves do not necessarily put forward a unified agenda[9] – see for instance Baird and Shoemaker (2005; 2007) on the internal resettlement issue. Thus, the context

[9] Despite remarkable efforts to better coordinate their actions through regular round table meetings and joint working groups organized with government agencies under the Paris and Vientiane

within which LUP initiatives are designed and implemented is one of complex, multilateral negotiations and trade-offs between a diversity of stakeholders.

This highly complex process – through which plans are defined, contested and reinterpreted by a diversity of parties – is far from being trivial. Disconnections, if not direct competition, between the territorialisation projects of LUP agencies with overlapping geographical and temporal focuses can indeed have very negative consequences at the local level. As described by researchers and development workers (e.g. Romagny and Daviau, 2003; Evrard and Goudineau, 2004), non-coordinated planning and intervention between provincial and district governments, in charge of village resettlement plans, and Agriculture and Forestry services, responsible for LUPLA, often engenders critical land issues. For instance, a study conducted by Lestrelin and Giordano (2007) shows that the cumulative effects of LUPLA and the Village Relocation and Consolidation programme in a village of Luang Prabang province have been a ten-fold increase in population density per unit of agricultural land and a rapid degradation of farmland over the past 25 years. As further described by Evrard (2004) in a countrywide review of case studies, with insufficient land reserved for new families and potential newcomers, villagers resettled after LUPLA implementation often have to cultivate land illegally or purchase land to early settlers in their recipient village. This issue tends to generalize and aggravate in the recent context of allocation of large land concessions to private companies in villages were LUPLA has already been implemented. In many cases, former land-use plans are just ignored, demonstrating the poor binding value of the contract linking the different parties involved in the LUPLA (Dwyer, 2007; Hanssen, 2007; Baird, 2010). In the best cases, new land-use plans are designed with the support of private companies, allowing the latter to reserve large tracks of 'degraded forest' later reclaimed for plantation concessions.

2.4.3 Tensions between land suitability and sustainability paradigms

Another important area of tension has emerged between proponents of land suitability and sustainable development approaches. There are indeed critical divergences between the two models. The key objectives of the land suitability approach are to assess land development potential and allocate land for different economic purposes. This approach takes a sectoral perspective which engenders a clear partitioning of institutional mandates and a multiplication of the institutions involved in land management (i.e., one institution per land-use type). Contemporary applications of this approach can be found, for instance, in land and crop suitability maps which, in the medium term, are expected to be important land management and planning tools. These maps – based on satellite imagery analysis and local soil and topographic surveys – are prepared by the National Agriculture and Forestry Research Institute (NAFRI) and provided to lower administrative levels in order to inform provincial and district LUP and guide the allocation of land concessions. With support from SIDA, NAFRI has also developed an Agro-Ecological Analysis and Zoning (AEA-AEZ) approach (LSUAFRP, 2004;

NAFRI, 2006), which involves identification and delineation of different agroecological zones at the district scale, description of the agricultural systems present within the different zones and identification of the main biophysical and socioeconomic constraints and opportunities for development. While not an official planning instrument per se, the AEA-AEZ approach has nevertheless been applied for defining agricultural extension and land improvement activities in several districts. These two instruments – land suitability mapping and AEA-AEZ – find their roots in work conducted by the FAO during the 1970s (e.g., FAO, 1976; 1978) and reflect the 'old' LUP paradigm focused on assessing land development potential and optimizing land resource allocation.

In contrast, the key objectives of LUP for sustainable development are to account for the multidimensionality of livelihoods and to preserve land-use options for future generations. This approach attempts to integrate different economic sectors and planning scales, promoting coordination and shared mandates between institutions. For example, the Department of Planning of the MAF has developed an Integrated Watershed Management (IWM) approach in coordination with the Mekong River Commission (MRC) and the Danish International Development Agency (DANIDA). From 2002, IWM was piloted in five watersheds and is currently implemented in the Nam Ngum watershed. The approach is based on analogies between various administrative and biophysical levels (Pravongviengkham *et al.*, 2005). Provincial authorities are responsible for the definition of strategic plans at the river basin scale – i.e., identification of watershed units and delineation of conservation and economic development zones. On this basis, district authorities are responsible for developing management plans at the watershed unit scale, budgeting and, in coordination with village development committees, implementing the plans. In line with this approach, the Department of Forestry has also engaged in the delineation of National Watershed Protection Forests throughout the country since 2007. Compromises have to be found between superimposed planning layers and scales, between the two normative land management approaches – suitability and sustainability – and their proponents. In a context of competition between governmental agencies, these compromises often materialize through the creation of cross-institutional committees and advisory groups (Figure 4). Thus, the tension between land suitability and sustainability paradigms brings additional players and complexity into the negotiations described above.

2.5 Discussion and conclusions

The conceptual approach employed in this paper provides valuable insights into the various socio-environmental projects that have shaped the history of LUP in Lao PDR. It also allows reflection on the sources of contention between the country's planning actors. As described above, three concurrent territorialisation projects have engendered a diversity of LUP initiatives. In the first of these projects, nation building efforts during the early years of the Lao PDR directly influenced the design of an extensive internal resettlement programme from the remote uplands to the valleys and plains. Also,

decentralization was carried out for the purpose of boosting rural development. Finally, countrywide agroecological assessments were conducted, with the assistance of major IDAs, aimed at identifying potential sources of revenue for the national economy. In the 1990s, another territorialisation project emerged out of growing environmental concerns, the increasing involvement of foreign experts and the rapid diffusion of the sustainable development paradigm. Various land zoning, land-use classification and land allocation programmes were thus designed and implemented throughout the country for the purpose of rationalizing land-uses and limiting environmental degradation. Recentralization was also pursued partly in response to land mismanagement at the sub-national level. More recently, a third territorialisation project has emerged as a sequel to the economic reform of the mid-1980s and under the influence of neoliberal ideas put forward by international donors. A new decentralization agenda was established while concession-related policies and large-scale land-use plans were created in order to facilitate private land development and the establishment of large capital projects.

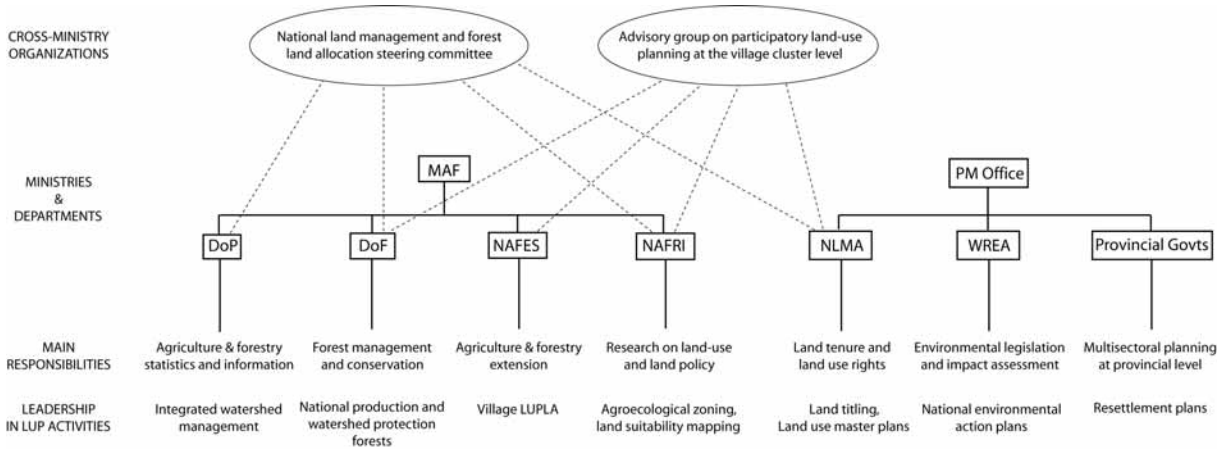

Figure 4. The main governmental agencies involved in land-use planning.

Codes: DoF = Department of Forestry, DoP = Department of Planning, MAF = Ministry of Agriculture and Forestry, NAFES = National Agriculture and Forestry Extension Services, NAFRI = National Agriculture and Forestry Research Institute, NLMA = National Land Management Authority, WREA = Water Resources and Environment Agency.

The coexistence of these territorialisation projects is not seamless however. The overall LUP system is entangled in conflicts of interest and power struggles, as a growing diversity of actors support different views and planning initiatives. Tensions have emerged between the centre and the periphery as a result of successive decentralization–recentralization processes, with the consequence that central decisions are systematically negotiated and reinterpreted at the provincial, district and local levels. At the same time, the growing involvement of the international community in the planning sector and inconsistencies between the ‘old’ land suitability approach and ‘new’ models inspired by sustainable development have resulted in the creation or import of new planning institutions and have brought more players and further complexity into the mediation process. As a result of these dynamics, LUP

implementation procedures and end products are contingent on the outcomes of multilateral 'negotiations' between numerous actors: central and sub-national governments and planning agencies, local populations, private investors, international donors, IDAs and NGOs, and proponents of land suitability and sustainability approaches. From this highly complex process – through which plans are defined, contested, resisted and reinterpreted by a diversity of parties – emerge an extreme variety of local situations. Over time, superimposed planning geometries have also resulted in a highly complex territorial structure which does not necessarily reflect on-the-ground realities nor convey a coherent message. This complexity can have important consequences for the efficiency of LUP and its outcomes at the local level.

In many instances, significant social and environmental problems have been reported to arise from superimposed land-use plans and the resulting constraints imposed on local livelihoods (e.g., Vandergeest, 2003; Evrard and Goudineau, 2004; Ducourtieux *et al.*, 2005; Lestrelin and Giordano, 2007; Fujita and Phanvilay, 2008). These issues reveal important disconnections, if not direct conflicts, between the concurrent approaches of planning agencies. In turn, they also suggest that there is a great need for facilitated communication and negotiation, not only between local populations and planners but also between planning agencies themselves. This paper argues that the promises of 'new' approaches like PLUP may be partly achieved by harnessing the reactivity of the LUP arena. The complexity of the planning system and the existence of tensions between planning actors, institutions and approaches reflect the capacity of the LUP arena to adapt policies to specific contexts and changing socio-environmental challenges. This sustained effort towards policy adaptation and 'improvement' needs not only to be better informed, but also better coordinated and channelled. In other words, the practice of LUP should not be exclusively concerned about selecting and putting into practice the 'best land-use options' (FAO, 1993). It should also involve a broader and more critical reflection on the way individual and institutional divergences around particular social and environmental values might be addressed as part of a collective endeavour (Owens, 1994; Rydin, 1995; Meadowcroft, 1997; Hillier, 1999). New research, better science and greater expertise are not necessarily the key ingredients for achieving sustainable development. Instead, what is primarily needed is "the development of new forms of partnership, and new tools for creating political dialogue, that frame the problems as questions of political choice, given uncertainty and constraints; that renounce the goal of precise and unambiguous definition and knowledge; and that involve many more people in the conversation" (Robinson, 2004: 382).

Part 2. Land-use planning and sustainable development

Chapter 3. Measuring participation: Case studies on village land-use planning in northern Lao PDR

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Plate 3. Village meeting in Phakok (Phonxay district, Luang Prabang province)

Abstract

In the early 1990s, the Lao government launched a nationwide Land-use Planning and Land Allocation programme in a bid to foster socio-economic development while protecting the environment. However, the programme has long been perceived as having negative impacts on rural livelihoods. A central criticism was that limited local participation results in unsustainable land-use plans; consequently, the government introduced significant changes into the process to enhance participation. This paper examines the extent to which the evolution of Lao PDR' village land-use planning has resulted in increased local participation and improved livelihoods. Local participation was assessed quantitatively in six study villages, in combination with more qualitative surveys on planning practices and influences on livelihoods and land-uses. The analysis reveals that local participation increased only slightly from early planning initiatives until pilot implementation of the revised programme, known as Participatory Land-use Planning. It also shows that (participation in) planning had very limited influence on local land-use patterns. Drawing on these findings, the paper explores ways to better translate plans into concrete actions and to effect tangible change in local practices.

Keywords: land-use planning, participation, sustainable development, case studies, Lao PDR.

3.1 Introduction

"Can one really imagine that we can look ahead (not just a few years, but decades and longer) and successfully anticipate potential threats to the developmental process, and then collectively choose which futures we prefer, and then so engineer our societies as to realize the preferred visions?" (Meadowcroft, 1997: 183)

A primary objective of land-use planning (LUP) is the establishment of sustainable development. As such, LUP has triggered debates on social and environmental values and on the need for participatory processes to address individual differences in these values (Owens, 1994; Rydin 1995; Hillier, 1999). As the United Nations' Rio Declaration on Environment and Development illustrates, enhanced "public participation in decision-making" is widely considered a "fundamental prerequisite for the achievement of sustainable development" (UNCED, 1992: 23.2). Arguments in favour of broader participation are generally both instrumental and value-based (Macnaghten and Jacobs, 1997; Meadowcroft, 2004). On the one hand, increased public involvement in decision-making is expected to generate important functional gains (e.g. "better" and more legitimate decisions, wider support and facilitated implementation). On the other hand, when associated with notions of equity and the right to self-determination, broader participation is viewed as improving opportunities for individuals to fulfil their basic needs and aspirations, hence leading to a more sustainable development process.

Given these intentions and expectations, the notion of planning for sustainable development raises important questions. Scholars such as Rydin (1995) and Meadowcroft (2004) point to a crucial need to consider ways to actually enhance participation. Indeed, as moving from positive intentions to the actual achievement of participation is not straightforward, appropriately designed mechanisms (involving, for example, information dissemination, empowerment, mediation and/or collaboration) are required to enhance public involvement in decision-making and plan implementation. Davies (2001) moves beyond the procedural aspects of participation to query the actual products of participation: Does enhanced public participation in planning necessarily produce greater social and environmental benefits? These are some of the key issues that this study examines empirically in regard to village LUP in Lao PDR.

Eighty per cent of the population of Lao PDR relies on agriculture for a living (GoL, 2006). The country is further characterised by high poverty levels[10] and remarkable ecological wealth (UNEP, 2001). LUP is therefore generally considered an important tool for overcoming the challenges of sustainable development in Lao PDR (e.g. GoL, 1999, 2003, 2005). The government's recent National Adaptation Programme of Action to Climate Change, for instance, identifies land suitability zoning

[10] Lao PDR, included on the UN's list of Least Developed Countries, ranked 94th out of 134 countries on the 2009 Human Poverty Index (UNDP, 2009).

and LUP as key strategic priorities in order to "increase the capacities of farmers to adapt to changes in climate and associated natural hazards" (GoL, 2009: 65). Similarly, a central principle of the recently endorsed manual on Participatory Land-use Planning (PLUP) is that "land-use zoning will ensure that land-uses within the villages in a village cluster are appropriately delineated to provide for sustainable livelihoods for future populations" (MAF and NLMA, 2009: 9). By defining and zoning optimal land-uses and allocating land-use rights to local populations, LUP is expected to achieve the aim of fostering socio-economic development while protecting the environment.

The government's Land-use Planning and Land Allocation (LUPLA) programme constitutes the leading initiative in achieving this aim. LUPLA was developed in the early 1990s; in 2005, it was implemented in 7,130 villages – two-thirds of the villages officially recorded in the country (GoL, 2005). Although data after 2005 are not available, the situation in some of our study villages, presented in Section 2.1, indicates that implementation has continued. The programme has greatly evolved over time (see Section 2.1), but it still involves three main processes: delineation of village boundaries; zoning of the village land into different land-use types (e.g. residential, agricultural and pastureland and five categories of forested land); and allocation of agricultural plots to individual households. These processes are intended to clarify land ownership, encourage investment in more intensive and market-oriented land-uses, reduce the extent of shifting cultivation (believed to be a main cause of land degradation) and improve government revenues from land taxation (Evrard, 2004).

In principle, LUPLA appears superior to similar land reforms in neighbouring countries (Vandergeest, 2003; Poffenberger, 1999 *in* Fujita and Phanvilay, 2008). Importantly, it represents a key step towards the formal recognition of customary rights to use land and natural resources. From a decentralisation perspective, it involves a significant transfer of responsibility, as community forest and agricultural land management, land distribution and conflict resolution become the mandates of village authorities. However, despite its ambitious goals and potential benefits in terms of local empowerment, LUPLA has long been criticised for having negative impacts on rural livelihoods. In particular, it has been portrayed as causing agricultural land pressure, decreased food security and increased poverty (e.g. SPC, 2000; Evrard, 2004; Ducourtieux *et al.*, 2005; Lestrelin and Giordano, 2007) as well as cultural trauma and uncontrolled migration (Vandergeest, 2003; Evrard and Goudineau, 2004).

The debate over LUPLA is largely about how limited local participation results in unsustainable land zoning, planning and allocation (e.g. Evrard, 2004; GTZ, 2004; Thongphanh, 2004; Fujita and Phanvilay, 2008). The arguments are summarised in a countrywide review of studies on LUPLA as follows:

"In most areas the LUP/LA activities were carried out as one rushed sequence of working steps limiting the time for participation and reflection. Villagers were mainly asked to participate in the

initial steps of data collection, but not during the crucial subsequent steps of e.g. land-use zoning or the drafting of village regulations. Very little attention was paid on the dissemination of information on LA [land allocation] to the villagers. Overall, the short implementation process is identified as a major constraint of LUP/LA, leading to inadequate resource management plans insensitive to customary resource use and management practices" (GTZ, 2004: 15).

With a more specific focus on gender, Rodenburg and Phengkhay (2000) also highlighted important disparities in individual participation to LUPLA. In ethnic minority areas, the participation of women appeared significantly hindered by lower education levels, limited knowledge of the Lao language (employed during discussions with planning officers) and the greater role traditionally attributed to men in public meetings. [11] As described by the two researchers, if women and other less advantaged groups (e.g. the poor and illiterate) do attend LUPLA meetings, quite often, they do not contribute to the discussion and hand all bargaining and decision-making power to the local elites. In case of abuse, this power imbalance may contribute to perpetuate or reinforce local inequalities in access to land.

Because of such criticism, significant changes have been made to the LUPLA process and its practical implementation during the past two decades. The first experiments with land reform in the early 1990s consisted of a simple agreement between village authorities and the national authority represented by the District Agriculture and Forestry Offices. Under the agreement, called Land and Forest Demarcation (*baeng din baeng pa*), village boundaries, land available for agrarian purposes and land for preservation or regeneration as forest were determined. The agreement was later renamed Land and Forest Allocation (*mop din mop pa*) to include allocation of agricultural plots to individual households. With support from Sida (Swedish International Development Cooperation Agency), two successive manuals were developed, putting strong emphasis on enhanced local participation and restructuring LUPLA into a 10-stage process involving participatory mapping, detailed field surveys, discussion of land management plans, village and individual agreements, participatory monitoring and evaluation (LSFP, 1997, 2001). Enduring concerns about limited local participation and integration across planning scales eventually led to LUPLA being redefined as Participatory Land-use Planning (PLUP). PLUP focuses on the village cluster; it is thus expected to facilitate coordination between planning initiatives and institutions operating at different scales. It also provides guidelines to ensure gender and ethnicity issues are acknowledged and to enhance local participation throughout the entire planning process (MAF and NLMA, 2009).

It should be noted that this rapid evolution of village LUP in response to criticism and reported deficiencies is quite remarkable. Where many might expect disregard – given the "authoritarian" quality often attributed to Lao PDR' current political regime (e.g. Jönsson, 2002; Stuart-Fox, 2005) –

[11] More generally, the representation of women in government functions at the local level was only 1.5% in 1999 (UNDP, 2002).

this evolution instead suggests considerable responsiveness on the part of policymakers. However, two key questions are in order, in line with the issues raised by scholars such as Rydin (1995), Davies (2001) and Meadowcroft (2004): (1) To what extent has the evolution of village LUP approaches resulted in increased local participation? (2) To what extent does (participation in) village LUP influence local livelihoods and land-uses?

This paper addresses these questions through a series of case studies. Section 2 presents a brief description of the research sites and their representativeness with regard to village LUP in Lao PDR. We then present the experimental approach that was developed to assess and compare participation in LUP. The discussion emphasises the need to adopt systematic measures to assess a project's success more objectively. Section 3 presents the key empirical findings. In particular, it describes the observed evolution of local participation in village LUP and the impacts of LUPLA on livelihoods and land-uses. In Section 4, the observed preliminary outcomes of PLUP are discussed and possible avenues are proposed to improve the process.

3.2 Measuring participation (through non-participatory methods)

3.2.1 Research sites

Six villages in Luang Prabang province,[12] Soptia, Phadeng, Paklao, Nambo, Phakok and Phoukong, were selected as research sites representative of different stages in the evolution of village LUP (Figure 5). Soptia is characteristic of "early" LUPLA initiatives. LUP was undertaken in 1999 with limited funding, human resources and capacity; it was conducted within a few days and without field surveys. Land was zoned based on topographic maps but no land management plans were attached to the zones. Implementers then applied a simple "four-plots-per-household" rule for land allocation and the distribution of Temporary Land-use Certificates (TLUCs) to village households. The process undertaken in Phadeng and Paklao in 2006 was similar, except that the size of the four agricultural plots allocated to village households was calculated according to the available workforce in each household.

In contrast to these three villages, Nambo benefited from significant investment in local participation, with a 28-day process supported by considerable human and financial resources (the process was funded by Sida and involved numerous officials from the Agriculture and Forestry, Land Management and Agricultural Extension agencies). An improved version of LUPLA, carried out in 2008, involved complete zoning and mapping of the village land, definition of land management plans and delineation and registration of individual plots.

[12] Luang Prabang was one of two provinces where LUPLA pilot projects were carried out in the early 1990s before the initiative was expanded to the whole country. Luang Prabang was thus selected to cover the whole range of LUP approaches since the initial testing phase.

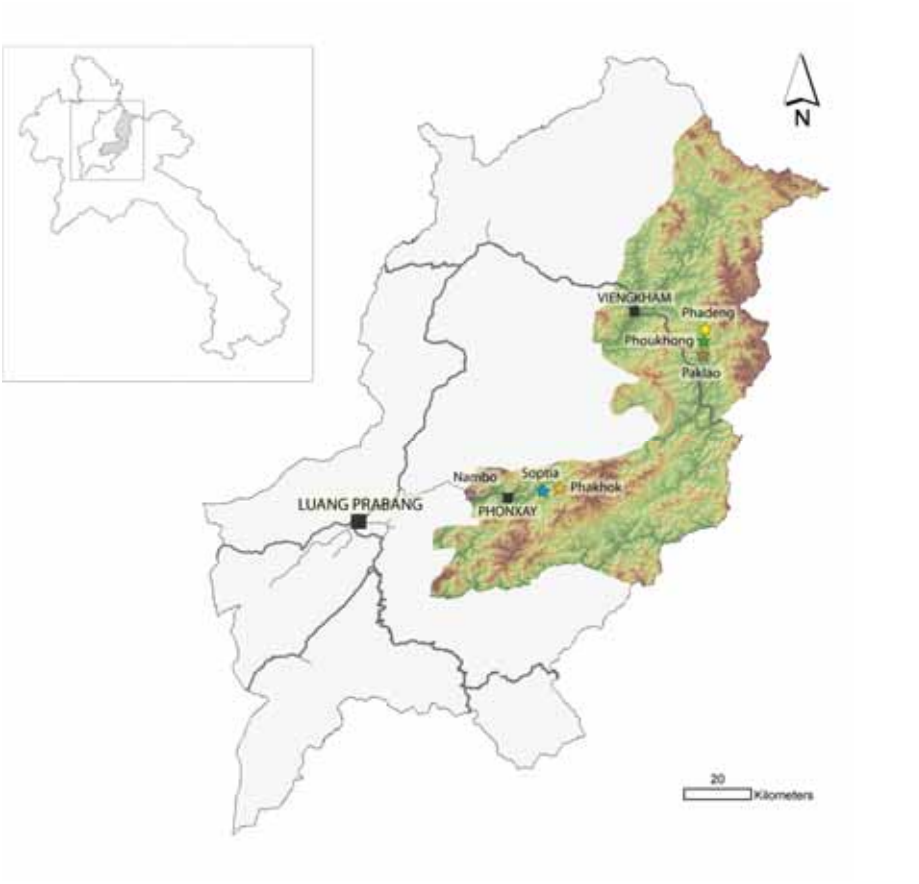

Figure 5. Location of the research sites.

Phakok and Phoukong villages were selected as pilot sites for PLUP testing in 2009. These villages have received support from research development projects,[13] with considerable human and financial resources deployed for enhanced local participation, more accurate data and data management, and enhanced integration of plans across scales. High-resolution satellite imagery, 3-D models, global positioning system (GPS) and geographic information systems (GIS) were used to support inter-village boundary negotiations. These technologies were combined with exhaustive geographic and socio-economic surveys to achieve complete zoning and mapping of the village land and definition of land management plans. Most of the planning stages have been completed in the two villages, with only individual and community land titling still to be conducted. As we conducted our fieldwork at the same time that PLUP was being implemented, selecting Phakok and Phoukong as research sites allowed us to observe the way participation was "operationalised" during the planning process. By contrast, the retrospective surveys in Soptia, Paklao, Phadeng and Nambo villages provided more historical perspectives on the evolution of LUPLA, local participation and its role in shaping development trajectories.

[13] The AgroBiodiversity Initiative in Phakhok and the Upland Research and capacity Development Project in Phoukhong.

3.2.2 Experimental approach

As Burton (2004, 2009) pointed out, a very large majority of studies assessing participation adopt a loose qualitative approach and rely mainly on participatory methods and practice stories to gain insights into public involvement in and influence on decision-making. In determining participation levels, studies usually assess the perceptions and beliefs of a (generally limited) number of key actors regarding their contribution to, ownership of, and satisfaction relative to a particular policy process (e.g. Burns *et al.*, 2004). Although this approach is not without interest (e.g. for contextualising participation and exploring the diverging perceptions of stakeholders), it provides relatively limited scope for a comparative analysis across research sites, because the assessed participation levels depend greatly on the subjectivities of individuals – whose selection also depends on the subjectivity of the researcher(s) (Sandker *et al.*, 2010). It is thus uncertain that such an approach can produce a consistent picture of participation levels across different locations.

In the present study, a simple quantitative approach was developed, involving almost exclusively the subjectivity of the researcher(s). Four key indicators were derived from questionnaire surveys (Table 2) of a random sample of 15–30 individuals in each study village.[14] The first of these indicators, called *presence*, accounts for the physical attendance of individuals in different activities that constitute the village LUP process. Activities were attributed different values (Table 3) on the basis of (our perception of) their potential to bring about participation. This allowed us to derive scores valuing the level of presence of individuals during the LUP process. The second indicator, referred to as *voice*, relates to the types of verbal interventions made by individuals during LUP meetings and group discussions; that is, a simple request for clarification is attributed a value of 1, a demand for modification of the plan has a value of 2 and a direct critique has a value of 3. This scoring system enabled us to assess individuals' contributions to discussions about village LUP. The third indicator measured individuals' level of *understanding* of the objectives of village LUP. We asked interviewees to offer two main objectives of village LUP; understanding levels were then derived on the basis of the correspondence between perceived and official objectives – a value of 2 for key objectives explicitly mentioned in village LUP manuals (e.g. "to limit deforestation", "to clarify land tenure") and 1 for more implicit or secondary objectives ("to reduce poverty", "to promote tree plantations"). Finally, an *overall participation level* for each individual was calculated by summing *presence*, *voice* and *understanding* scores (Table 2).

[14] Thirty individuals each in Soptia, Paklao, Nambo and Phoukhong, 27 in Phakhok (three of the 30 initially sampled left the village before the end of the fieldwork period), and 15 in Phadeng (the original Phadeng community scattered after the village was resettled during the fieldwork period).

	Derived from	Example	Score
Presence	Participation in different stages of LUP	*Presence at inception meeting, group discussions and field measurements*	*1+2+1 = 4 (max. value = 12)*
Voice	Forms of intervention during LUP meetings	*Direct critique of boundary decisions*	*3 (max. value = 3)*
Understanding	Perceived objectives of LUP	*"LUP aims at reducing poverty and stabilising shifting cultivation"*	*1+2 = 3 (max. value = 4)*
Overall participation	Sum of *presence*, *voice* and *understanding* scores		*4+4+3 = 11 (max. value = 19)*

Table 2. Indicators employed for assessing individual participation levels.

Activity	Value
Inception meeting	1
Mapping	3
Field measurements	1
Group discussions	2
Planning	4
Closing ceremony	1

Table 3. Values attributed to the activities that comprise the overall village LUP process.

It is reasonable to expect that presence and intervention during planning activities and understanding of planning objectives will go hand in hand. Indeed, statistically significant correlations were found between the three variables *presence*, *voice* and *understanding* (Table 4). More instructively, although also predictable, a statistically significant correlation was found between the *overall participation level* of individuals and their position in the (local) social hierarchy; that is, the higher an individual's social position,[15] the greater his/her participation in the planning process (Table 5). Based on this finding and reflecting questions raised by researchers on the participation of non-elite groups to LUPLA (see Section 1), two secondary indicators were developed. *Grassroots participation* was assessed by calculating the mean *overall participation level* of regular citizens – i.e. individuals not engaged in government or administrative functions.[16] In order to get further information on the way participation to LUP is distributed (that is 'concentrated' among few individuals or 'equally shared' in the entire population), *participation balance* was calculated as the relative standard deviation (RSD) of the *overall participation level* of individuals in each study village. *Presence*, *voice*, *understanding*,

[15] Social position was ranked according to the status of the household head in the following order: regular citizen; member of official mass organisation and/or local militia; head of village unit, teacher, police officer or local party secretary; village chief.

[16] Using a similar method to measure the participation of women could have provided further information. Unfortunately, the questionnaire surveys conducted within the framework of this study did not account for gender differentiation.

overall participation level, *grassroots participation* and *participation balance* thus comprised the six quantitative dimensions through which this study examined local participation in village LUP.

	Presence	**Voice**	**Understanding**
Presence	1	0.213[a]	0.304
Voice	0.213	1	0.371
Understanding	0.304	0.371	1

[a] Underlined values represent significant correlations (at the 0.01 level).

Table 4. Correlation coefficient matrix (Pearson): presence, voice and understanding indicators (n=162).

	Participation	**Wealth**	**Social position**
Participation	1	0.098	0.343[b]
Wealth	0.098	1	0.251
Social position	0.343	0.251	1

[a] Social position was ranked as follows: regular citizens (1) < members of official mass organisations and local militia (2) < heads of village unit, teachers, police officers, local party secretaries (3) < village chief and high-level party secretaries (4). The level of wealth of each village household was determined with the local authorities and ranked as follows: poor (1) < middle-class (2) < rich (3).
[b] Underlined values represent significant correlations (at the 0.01 level).

Table 5. Correlation coefficient matrix (Pearson): overall participation level, wealth and social position (n=162).

Although the approach reduces possibilities for variations due to individual subjectivities and provides consistent baseline data for comparative analysis, important limitations must be acknowledged. In particular, the values attributed to the different planning activities and individual interventions may be subject to debate. More generally, by focusing on a few quantitative indicators, the approach misses key qualitative elements of the specific socio-political circumstances of participation, e.g. the "micro-physics of power" (Jessop 2007) that underlie the interactions between planners and local populations. Just as importantly, the quantitative approach does not enable the assessment of the actual influence of participation on the "products" of planning (Davies, 2001).

To address these shortcomings, significant qualitative elements derived from field surveys were included in the data analysis. In addition to direct observation of various meetings and field activities during PLUP implementation in Phakok and Phoukong, the research team conducted systematic semi-structured interviews with key informants, both villagers and planners, to gain insights into stakeholders' expectations and daily experiences during the planning process. Similar semi-structured interviews were conducted with district authorities and villagers of Soptia, Paklao, Phadeng and Nambo designed to gather practice stories on past LUPLA implementation, related issues and outcomes. Participatory mapping was used with the village authorities of Phakok, Soptia and Nambo as complementary information to represent spatially the impact of land-use policies. Secondary data were also gathered from various projects operating in the study sites.

3.3 Empirical results

3.3.1 Local participation in village LUP

The evolution of village LUP procedures and practices during the past decade – from early LUPLA, as implemented in Soptia in 1999, to pilot implementation of PLUP in Phakok and Phoukong in 2009 – has been accompanied by a slight increase in local participation, as illustrated by Figure 6. With the new planning procedures introduced by PLUP, the mean overall participation level actually doubled.[17] However, although local understanding of the objectives of village LUP has improved, villagers' presence at the various planning stages remains low, especially at the crucial stages of zoning and planning village land-uses (Figure 7). Local claims and concerns remain largely unvoiced and, notwithstanding a slight increase, the overall participation of the non-elite remains critically low. Indeed, PLUP, as applied in Phakok and Phoukong, did not succeed in fostering more balanced participation than the improved 10-stage LUPLA procedure employed in Nambo in 2008. The latter was characterised not only by considerable human and financial resources but also by a negotiation process regarding participation. For instance, an influential local actor – a retired employee of the Provincial Agriculture and Forestry Office – was able to negotiate the village boundaries with district and provincial authorities, resulting in an uncommon representation of the village land, stretching across two districts (Figure 8).

Implementers' limited experience and technical capacity led to confusion during on-the-ground implementation of PLUP. In Phakok, for instance, implementers did not consider the half-day of GPS training sufficient to proceed to boundary mapping. Furthermore, although exhaustive socio-economic surveys were conducted, there was little use of the collected data as a basis for discussions on land zoning and management. In Phoukong, implementers acknowledged that, although the "socio-economic survey" and "mapping" teams worked in parallel, they did not interact much during the process. Nevertheless, they defended their position, arguing that they had conscientiously met all the requirements of the PLUP manual. If the socio-economic data had indeed been compiled and summarised before zoning, then efforts at integration were limited to the presentation of a series of socio-economic posters during the land zoning discussions.

[17] That is, from 2.7, 3.1 and 3.8 in Paklao, Phadeng and Soptia, respectively, to 4.7 in Nambo, 5.5 in Phoukhong and 6.8 in Phakhok.

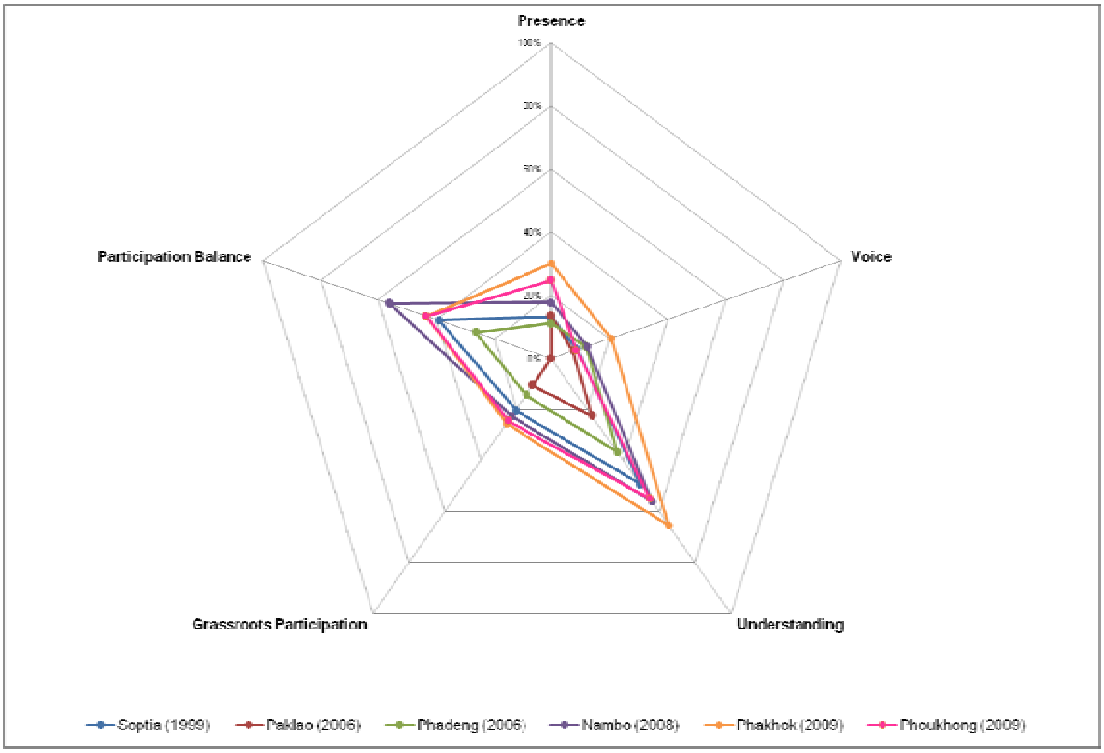

Figure 6. Participation radar in the study villages. Values on the *presence*, *voice*, *understanding* and *grassroots participation* axes are village averages represented as a percentage of their maximum values (see "max. values" in Table 2). *Participation balance* values are represented as: (1 – RSD of overall participation level) × 100.

Most of the villagers interviewed in Phakok acknowledged that they could not comprehend the link between the (scarce) data presented during meetings and the mapping outcomes. Understanding was further undermined by language issues, as most women involved in the planning process did not speak Lao, the main language used during meetings. The research team observed that the land zoning stage also appeared poorly participatory, as zones were mapped principally by district technical employees supported by a couple of villagers (see Figure 7). Furthermore, extension proposals made in relation to land management plans focused exclusively on intensive cropping techniques from Nepal, Vietnam and China, presented as alternatives to swidden agriculture. As accessibility is a key constraint for the area's economic development, a demonstration focused on the analysis of actual market potential might have been more useful. A realistic explanation of these various limitations is that implementers, caught in the middle of multiple methodological and implementation challenges (e.g. use of modern technologies including GPS and GIS, adaptive learning methods proposed by scientists, and their own former framework of practices inherited from LUPLA), built on their experience with past LUP approaches and neglected to engage with participation issues.

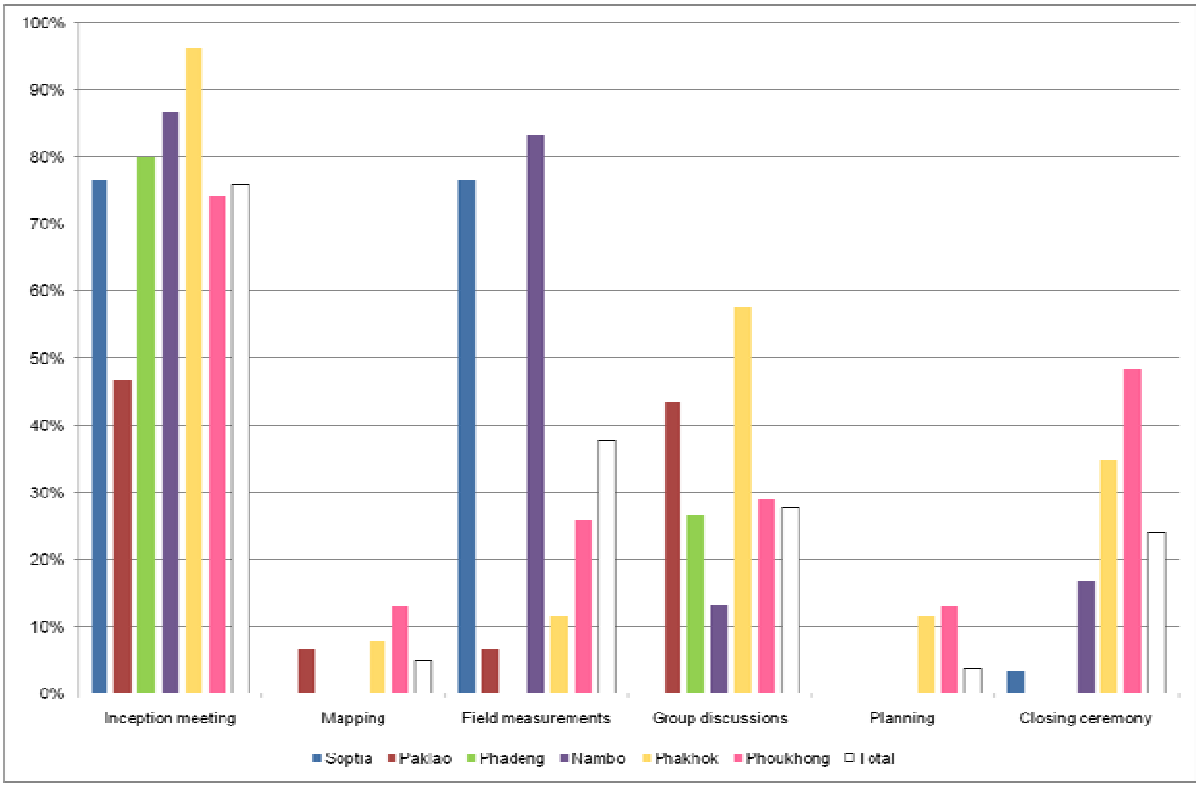

Figure 7. Presence at the different stages of village LUP (% of individuals).

3.3.2 LUPLA, livelihoods and land use change

LUPLA was found to have had a relatively limited influence on livelihoods and land-use patterns, despite important differences in implementation procedures and a general increase in local participation levels since the late 1990s. In villages such as Soptia, Paklao and Phadeng, 5–10 years after implementation marked by very limited local participation, LUPLA appeared to have been only a matter of delineating village boundaries and allocating land to village households. In Soptia, for instance, village leaders demonstrated an intriguing lack of awareness regarding LUPLA implementation and products. During a group discussion in October 2009, the village chief stated that Soptia had never undergone LUPLA; one of his assistants corrected him, stating that LUPLA had been implemented in 2003. Some debate followed on the year of implementation, which, according to district authority records, was 1999. As the discussants acknowledged, most of the documents produced during the process had been lost and, with the exception of (long expired) TLUCs delivered to individual households and a number of signboards marking the limits of the village land, nothing remained of any land zoning and management decisions that might have been made at that time. Similarly, in Paklao and Phadeng, few villagers could remember if and when LUPLA took place – this was just three years after actual implementation. According to the village authorities, district technical officers proceeded to boundary delineation and land zoning directly on topographic maps, without conducting field surveys. Four agricultural plots per household were then allocated but not

located on a map; no record (e.g. village land registry, individual land-use certificates) of the land allocation process remained.

Figure 8. Village land-use planning map following LUPLA implementation (Nambo, Luang Prabang Province). Brown shading corresponds to agricultural land. All other colours correspond to forest areas classified as “conservation forest”, “protection forest”, “regeneration forest” or “production forest”.

Land-use zoning – a core element of village LUP that is expected to optimise land and natural resource uses – was thus largely ignored. Unsurprisingly, during interviews, villagers of Soptia, Paklao, Phadeng and Nambo often cited secure individual land tenure and clearer village boundaries as the main positive outcomes of LUPLA. In Soptia and Nambo, however, achieving the potential benefits of boundary delineation and individual land allocation to minimise land conflicts was partly hindered by the effects of resettlement policy. In Soptia, major land disputes emerged after three remote communities were relocated near the village boundary. With limited access to productive farmland (the only available land being several hours’ walk away), the new settlers were pushed to encroach on Soptia’s land, triggering conflicts with their neighbours. In Nambo, disputes emerged within the community because of an unfair land allocation process and the resettlement of people in the village after LUPLA. Despite significant time, human and financial resources from implementers and apparently well-balanced local participation (see Section 3.1), LUPLA merely contributed to formalising local land tenure disparities. Early settlers and local elites exploited their social position

and influence within the village to register large tracts of land to the detriment of less established and powerful residents. Forced to buy land from early settlers, several households that resettled in Nambo after LUPLA implementation were the main losers in this process. Finally, in Paklao, several villagers expressed doubts about the usefulness of boundary delineation in mitigating land conflicts between villages, as their neighbours do not have defined boundaries.

3.4 Discussion and conclusions

The experimental approach we developed to measure local participation provides valuable empirical evidence to answer our first research question. The results show that the evolution of village LUP in response to criticism and reported deficiencies has resulted in visible, yet fairly limited, enhancement of local participation. Non-elites remain largely excluded from the process and, in particular, from the crucial stages of zoning and planning village land-uses. However, limited local participation in decision-making (not least in the study villages that provide substantial historical perspective on LUPLA) means our second research question – about how participation influences LUP outcomes – remains largely unanswered. Land-use zoning is generally ignored and village LUP becomes merely a matter of delineating village boundaries and allocating land to village households. In turn, the impact of LUPLA on local access to land appears highly contingent upon existing configurations of power within villages. As a function of the bargaining power of each individual household, land allocation tends to freeze existing disparities in access to land resources. When resettlement interferes, which appears to be commonplace in the Laotian uplands (e.g. Evrard and Goudineau, 2004; Baird and Shoemaker, 2007), LUPLA can also contribute to considerable land speculation.

PLUP attempts to address these two latter issues, namely the incoherence between superimposed plans and the potential inequalities resulting from land allocation. In particular, a village cluster approach and the introduction of community land titling are expected to facilitate the integration of diverse planning interventions (including resettlements) and to limit the potential for land grabs by powerful actors. However, despite the ambitious principles of PLUP, observation in the study villages suggests the process remains entangled in confused on-the-ground implementation. With vague methodological guidelines and limited implementation capacity, PLUP appears to repeat the shortcomings observed with LUPLA in terms of limited and unbalanced participation. Without proper methodological training and technical support of implementing agencies, the risk remains that, as with previous land-use planning approaches, the beneficial principles of PLUP will be lost during application in the field.

In many instances, professional land-use planners and development experts neglect to engage directly with participation and its implications for social justice and socio-environmental outcomes; rather, they tend to adopt consensual and conflict-free positions. Hence, they approach sustainable

development as a technical issue only (Rydin, 1995). As this study illustrates, the participatory label, heralded as a prerequisite to rural development and conservation projects in developing countries, does not by itself provide any guarantees. The concept is often instrumentalised to satisfy strategic objectives on donors' agendas without acknowledging existing gaps between intentions and reality (Ericson, 2006). To avoid being compromised by altruistic shortcuts, leading to a "Samaritan's dilemma" (Gibson *et al.*, 2005), projects must move beyond simplistic concepts such as "the larger (number of participants), the better" or "maximise rather than optimise". Projects advocating participation should integrate a monitoring approach. It is not sufficient that participation be declared as having been "granted"; rather, participation should become both a qualitative and a quantitative asset to reach a level of transparency comparable to other variables designed for statistical significance.

In this regard, the experimental approach for monitoring participation applied in this study can provide an alternative. As participation is the cornerstone of planning and development initiatives, it is essential that participation management is not relegated to a complacent assessment. In other words, assessing participation requires both a qualitative participatory approach and systematic measurements less dependent upon individual subjectivities. Beyond monitoring of participation, however, appropriate means and support are crucial to avoid failure in LUP projects. As Valencia-Sandoval *et al.*,(2010: 65) argue, a critical challenge for the LUP arena worldwide lies in the development and effective deployment of facilitation tools and "mechanisms to involve and engage local stakeholders". In that sense, the kind of monitoring tool presented in this paper should be articulated with broader methodological innovations both to provide feedback on actual participation and to allow for stronger, more informed engagement of stakeholders with negotiations addressing local and national socio-environmental objectives. As Yates *et al.*,(2010) argue, significant human and financial investments constitute key elements for bringing a sense of success and ownership to the actors involved in planning initiatives. Hence a country such as Lao PDR – which is heavily dependent on foreign assistance – thus needs, in addition to properly developed monitoring and facilitation tools, enhanced human and investment capacity.

Part 3. Land-use negotiation platform

Chapter 4. Toward a land zoning negotiation support platform: "Tips and tricks" for participatory land-use planning in Lao PDR

Chapter 4 is reproduced from the article in press:

Bourgoin, J., Castella, J-C., Pullar, D. V., Lestrelin, G., and Bouahom, B. (in press) Toward a land zoning negotiation support platform: "Tips and tricks" for participatory land use planning in Lao PDR. Landscape and Urban Planning.

Plate 4. Participatory land use planning in Bouami,(Viengkham district, Luang Prabang province)

4.1 Abstract

Managing complex landscape mosaics in areas dominated by poverty often requires addressing conflicting objectives and managing trade-offs, such as that between maintaining/enhancing ecological functions and improving livelihoods. Lao PDR, like many other developing countries dependent on agriculture and natural resources for the subsistence of a mostly rural population, has used land-use planning (LUP) as a core policy instrument to achieve sustainable development. However, previous reviews of LUP implementation showed large discrepancies between policies and practices and between the intended goals and actual outcomes. There is a need for increased participation, improved integration of scales, harmonization of superimposed plans, and enhanced coordination between implementing agencies and other stakeholders. Consequently, former normative approaches to LUP have been gradually replaced (at least on paper) by a new paradigm. Participatory land-use planning (PLUP) has recently become a central element of donor-supported programs in developing countries. However, despite the good intentions of PLUP principles, implementation remains entangled with confused practical issues that compromise effective participation. As an alternative to complex, technologically sophisticated LUP models that local stakeholders cannot use or replicate, a communication platform supporting negotiations among multiple stakeholder groups was tested in a village cluster in Luang Prabang Province in northern Lao PDR. This innovative approach, based on a combination of role-playing games, participatory 3D modelling, GIS, and socioeconomic and environmental impact assessment, allows stakeholders to collectively explore the consequences of land-use decisions and choose between alternative future landscapes.

Keywords: participatory land-use planning, communication platform, Geographic Information Systems, role playing game, Participatory 3D Modelling, Lao PDR.

4.2 Introduction

Described as an activity that envisages future land arrangements (FAO, 1993), land-use planning (LUP) has been recognized as a key instrument for identifying and ensuring sustainable land-uses, improving the livelihoods of rural communities and thereby achieving sustainable development. LUP has evolved from an expert approach to land suitability in the 1960s and 1970s to a more integrated approach involving planning experts, decision-makers, and ordinary citizens. Incorporated into sustainable development discourses, the blending of ecological, economic, and social aspects through hybrid lay–scientific initiatives is still relevant to ensuring locally appropriate and durable measures (Beierle, 2002; Grainger, 2010; Reed, 2008). Involving ordinary citizens in local management decisions and policy implementation was the core message of Agenda 21 signed at the Rio Earth Summit in 1992, and thus the mandate of participatory land-use planning (PLUP) in achieving balance between development needs and the preservation of the rural environment (Maginnis *et al.*, 2004; McShane and Wells, 2004; Sayer, 2009; Sayer and Campbell, 2004). The popularity of participation in natural resources management has not declined since then (Neef and Neubert, 2011). From an ethical perspective, enhanced public participation in LUP is expected to limit the potential for a "top-down" imposition of pro-development interests in planning decisions (Rydin, 1995). Thus, collaborative management, defined as "joint decision-making by the state and communities about a set of resources" (Berkes, 2009, p. 1693), is motivated by a desire to involve in policy-making those citizens whom management decisions are likely to be affected (Berkes, 2009; Wagle, 2000). From an instrumental perspective, enhanced participation in planning is expected to engender wider public support and facilitate the implementation of plans (Macnaghten and Jacobs, 1997). A large range of PLUP approaches, designed to encourage sustainable resource management by local communities, have been developed and tested in many countries.

Scientific articles and gray literature that discuss the theoretical appeal of the notion usually conclude by noting the difficulties of applying it in practice and hence of achieving its ambitious goals. For example, a challenge with community-based landscape planning in developing countries is that many of the people involved have low levels of literacy (Reid *et al.*, 2006). It is also argued that the participation process can help reinforce the influence and interests of local elite over a silent and unheeded majority (Berkes, 2009; Wagle, 2000). Becu *et al.*,(2008) wonder how to engage local stakeholders beyond passive participation where involvement usually does not go further than silent meetings and data collection. The difficulty in combining different perspectives into a collaborative management initiative is now assumed inherent in community-based planning (Wilson, 2006). Boundary objects have been promoted as an effective means of addressing transdisciplinary issues involving both experts and decision-makers through the development of tools that provide an interface between science and policy, and between knowledge and action (Cash *et al.*, 2003; Wu and Hobbs,

2002). Such tools are characterized by their propensity to translate scientific concepts into lay language (Grainger, 2010; Olsson *et al.,* 2007). The success of efforts to engage local stakeholders in negotiations depends on the boundary objects' efficiency in facilitating communication and providing a "language" common to all stakeholders involved. Cash *et al.,*(2003, p. 8089) have developed a framework "for understanding the effectiveness of systems that link knowledge to action for sustainability". The effectiveness of the boundary object created through participatory activities depends on its capacity to be locally relevant (salience), to reflect local interests (legitimacy), and to demonstrate scientific adequacy (credibility). Nassauer and Opdam (2008, p. 635) introduced the concept of "design" in the paradigm of landscape science, which intends to provide a "common ground for technology transfer: where practitioners and scientists conceptualize landscape innovations". Addressing management issues in two developed countries, the authors demonstrate the importance of strengthening interactions between science and society through "knowledge innovation".

Despite the development of rationales to link landscape science and citizen involvement, reported cases of PLUP are characterized by deficient methodological standards that hinder the practical implementation of sustainability principles (Fox *et al.,* 2008; Kaswamila and Songorwa, 2009; MAF and NLMA, 2009). Internationally, on-the-ground activities are usually conducted under the implementers' own interpretation, engendering a diversity of implementation pathways under the same overarching concept. Hessel *et al.,*(2009), for example, in a case study from Burkina Faso, demonstrate that the link between spatially explicit mapping and socioeconomic data was bypassed and that, although their outputs could trigger useful discussions, the level of accuracy attained could not guarantee further use by local communities. Fox *et al.,*(2008) describe PLUP experiences in Cambodia where planning was limited to a participatory mapping exercise with local communities. The exercise addressed land and tenure issues at a village scale, but inter-village conflicts could not be visualized. Much other PLUP-related research developed non-spatial and theoretical scenarios that were not actually intended for implementation (Hoang Fagerstrom *et al.,* 2003; Marchamalo and Romero, 2007).

In Lao PDR, weaknesses in providing landscape innovations through co-management are exemplified by successive LUP policies (Lestrelin *et al.,* in press). Since the early 1990s, a Land-use Planning and Land Allocation (LUP/LA) program has been implemented throughout the country. By increasing land tenure security, LUP/LA is expected to encourage agricultural intensification, to favour private investments and the development of commercial on-farm productions, and importantly, to stabilize shifting cultivation and preserve the country's forest, soil, biodiversity, and water resources (Fujita and Phanvilay, 2008; Lestrelin, 2010; Vandergeest, 2003). Through these processes, the central government formally recognizes customary rights to use natural resources, and provides local institutions with important responsibilities, such as land distribution and registration, tax collection,

land-use monitoring, and conflict resolution. Hence, in line with the sustainable development paradigm, greater consideration for local claims, knowledge, and institutions is expected to bring about more balanced and environmentally sound development trajectories (UNCED, 1992; WCED, 1987). However, various studies have indicated that the implementation of LUP/LA in Lao PDR did not always achieve the success predicted by the Lao authorities (Ducourtieux *et al.*, 2005; Fujita and Phanvilay, 2008; Lestrelin and Giordano, 2007). One of the reasons for the poor outcomes is the gradually increasing complexity of Lao PDR' LUP system, which resulted from two concurrent processes: a multiplication of the actors involved in LUP—each with its own mandates, priorities, and approaches to planning—and a sustained, yet not necessarily coordinated, effort to improve on previous policy (Lestrelin *et al.*, in press).

A more positive trait is that the flourishing of new LUP instruments reflects partly a sustained effort by the government of Lao PDR and its international development partners to improve planning approaches and, importantly, adapt them in response to reported deficiencies, emerging issues, and changing concerns. This is illustrated by the evolution of village-level LUP, where each new instrument is presented as an improvement on previous ones (Lestrelin *et al.*, 2011). Since the mid-1990s, the LUP/LA mandate has gradually expanded by including individual land allocation procedures and monitoring (LSFP, 1997, 2001). More recently, PLUP has emerged to replace LUP/LA in order to provide a more participatory and integrated planning process at the village cluster level (MAF and NLMA, 2009). However, the premise of PLUP in Lao PDR, as scrutinized by Lestrelin *et al.*, (2011), appears to repeat the mistakes of the past with inappropriate on-the-ground practices undermining thoughtful (inter) national guidelines. The authors conclude that solely highlighting the need for more participation could neither increase local participation nor affect local land-uses in pilot initiatives of PLUP. In practice, limited facilitation skills and implementation capacities of land-use planners, together with the absence of constructive feedback loops, impose considerable limits on local communities' participation and inclusion of local perspectives.

Building on these findings, this paper proposes a negotiation platform capable of engaging local communities in a more participatory version of LUP in accordance with the main principles defined by the national agencies in charge of the implementation, that is, the Ministry of Agriculture and Forestry (MAF) and the National Land Management Authority (NLMA). The method is then illustrated by a case study from Viengkham District in Luang Prabang Province. Finally, lessons are drawn from this experience, and the conditions for generalizing this innovative approach to the national level are discussed.

4.3 Revisiting the principles of PLUP: Participation and integration

The two Lao government agencies in charge of land management (MAF and NLMA) prepared a manual on "Participatory Agriculture and Forest Land-use Planning at Village and Village Cluster Level" to coordinate their efforts into a standardized approach to PLUP which their respective line agencies at the province and district levels could apply consistently. Building on the knowledge generated during past LUP initiatives (i.e., LUP/LA), the guidelines intend to provide appropriate adjustments in a context of strong governmental ambition to participate in globalized trade and investment through the engagement of rural areas in a market-based economy. The improved PLUP approach has been built on participation and integration principles to ensure consistent field application.

4.3.1 Participation

The manual highlights the need to improve the participatory nature of LUP and advocates that the elaboration of land-use plans should be directly derived from villagers' views. Land management activities should also be adaptive and allow for different ethnic groups to voice their needs with an equal representation of women and men at each stage of decision-making. Prior to the zoning process, village rights to exploit natural resources and modify their landscape through LUP have to be clarified for the entire village community. In fact, the main promise when involving local communities in LUP is to prevent deviant uses by local elite and other influential actors who might seek to exert control over natural resources; for example, cases of land-grabbing have been reported in conjunction with LUP implemented with the support of foreign investors (Baird, 2009). Besides, the aim is for the process to be driven by the people who will be the most affected by the outcome and who can provide knowledge that will fit into the local frame (Ericson, 2006). Participation is essential because it provides local-scale information and intends to "encourage the construction of a common vision for sustainable regional development" (Valencia-Sandoval *et al.*, 2010, p. 65). Furthermore, by improving villagers' capacity to influence local processes, local participants gain the ability to negotiate with government representatives, an aspect that redesigns the power balance. Within the communities, it also gives visibility to a wider range of stakeholders and contributes to balance gender, social and economic status, and ethnicity.

4.3.2 Integration

Coping with scales, knowledge, and multiple stakeholders' perspectives is included in the mandate of land-use planners; however, although integration is recognized as an important principle, in practice, it often remains at the recommendation stage (Gunarso *et al.*, 2007; Lal *et al.*, 2001). PLUP therefore reaffirms the ambition to effectively translate integrative concepts into local land management plans. The sub-district perspective of PLUP is expected to mitigate inter-village conflicts and support

collaborative management between villages of the same village cluster. Border conflicts between villages are often the result of past relocation policies clustering villages along the road or merging small villages into larger ones. In addition, tacit agreements over land-use exist between neighbouring villages, which justifies integrating LUP at multiple scales from village to village cluster and district.

The participatory nature of the process entails the integration of different types of knowledge. Indigenous knowledge, widely praised for its local relevance and the salience it provides to the whole initiative, should be integrated with scientific expertise regarding global processes affecting land-uses. The use of advanced geographic technology through Global Positioning Systems (GPS) and satellite imagery is also promoted to avoid mapping irregularities (MAF and NLMA, 2009). Knowledge integration has the potential to better inform negotiation and facilitate multi-actor landscape planning (Opdam *et al.*, 2006). However, combining hard scientific data with local expertise can be challenging, as local stakeholders might not understand the consequences of their decisions and could be manipulated by those who better understand the issues at stake, that is, land-use planners and local leaders (Kitchin and Dodge, 2007; Nassauer and Opdam, 2008). Rather than using "outsourced" data likely to be locally distrusted and/or rejected, the knowledge used to make informed decisions should be generated through social interaction involving layman stakeholders. Facilitators of such collective processes have then to frame the knowledge into meaningful "boundary objects", which become the main supports for multi-stakeholder negotiations in search of land management compromises (Jasanoff, 2007; Treu *et al.*, 2000; Von Haaren, 2002). These simple—but not simplistic—media have to be carefully designed so that they address the trade-offs between scientific/academic relevance (credibility) and the understanding/interest of local communities (legitimacy and salience) (Cash *et al.*, 2003; Pullin *et al.*, 2004).

4.4 Case study site

In the uplands of Lao PDR, as in many other developing countries, agriculture and natural resources constitute livelihood mainstays for the rural population. Subsistence farming by shifting cultivation is widespread because of low accessibility to roads and markets, although the government has denounced shifting cultivation as "primitive, unproductive and harmful to the environment" (Haberecht, 2009, p. 29). Ranked among Lao PDR' poorest districts, Viengkham District borders the nation's second largest protected area (Nam-Et Phou Loey National Protected Area), which harbours one of the few remaining breeding populations of tigers in the country. LUP is considered a key policy instrument for helping to reconcile conservation and development objectives and prevent loss of ecosystem services (i.e., biodiversity, soil fertility, carbon sequestration) in the complex landscape mosaics found outside protected areas (MAF and NLMA, 2009). In Viengkham District, as in other remote upland areas of the country, the Government of Lao PDR would also like to use PLUP as a way to clarify the customary tenure system and accelerate the transition from subsistence to market-

oriented agriculture. Within the district, Muongmuay village cluster encompasses six villages: Donkeo, Paklao, Bouami, Muongmuay, Huaykon, and Vangkham (Figure 9A). This village cluster was selected based on its typical characteristics of upland agriculture and relative remoteness from the main markets, hindering the diversification of agricultural activities. Most villagers subsist on local products, traditional slash-and-burn shifting cultivation prevails, and most of the cash income is generated from the sale of non-timber forest products (NTFPs) and livestock (Castella *et al.*, 2011).

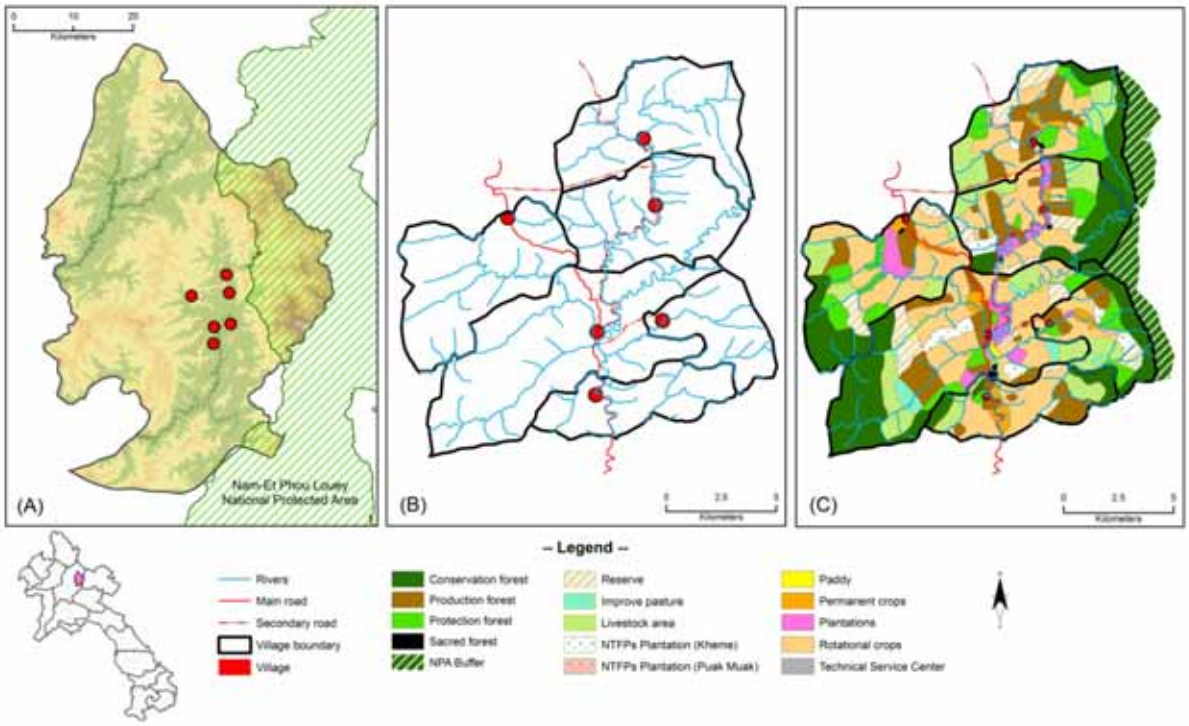

Figure 9. Location of Viengkham District (A) and the target villages where land-use planning was conducted from boundary delineation (B) to land-use zoning (C).

4.5 Action-research in PLUP implementation

In 2010, the researchers designed an innovative PLUP approach to apply the principles of enhanced participation and integration described in Section 2 which they tested in real conditions in the six villages of the Muongmuay village cluster, in Viengkham District (Figure 9A). The action-research involved scientists from international (e.g., University of Queensland, Centre for International Forestry Research , Institut de Recherche pour le Développement) and national (e.g., National Agriculture and Forestry Research Institute) research institutions, practitioners (e.g., development projects and extension agents from the District Agriculture and Forestry Office; DAFO), local authorities (e.g., land management officers and district governor's office), and village communities. A dozen people representing the national agencies took part in the implementation of PLUP over successive field missions. The end goal was to train a team of national experts capable of applying the

method themselves. The overall approach presented below was developed through an adaptive process that was constantly refined during implementation in the villages.

Figure 10. Boundary objects support interactions between people and landscapes. (A) Land-use zoning in Muongmuay village cluster on a participatory 3D model (see also Figure 9C). (B) 3D modelling facilitates villagers' comprehension and participation. (C) A virtual landscape is used to simulate land-use planning.

4.5.1 Village boundary delineation

A combination of topographic maps and high-resolution satellite imagery was used to define boundaries in one village at a time. Given the objective of addressing boundary issues for a cluster of villages, the challenge was to define a way to bring together knowledgeable representatives from all the villages concerned and delineate initial boundaries in one day. For that purpose, a participatory 3D model (P3DM) made of 4 pieces was constructed for the whole village cluster (Figure 10C). Each block was built in one day by a team of four people using paperboard cut around the contour lines and superimposed (Rambaldi, 2010). With Geographic Information System (GIS) software and only the village-points layer available, a frame encompassing all the target villages was created and clipped with a digital elevation model (DEM) of the area. Participatory maps of the villages were used to appreciate the potential extent of villages that did not possess definite administrative boundaries.

Each village was asked to select a man and a woman with extensive knowledge on village customary boundaries. Those representatives of the six villages of the village cluster met around the blank relief model along with delegates of the National Protected Area and people from villages neighbouring the target village cluster. People started to familiarize with the 3D model by adding names of places, rivers, and mountains. Then they started discussing with their neighbours the location of the boundary between their respective villages. The delineation was marked using colour pins and threads and facilitated by staff from the team who speak both languages. The delineation of the six villages' boundaries finished after three hours of intense discussions and negotiations. The polygons representing the village limits were geo-referenced and digitized in ArcGIS, and then projected onto a wall to make hardcopy versions for each village.

The boundary delineation meeting involved only two village representatives for each village. Consequently, to validate the boundaries, the maps were presented in each village to a broader assembly. The two representatives explained the collective process they had gone through and the boundary delineation was collectively refined and approved after discussions. The villagers and the implementing team also discussed the location of required GPS readings to finalize sections of the village boundary that did not match any physical features (e.g., rivers, mountain ridges).

Finally, during a meeting with the village cluster representatives, the boundaries of all villages were reviewed and finalized using maps. Figure 9B displays the result of the delineation process validated by the local authority. After ensuring that no potential territorial conflicts were left pending, inter-village boundary agreements forms were issued to all villages and approved by the district administration.

4.5.2 Data collection and processing

Socioeconomic surveys were undertaken at different scales in each village. At the village level, the annually collected census data by the district administration provided general information about the village households on social aspects (e.g., ethnicity, position in the village, social status), financial assets, and sources of income (e.g., capital, number of parcels, livestock, and plantations). The village census was complemented by an assessment of past population trends that helped identify potential village land requirements in the future. Focus groups were organized separately with men and women to identify agricultural and forest land-related problems and opportunities that could be addressed by land management plans and village extension programs. Finally, basic information on village wildlife, as well as the location, relative abundance, and collection patterns of wood and NTFPs, was used to assist the land zoning activity.

At the household level, interviews were conducted with 30 randomly selected families in the village to characterize the household economies and create categories according to a regional typology (Castella *et al.*, 2011). In the questionnaire, cropping and livestock systems were investigated, as was collection of NTFPs. Although of marginal importance to most households in the study area, plantations of valuable industrial trees, such as teak, rubber, and agar wood, and income from off-farm activities were also assessed, as they usually indicate a high level of socioeconomic differentiation within the village. More systematic landscape-level information was also gathered on the number, area, and location of both cropped and fallowed agricultural plots in the village. The household and land-use data generated from different sources were subsequently cross-checked with villagers. This adaptive stepwise survey was used to gradually refine the PLUP knowledge base available at the village level.

Further, an *analysis framework* was required to fully appreciate the value of all the information collected. In general, most LUP teams collect a large range of data because it is a compulsory requirement in national guidelines, but then use only a limited subset of the available information. This does not suggest that implementers do not have at their disposal relevant methods to conduct LUP, but that they often rely on their own field experience and empirically built mental models to facilitate the participatory planning activities. This person-specific approach, highly dependent on individual facilitation skills, tends to impede the ability to replicate and to ensure consistency of planning methods across sites. As a result, the LUP processes become highly dependent on the experience of individual implementers and projects. The extent to which socioeconomic data collected during the PLUP are actually used for land zoning and LUP becomes highly variable at the sub-national and national levels.

In the proposed analysis framework, the first step consisted of categorizing the households into several classes. Data on income generation were compiled, with each household being classified into different types of livelihood strategies depending on the share of their total income generated from cropping activities, livestock raising, tree plantation, NTFP collection, or off-farm activities. Dependency matrices linked household types and income-generating activities. The expert-based household typology was completed according to classification criteria generated from intensive livelihoods surveys in the northern uplands of Lao PDR (Table 6).

Type	**Main income source**	**Criteria (main / *secondary*)**
A	Shifting cultivation	- No major income from plantations - Receive less than 10–15 million kips/year from livestock (cattle + buffalos) - *Involved in off-farm work activities: waged worker, handicrafts*
B	Livestock	- No major income from plantations - Receive more than 10–15 million kips/year from livestock (cattle + buffalos) - *Involved in off-farm work activities: waged worker, handicrafts*
C	Plantations	- Involved in plantations: teak, rubber, agar wood, etc. - *Involved in livestock raising*
D	Off-farm	- Involved in off-farm activities: trader, shopkeeper - *Involved in livestock raising* - *Involved in plantations*

Table 6. Characteristics of household types.

4.6 Land-use zoning

4.6.1 Setting up village land management committees

In general, important decisions made in the village are devolved to the village authority, which is composed of the village head and two (or three) deputies, heads of the elder committee, youth and women's unions, and secretary of the communist party. However, as indicated in the PLUP manual, a better balance of power within the group involved in LUP should be promoted to improve broader village community participation. To address this concern, a village land management committee (VLMC) was set up with members selected according to individual criteria: high motivation, ability to communicate, and knowledge of village land-uses. Furthermore, the selection procedure aimed at achieving a balance of gender, ethnicity, and socioeconomic status among VLMC members. Achieving gender balance often involved tough negotiations with local authorities as they were often reluctant to provide enough women's names, arguing that women do not usually make decisions at village level, are too busy with domestic tasks and field activities, and are not knowledgeable enough on land issues. Despite long discussions, in most cases, the initial gender balance requirement ended up as a man: woman ratio of 2:1. A committee membership of 10 to 15 participants was found ideal to ensure real interactions could take place within the group and all individuals could voice their concerns (Neef and Neubert, 2011).

4.6.2 Participatory landscape simulation

A role-playing game developed by Bourgoin and Castella (2011) and called "PLUP Fiction" was used to train VLMC members in negotiating land zoning on a stylized landscape. Within a relatively short time (one and a half days), a group of villagers learned about the implications of land zoning for their livelihoods. This group-building exercise was the cornerstone of an empowerment process, as it put VLMC members in the role of land-use planners. During the zoning simulation, people drew areas of different land-uses on a board made of 100 one-hectare cells. After delineating all the zones, players counted the number of cells of each land-use type to get the corresponding number of hectares. The values on economic and environmental returns to the land-use types were then multiplied by the number of cells associated with each land-use to compute the economic and environmental values of the whole simulated landscape. Environmental value pertains to biodiversity and carbon indexes associated with the different land-use types. Incomes derived from livestock raising and NTFP collection in the simulated landscape were included in the calculations along with agricultural income. The "landscape values" resulting from successive land zoning simulations helped participants to explore different options without consequences in reality. They could negotiate land-uses and adjust and readapt the plans until consensus was reached among the different stakeholder groups they

represent (i.e., villagers, district authorities, conservationists). This exercise resembled a rehearsal for the actual land zoning negotiations taking place the next day.

4.6.3 Village zoning

The land zoning process involved the VLMC delineating zones on a 3D model of their village instead of the simulation board of the "PLUP Fiction" role-play. First, the participants familiarized with the blank terrain landscape by writing the names of places they recognized (e.g., mountain summits, rivers). Then, data collected during the focus group discussions (e.g., location of NTFPs, wood, and wildlife) were displayed on the 3D model with stickers. When all features of the landscape had been encompassed, the participants used pins and threads to delineate land zones within their village boundary (Rambaldi, 2010). This interactive method triggered lively discussions about the location and type of land-use (Figure 10B). When the whole landscape had been dealt with, and the zones named and described in relation to physical features of the terrain, the zoning stopped. Pictures were taken from above to encompass the whole village landscape. Then, the landscape pictures were geo-referenced with the help of recognizable terrain features such as mountains, roads, and rivers, to capture the land-use plan into GIS software (ArcGIS). When the image fit an appropriate scale, the different land-use types were subsequently digitized as polygons. A script was run to calculate the exact area of each polygon.

4.7 Iterative planning

4.7.1 Time

The parameters used to provide environmental and economic feedback from the land-use plan were the same as those elicited by the VLMC members during the "PLUP Fiction" zoning simulation. They were complemented by socio-economic data from detailed household surveys to estimate the proportion of each household type in the target village and their relative dependence on each land-use type. Based on the GIS-computed area for each land-use type, a cost–benefit assessment of the land-use plan was generated from an Excel spreadsheet and presented to the VLMC. First, an overall environmental value for the landscape was provided as a combination of biodiversity and carbon indexes. Then, the total village income was computed based on returns to land from livestock, agriculture, and NTFPs.

The economic outputs of a given landscape arrangement could thus be compared with the livelihood needs of the different household types and discussed by the VLMC. Depending on the feedback received, committee members negotiated which kind of land-use should be added, removed, or modified. They thus entered into a new round of planning, that is, delineation/capture/analysis. Time wise, the process was not costly. Photographs were taken after each round of LUP and analysed in the

GIS. Then, given the dynamic structure capabilities, the model instantly generated outputs after computing land-use areas. On average, this activity took one day. As with the zoning simulation, the process stopped when a satisfactory compromise was reached.

4.7.2 Scale

The government of Lao PDR has stated that LUP activities should take place at the scale of the newly created sub-district units (i.e., village clusters). Once the village boundaries had been agreed upon at the village cluster level, LUP was conducted in each of the six villages in the Muongmuay village cluster. Figure 9C represents the final land-use map of the cluster as an aggregation of single village land-use plans. At the end of the process, a planning meeting was organized at the village cluster level, gathering two key members of each VLMC, one man and one woman, who were selected by their peers to represent their village. The overall objective of the meeting, chaired by the head of the village cluster, was to visualize the results of the LUP conducted for each village and propose to negotiate any changes that planners wished to make on the 3D model at the higher level of integration (i.e., village cluster). For example, discussions took place on livestock areas that cut across village boundaries and that therefore lead to livestock circulating in neighbouring villages. Some villages decided to build fences around their livestock areas while others reached agreements on inter-village livestock management (e.g., communal livestock zones). Corridors were also created for wildlife circulation by creating continuous tracts of conservation forest between contiguous villages. After the meeting, the various village and inter-village agreements were checked collectively, and a village cluster agreement was prepared for endorsement by the district governor.

4.8 Discussion: How does the proposed approach fit with PLUP principles?

The approach presented in this paper combines a number of tools and methods that address the challenges of PLUP implementation in Lao PDR (Fujita and Phanvilay, 2008; Lestrelin *et al.*, in press, 2011; MAF and NLMA, 2009). Both the whole framework and its individual components were designed through a participatory learning and action process, and gradually refined to overcome practical problems encountered during implementation. This learning process enabled the identification of lessons for out-scaling (i.e., replication in other places) and up-scaling, reported below in relation to the two principles of PLUP introduced in Section 2.

4.8.1 Participation: From meeting attendance to consultation and negotiation

As pointed out by Lestrelin *et al.*,(2011a), too often land-use planners consider participation as a question of who is present in the room during the LUP process. Questions like “who should participate?” and “how should key issues be addressed through multi-scale co-management” (Wagle, 2000) receive too little attention. Similarly, the extent to which people understand the process and

challenges of land-use planning and the influence they could have by voicing their ideas, remain largely overlooked. In many cases, improving participation has been interpreted as balancing genders and ethnic groups in the assembly, or addressed by increasing the number of community members attending meetings. Consequently, the qualitative dimension of participation (i.e., people's engagement, commitment, and empowerment) has been neglected by land-use planners, who have focused more on the quantitative dimension of participation. A commonly reported reason for suboptimal implementation is that time constraints prevent local communities from gaining a good understanding of the complex issues involved in LUP, and consequently from actively engaging in negotiations with land-use planners. As we learned from the innovative PLUP experience reported in this paper, other important obstacles to genuine involvement of local communities are: (i) the absence of visualization and learning tools that would increase local communities' understanding of the land issues at stake and promote effective participation; (ii) land-use planners' limited facilitation skills for engaging local people in an open negotiation process; and (iii) limited efforts for assessing the *quality of participation* (i.e., the actual engagement of local people into the planning process) which, in turn, provides limited motivations for land-use planners to perform better.

In the approach reported in this paper, landscape visualization and learning tools were developed to support LUP activities and help local people elaborate their own views based on a simple representation of the landscape. First, a terrain model of the target village cluster was built based on a DEM. The 3D representation of the landscape facilitated the interventions of the villagers who were not able to locate themselves on a simple 2D topographic map. The main advantage of P3DM is that it allows participants to project their own mental model of village land-use on a scaled physical landscape (Rambaldi and Callosa-Tarr, 2002). After the preliminary discovery phase, during which participants built a common representation of their environment by naming the important benchmarks of their village landscape (i.e., streams and rivers, valleys, and mountains are labelled and named in the local language), they could exchange views and negotiate meaningfully based on the boundary object they co-constructed with the land-use planners (Brunckhorst *et al.*, 2006; Castella, 2009; Maginnis *et al.*, 2004; Sayer and Campbell, 2004).

Second, an abstract landscape representation was used during the "PLUP Fiction" role-play to focus the participants' attention on learning the rules of the game (i.e., socioeconomic implications of decisions made in relation to the location and area of different land-use types), rather than allowing them to be distracted by land issues in their real landscape, which would have been made visible by more realistic boundary objects such as high-resolution satellite imagery. The landscape simulation board used to train participants in land zoning is therefore an abstract representation of the land cover/use of a hypothetical village. It triggered lively discussions about the general implications of spatial arrangements during land zoning made independently of the real situation of the village. This social learning experience also involved villagers assessing different scenarios through which they

could understand the implications of alternative futures (Blackstock *et al.*, 2007), and comprehend that LUP is not a frozen representation of their landscape but an adaptive instrument they can use to redesign their landscape whenever necessary. Learning-by-doing with boundary objects turned out to empower local participants, who could employ the lessons learned during the simulation and demonstrate local appropriation and adoption of the process to engage more actively in the planning process for their real village (Becu *et al.*, 2008; Berkes, 2009; Castella, 2009).

Engaging a group of villagers, often illiterate or with only elementary school education, in balanced negotiations with land-use planners is a real challenge. The "PLUP Fiction" tool provided a unique experience for villagers to learn the tips and tricks of LUP, and enhanced local capacity for problem-solving through scenario planning (Berkes, 2009; Bourgoin and Castella, 2011). It helped elucidate the seemingly complex planning approach by explaining how the environmental and socio-economic value of different landscape patterns can be assessed based on local knowledge of land-use systems. This boundary activity motivates knowledge co-production by providing clear linkages between village socioeconomic information and the spatial arrangement of the land. As noted by Castella *et al.*,(2005), individual farmers often have a limited understanding of the village land-use as a whole, and thus a simulation involving playing different roles can increase awareness of how various local strategies in land management are related to households' reliance on the land for subsistence and income generation. Field observations showed that in the absence of training of new land management committee members, past land-use plans mainly resulted from the inputs of government implementers and/or a few local elites (Lestrelin *et al.*, 2011). Through the training in land-use negotiations, villagers from a range of social positions were transformed from marginalized observers to main actors in the process.

4.8.2 Integrating landscape planning and management

Managing the trade-off between local relevance and scientific credibility is a key challenge in landscape design (Cash *et al.*, 2003; Nassauer and Opdam, 2008; Opdam, 2010; Pullin *et al.*, 2004). For instance, a more complex method was applied in a pilot study using GIS scripts and scenario modelling to compute all the values and deliver the outputs (Pullar and Lamb, 2008). Although this approach has more credibility for an academic audience, it would have required advanced GIS training for local government staff. The complexity of the scripts and algorithms would have prevented them from adapting the method to their own circumstances and/or reusing it in other villages. Other evidence-based approaches relying exclusively on high-definition satellite imagery are constrained by the time and skills required for planners to ensure that local actors can actually understand and use these high-tech devices. In a context of co-management, the negotiation support tools developed in this study were designed to bridge socio-economic data and spatial information in simple media that (i) retained the most important information for decision-making and (ii) packaged

the relevant knowledge in a format that made it understandable by all stakeholders involved. To ensure a legitimate process, time and resources were dedicated to provide proper training to empower members of the VLMC. Otherwise, there is a risk that participants become passive spectators, leaving the district planners to pilot the planning process. These experiences are reported here to stress the importance of adapting materials and methods to local contexts and to the capacity of the people who will be further implementing the land-use plan.

Throughout the field work, it was also important to highlight the adaptive nature of the process. While at the end of the initial one-week learning process a land-use plan is signed by the local authorities, members of the VLMC have learnt that this plan needs to be revisited in time. They know that this first step is the beginning of the PLUP process and not the end. Implementing the land-use plan (including land management rules, sanctions for deviant behaviours, land titling, monitoring, etc.) is a highly adaptive process. When members of the VLMC decide that they want to make a completely new land-use plan as the ecological and economic situation of their village has changed since the last plan, they may engage in a new planning and implementation loop with the support of district staff that have been trained in PLUP facilitation.

The initial action-research process was driven by external expertise (e.g. facilitation, interpretation of spatial data, documentation) and financial resources, which is similar to previous land-use planning processes in Lao PDR that were driven by external assistance. But, in the case reported in this paper, after initial validation in several villages, guidelines and toolboxes have been developed to support capacity building of district implementers towards a wider implementation of PLUP and to engage district staff in durable activities.

Another key aspect of PLUP success is the need to build trust between the stakeholders who will interact during the few days of the planning process, that is, the district planners (with the support of the action research team in our case) and the village community. At the debriefing session at the end of the collective process, villagers usually admitted that they were reluctant to provide real, precise information to the team collecting socio-economic data as they suspected that the information would be used for tax collection. The learning process increased the participants' confidence, as they realized that using correct information about land-use and livelihood systems would improve the quality of the final product—the land-use plan—and therefore would facilitate its implementation.

Once trust had been built between planners and community members, the manipulation of the boundary objects allowed villagers to refine and adapt their plans to make them more realistic. Being realistic is a necessary condition for a plan's actual implementation. In villages investigated by Lestrelin *et al.*, (2011), as a response to land shortage issues from early LUP/LA implementation, villagers were allocated whatever land they would request for agriculture, resulting in unrealistic plans similar to those obtained during the first round of PLUP. In these villages, the land-use plan was

never translated into action, mainly because people had not cared about producing a realistic plan at the outset. The iterative learning approach allowed farmers to gradually become amateur landscape planners but, most importantly, it increased trust in the district staff who came to facilitate the planning process, engaging them in a long-lasting partnership toward an improved landscape management (Reed, 2008).

4.9 Conclusions

This paper shows how visualization and learning boundary tools can help translate participatory principles into reality by empowering locals in designing future land-use plans and by acting as catalysts of negotiation (Folke *et al.*, 2005). Our action-research approach attempts to move beyond the "dos and don'ts" or "PLUP recipes" to propose an integrative communication platform combining local and scientific knowledge. It exemplifies "how [science] can improve the quality of the decision-making process, as well as that of its outcome" (Beunen and Opdam, 2011, p. 325). The concept of "design" in landscape science, introduced by Nassauer and Opdam (2008), has been used in the context of PLUP through the development of legitimate, credible, and salient "landscape boundary objects". The proposed boundary objects empowered the VLMCs by improving effective participation. Often relegated to the role of mere observers of a planning process piloted by district authorities, local villagers could voice their views and influence the land-use decisions. Hence, by negotiating land-use plans and development scenarios, participants seemed to have been able to reach an agreement on a spatially explicit landscape management plan with a high degree of ownership.

The legitimacy of PLUP outputs should be considered at both local and national scales. A successful bridging approach needs to be pertinent at the national level while being supported by local authorities. Therefore, boundary work should be anchored in a national governmental strategy to engage communities in decentralized governance of the farm/forest interface, and thus build long-lasting mechanisms of co-management.

Part 3. Land-use negotiation platform

Chapter 5. 'PLUP FICTION': Landscape Simulation for Participatory Land-use Planning in Northern Lao PDR

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Plate 5. Villagers of Vangkham involved in landscape simulation (Viengkham district, Luang Prabang province)

5.1 Abstract

A landscape simulation was designed and tested in Viengkham, a mountainous district in the north of Lao PDR. This social learning process was introduced by researchers affiliated with national research institutions to improve land-use planning practices and increase the ownership of the local people in the planning process. Twelve members of the village land management committees participated in the role play, called 'PLUP Fiction', which is part of a stepwise process of Participatory Land-Use Planning (PLUP). This paper introduces the principles of land zoning, the sequence of events presented during the role play session, and the lessons learnt from a series of experiments conducted in remote upland villages. The villagers gained an increased understanding of the issues at stake during a zoning process thus demonstrating the relevance of this learning-simulation tool. They were able to explore different zoning options, assessing their respective advantages and constraints, and gradually improve their understanding of the consequences of land zoning on the environmental and economic values of the resulting landscape. The villagers also felt empowered by their newly acquired knowledge and well-disposed towards negotiation in improving their current land-use through more realistic plans. Long term environmental concerns (i.e. biodiversity and carbon values) were fully integrated with shorter term economic considerations in the collective decision-making process. Furthermore, 'PLUP Fiction' has become a key tool to fully involve local communities in Reducing Emissions from Deforestation and Forest Degradation (REDD) through negotiations taking place during a land-use planning process.

Keywords: land-use planning, participation, negotiation, role-play, landscape simulation, uplands, Lao PDR.

5.2 The challenges of land-use planning in the uplands of Lao PDR

Land-use planning (LUP) has long been used as a policy instrument to achieve environmental and socio-economic goals of those developing countries which depend on agriculture and natural resources for the subsistence of a mostly rural population. More recently, LUP has been embedded in international debates on biodiversity conservation and Reduction of Emissions from Deforestation and Degradation (REDD), financial mechanisms that aim at rewarding local communities for biodiversity and carbon efficient management practices. The concrete implementation of such a mechanism is struggling with questions related to land demarcation and tenure, and resource rights. By addressing these concerns, LUP is increasingly perceived as a key instrument for the implementation of financial mechanisms for conservation at the local level (Blom *et al.*, 2010). Furthermore, LUP is a prominent policy instrument considered for preventing international 'land-grabbing'. Deeply rooted in the current food and economic crises, unclear land tenure in developing countries is putting them at risk of becoming victims of private investors instead of partners in sustainable development (Cotula *et al.*, 2009; Godfray *et al.*, 2010). Land titles issued after local negotiations through participatory LUP could both prevent land grabbing and provide incentives for more responsible management of natural resources (Fitzpatrick, 2005; Cotula *et al.*, 2009). After the Rio Conference in 1992 and the advent of the sustainable development paradigm, LUP has been promoted as a method to "*select and put into practice those land-uses that will best meet the needs of the people while safeguarding resources for the future*" (FAO, 1993). Coherent and effective land-use planning is especially required in the mountainous regions of developing countries where difficult market access entangles local communities in subsistence agriculture and insecure livelihoods (Millennium Ecosystem Assessment, 2005).

In Lao PDR, despite the early promises of LUP in the 1990s, LUP has been criticized and depicted as a coercive policy instrument forcing populations to stop shifting cultivation in the name of environmental preservation, without providing alternative livelihood options (Ducourtieux *et al.*, 2005). Today, the top priority of the Lao Government, for the 75% of its national territory covered by mountains, is to alleviate poverty while preserving the natural resource base (Lestrelin *et al.*, in press). Land-use planning remains a key policy instrument to encourage resource use intensification, favour private investments, develop commercial agriculture and, most importantly, reduce the rural population's dependence on forest resources. However, assessments of LUP implementation and its impact on landscapes and livelihoods have revealed certain deficiencies in the process resulting in a gap between the expected outcomes and the actual achievements (Ducourtieux *et al.*, 2005; Fujita and Phanvilay, 2008; Lestrelin *et al.*, 2011b). Consequently, all stakeholders in the national "LUP arena" came to recognize the need to improve the LUP process through increased participation, scale integration, harmonization of superimposed plans together with enhanced coordination between the

implementing agencies and other economic sectors (MAF-NLMA, 2009; Lestrelin *et al.*, 2011a). The principles of Participatory Land-use Planning (PLUP) have been promoted as an alternative to the previous, suboptimal practices. Lao implementing institutions and line agencies at different scales have been requested to use the new code of conduct described in great detail in the widely distributed PLUP Manual (MAF-NLMA 2009). In 2010, the implementation of these new guidelines by pilot projects has shown that the translation of the new PLUP principles into concrete actions remains awkward and the participation of local stakeholders still abusively taken for granted (Lestrelin *et al.*, 2011b). Asking the same people with the same means to do things differently on the basis of a new set of guiding principles resulted in serving the same old soup in a new pot, with the same limited results as before.

Promoted as a method to translate strategic principles into actions (Rist *et al.*, 2007), collective learning is emphasized in this paper as a way to effectively engage marginal uplands communities in a participatory process of land-use planning. A learning tool called 'PLUP Fiction' has been developed (i) to simulate the changes in landscapes and livelihoods in relation to zoning and (ii) to involve members of village land management committees (VLMC) in the exploration of alternative land-use scenarios. The role-play, based on a game board mimicking a typical landscape of the northern uplands of Lao PDR, is a product of the companion modelling approach (Bousquet *et al.*, 2002; Boissau *et al.*, 2004; Etienne, 2010). Furthermore, 'PLUP Fiction' has been designed to provide a learning support to land zoning, which is a key stage in the land-use planning process (Bourgoin *et al.*, in press).

After a presentation of the participatory simulation tool, illustrated by a case study in the mountains of northern Lao PDR, this paper discusses the quality of participation achieved through this innovative method.

5.3 Case study sites

The study site is located at the border of Nam Et – Phou Loey National Park in Viengkham District, Luang Prabang Province (Figure 11). Since one of the objectives of PLUP is the integration of multiple scales and perspectives it was decided to test it at the village cluster (*kumban*) level by including all six villages of the Muongmuay *kumban* in the PLUP process. The two main ethnic groups present in the study area are the Lao Lum (20%) and the Khmu (80%), which are known to settle respectively in the valley bottoms and in the hillsides (Chazee, 1999). The land-use systems in upland areas are comprised of rotational upland rice with limited areas of lowland paddy rice, and a range of other crops, i.e. annual food crops (leaf vegetables), cash crops (maize, pigeon pea, cucumber, longbeans, and watermelon), and perennial commercial tree crops (tea, teak, agarwood, and rubber), large livestock (buffaloes and cattle) and small livestock (pigs and poultry). The

collection of non-timber forest products (NTFPs) is also an important component of the livelihood system by acting as a safety net in periods of food scarcity and a complementary income source for villages with sufficient market accessibility.

In 2010, the 'PLUP Fiction' role-play was introduced in the six villages of the Muongmuay *kumban*. While 'PLUP Fiction' does not explicitly refer to land management at the *kumban* level, it trained members of the village land management committees to manage their own village landscape. Then, some of them deal with higher level land management issues as representatives of their village at the village-cluster land management committee. Only two villages in this *kumban* had previously experienced land-use planning in 2006. However by 2009 nothing remained of this LUP experience conducted by the district authorities with the support of a development project, except for a wooden board with a painted land-use map at the entrance to Bouami village. In the meantime, all written records and documentation had disappeared and only a few people had a vague memory of a mapping exercise having taken place in their village.

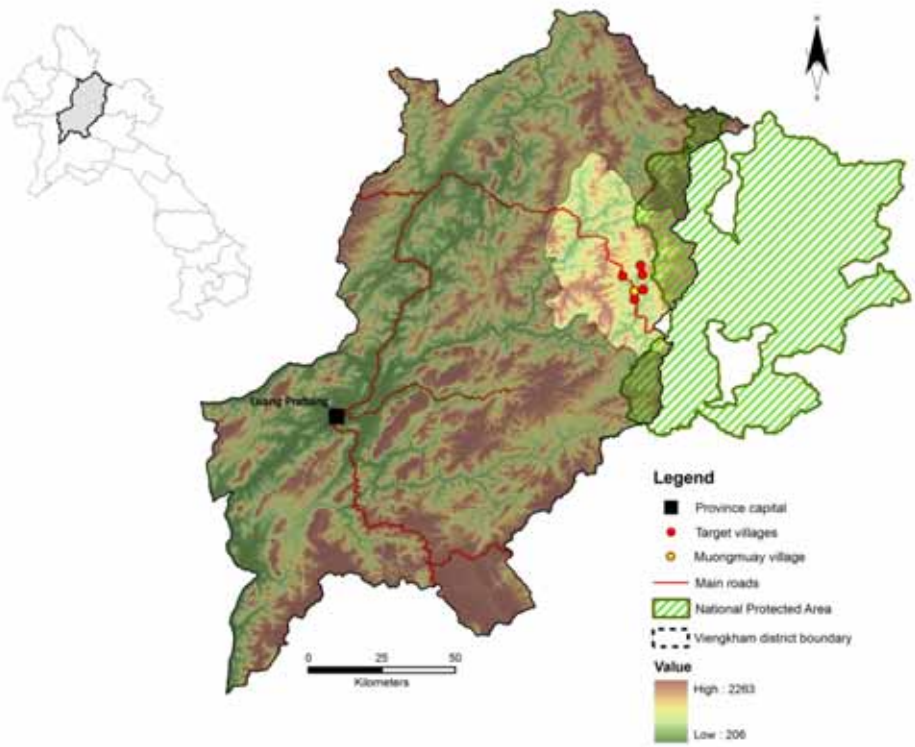

Figure 11. Location of the case study site in Viengkham district, Luang Prabang province.

5.4 The successive stages in the 'PLUP Fiction' role play

The seven member implementation team consisted of two local staff from the district line agencies (the Department of Land Administration and the Department of Agriculture and Forestry), two provincial staff from the northern branch of the National Agriculture and Forestry Research Institute (NAFREC), one staff member from the Provincial Agriculture and Forestry Office (PAFO) and was facilitated by the two authors who are with international research institutions. The district staff was of *Khmu* ethnicity and could therefore introduce the role play and facilitate the discussions in the local language. The PAFO staff could also interact with local people in Khmu language and therefore minimum translation from *Khmu* to *Lao* language was required in five of the six villages that were predominantly of Khmu ethnicity.

The role play was performed over one and half days in the meeting room of each village. A meeting of the whole village was held in the morning of the first day to inform the villagers about the PLUP process that would be organized in their village over a five-day period. Once villagers had been informed about the process, the team proceeded to the selection of the 12 villagers who would become members of the village land management committee after participating as players in the 'PLUP Fiction'. The village authorities assisted in the selection so as to achieve a gender balance and to include people from different socio-economic backgrounds and positions within the village governance system. The people chosen also had to be able to communicate easily and to be knowledgeable about land matters.

5.4.1 The simulation board

A simulation board with 100 one-hectare-cells was used to introduce the virtual landscape to the participants. Each cell could be used to show a different land cover/use. Landscape and household survey study (Castella *et al.*, 2011) were used to derive the relative percentages of the different classes of land cover. The authors designed the spatial distribution of the different land cover areas on a grid so as to recreate a "typical" landscape of the northern uplands of Lao PDR (Figure 12). All classes of land cover found in the region are represented: agricultural land, made up permanent crops (e.g. paddy rice in the valley bottoms, and maize and cassava on the hillsides) and rotational crops (e.g. upland rice), grasslands generally used for extensive livestock grazing (e.g. cattle and buffaloes), tree crop plantations (e.g. teak and rubber), residential areas including gardens, and natural vegetation of two classes: shrub and forest. A road and a river appear on the board to make the landscape look more realistic while ensuring that the configuration did not exactly match any of the six villages of our study site. Such an abstract landscape representation aims at removing participants from considering the situation of their own village and ensuring that they remain focused on the simulation rules and principles instead of being distracted by any pragmatic local concerns.

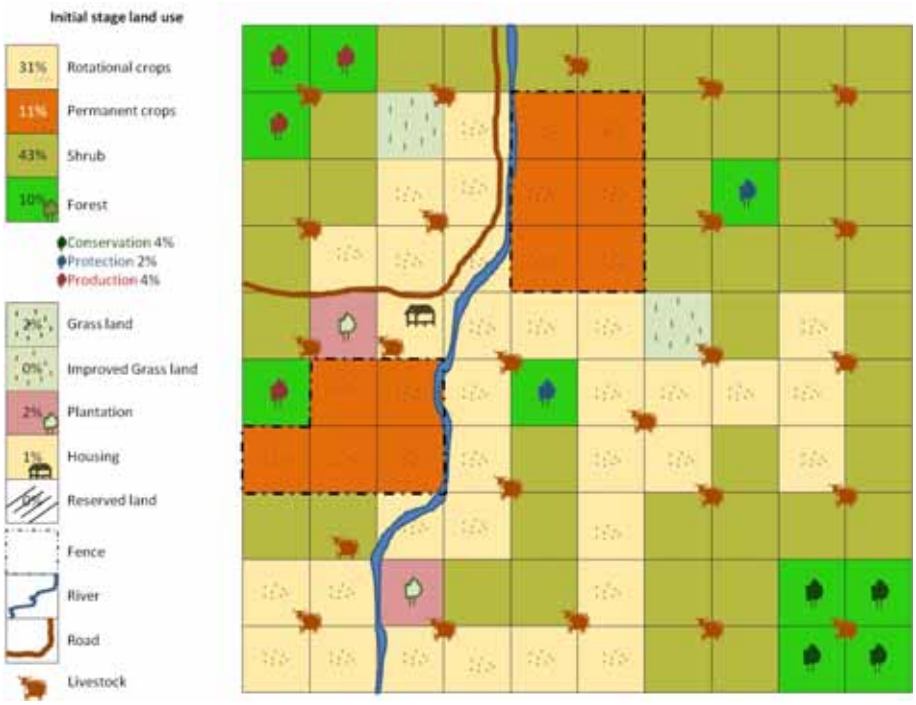

Figure 12. Landscape simulation board.

5.4.2 Participants' roles in the land zoning simulation

The twelve players drew different cards to determine their various roles: eight red cards as members of the village land management committee, two yellow cards for representatives of the district economic development division and two green cards for representatives of the district forest and environment division (Figure 13). The rights and responsibilities of the different stakeholder groups were introduced. The eight village representatives do not play the role of individual villagers but have to consider themselves as members of the village agriculture and forest land management committee (VLMC). As a rule of the simulation, the two district representatives involved in economic development find their satisfaction in the level of income generated by the whole village. On the other hand, he two forest division representatives value biodiversity preservation and carbon storage.

5.4.3 The sequence of the role play

As previously mentioned, the purpose of the role play is to support the participants to negotiate (not to predict future changes) and reach a trade-off outcome, satisfactory for all the villagers and the government representatives responsible for both the environment (biodiversity/carbon) and village economies. Emphasis is placed on the need to consider and integrate socio-economic data in the land zoning process (see next section). Through the role play, depicting an abstract version of the village situation, the objective is to train the 12 villagers in taking up the function of VLMC members responsible for zoning and planning activities on their real landscape. To this extent, the players need to learn how different landscape patterns generate contrasting economic and environmental returns.

The parameters of the simulation tool are discussed with all participants, e.g., agricultural and NTFP income in kip, livestock carrying capacity and labour force required for each land-use. The team calculates the income associated with the different land-uses from crops, livestock and NTFP collection. Then, biodiversity and carbon values are computed for each land-use and compiled for the whole landscape.

Finally, with the help of the facilitators, the participants assess the future land-use plan on the basis of the economic and environmental value of each land-use type. If all are satisfied with the plan as compared to the current land-use situation, then they can reach an agreement. If one or several stakeholder groups are not satisfied (i.e. they lose in the new plan in comparison to the previous one) or have identified room for improvement, the whole group engage in a new round of negotiation. Several iterations of land zoning simulations can be performed before a general consensus is reached and the final plan is collectively agreed upon.

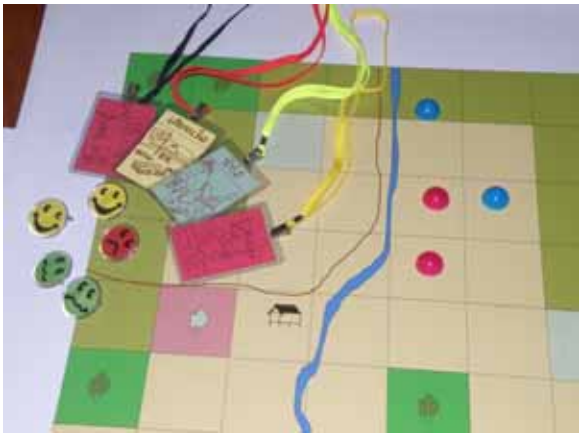

Figure 13. Landscape simulation board with caps representing livestock. The cards, drawn by the players, assign different roles to the players during the simulation. The 'smiley' faces show their level of satisfaction.

5.5 Learning the principles of land zoning

Assessing the environmental and economic value of a landscape is core to the iterative process of land zoning during the role play. The facilitators introduce the notions of economic return from land and labour, village labour capacity to implement a land-use plan and environmental return to assess the progress or the regression made between two successive zoning simulations.

5.5.1 Economic returns

All parameters used for the landscape simulation are elicited from the villagers through an interactive process of individual justification and collective validation of the proposed values. For each land-use type present in the village (e.g., forest, grasslands, permanent crops) four parameters are requested: agricultural income (kip/ha), income from gathering non-timber forest products (kip/ha), livestock

carrying capacity (i.e. number of head of livestock that can be raised on one ha without depleting fodder resources), and labour requirements in man/year/ha. In some cases the participants engage in a collective discussion to determine the 'average' value of the parameter for their village that is then set as the common basis for further calculations.

To estimate the economic value of a land-use plan, the income derived from all income generating activities (i.e. cropping, NTFP gathering and livestock raising) is computed for each cell according to the land-use type which is assigned during zoning. Several approximations are made. For instance, estimating the return from NTFPs is not straightforward as their spatial distribution in the landscape is irregular and the patterns of NTFP collection depend on their distance from the village. Consequently, NTFPs are assumed to be distributed evenly in the landscape with an economic return depending solely on the land-use type. Livestock presence on certain land-use types was considered as being detrimental to agricultural productivity and thus negatively affecting the income from NTFP collection and agricultural activities. Cattle and buffaloes, unless kept in fenced plots, usually roam freely in a continuous space around the village. To estimate the potential number of livestock in the landscape, we associate a carrying capacity with the different land-uses. Defined by experts, this potential number of animals per hectare of a given land-use is associated with the average income for an animal in the calculation of livestock returns to land.

An example of village parameters for the role play is provided in Table 7. These approximations avoided making the calculations too complicated. They had no influence on the negotiation and decision-making process. The same village specific parameters were used for the real land zoning activity the following day.

5.5.2 Labour capacity as a limiting factor

The labour force available at the village level is a major constraint to the realization of a land-use plan. In non-mechanized mountain agricultural systems, a single value of return on labour and labour requirement is associated with each land-use type as these two parameters are directly related to the amount of manual work people can provide. In spite of physical constraints (e.g. elevation, slope, distance, soil), a fixed value has been assigned to the labour requirement: the number of people needed to farm one hectare under a given land-use. The total village labour force obtained from household surveys is systematically compared with the labour requirement of each land-use plan. The latter is computer by multiplying the labour force value associated with each land-use type by the area of each land-use type of the zoning simulated across the village landscape. The players can then assess by themselves the realism or feasibility of a land-use plan.

5.5.3 Environmental returns

The environmental quality of the simulated landscape is based on two simplified indices, namely biodiversity and carbon (Table 7). These indicators, ranging from 1 to 4, score the level of biodiversity/carbon of the land-use type considered per ha. On the 100 one-hectare-cell board, the biodiversity and carbon index for the whole landscape may thus vary from 100 to 400. This fuzzy system was preferred to the introduction of complex formulas and numbers derived from biodiversity and carbon assessment performed in the target site. With primary school level of education, the proposed environmental concepts would have been difficult for the participants to grasp. Plant and wildlife diversity was clearly understood due to the proximity of the national park and to awareness campaigns on biodiversity preservation. However, carbon storage and gas emissions remained very abstract concepts.

LAND-USE	**Agricultural income (kip/ha)**	**NTFPs return (kip/ha)**	**Livestock capacity (head/ha)**	**Labour requirement (man/ha)**	**Biodiversity index**	**Carbon index**
Conservation forest	0	3,000,000	0.5	0	4	4
Grass land	0	100,000	1.5	0.1	1	1
Permanent crop	2,500,000	200,000	0.5	1	1	1
Shrub	0	0	0.5	0	2	2
Production forest	2,500,000	5,000,000	0.5	0	3	3
Protection forest	0	2,500,000	0.5	0	4	4
Rotational Crop	600,000	1,500,000	1	0.25	1	1
Plantation	4,000,000	100,000	0	0.1	1	2
Livestock area	0	100,000	1.5	0.25	1	1

Table 7. Parameters of the role play.

5.6 Participatory simulation of land zoning

5.6.1 Understanding current land use

The participatory landscape simulation begins with the delineation of current land-use systems on the board. First, players have to divide agriculture areas between rotational and permanent crops. Then, they classify the forest land into several types (i.e. production, protection, and conservation) in accordance with the Lao Government forest policies (MAF-NLMA, 2009). Practically, a transparent paper is overlaid on the board and the players draw areas with different colours of chalks (Figure 14).

Finally, they discuss livestock management and decide which land will be used for cattle grazing, and whether the animals will be left roaming free or enclosed. Livestock management is indicated on the board by placing tokens representing the number of head of livestock in the different land zones. At the end of the delineation process, the economic and environmental returns on land are calculated. Figure 15 illustrates how different types of information are combined to generate the simulation outputs: land zones, environmental and economic returns and labour requirements.

Figure 14. Villagers involved in land zoning simulation.

The facilitation team proceeds to the computation of all the values with the villagers. Booklets and calculators are provided to the participants to allow them to do their own calculations and compare with others. While the agriculture and NTFP return on land is a direct combination of the area and the return per hectare of each land-use type, livestock return is calculated by multiplying the average income for an animal, the livestock capacity and the area of each land-use. As shown in Figure 15, the village income is the combination of livestock, agriculture and NTFP return on land along with the off-farm income corresponding to 3.5% of the income generated by the village (value obtained from household surveys). Finally, the profit for each labour unit is obtained by dividing the village income by its total labour force.

The economic results pertain to the current land-use. However, not all villagers are benefiting to the same extent. At this stage, the facilitators underline the inherent inequity amongst villagers in relation to land-use and access to land. The way people use the land is related to their livelihood and when the landscape changes due to a modification of the land-use plan, different farmer types will be affected differently. As a consequence, a household typology developed by Castella *et al.*,(2011) is used as a way to differentiate several land-use strategies and take into account heterogeneity in household types within villages.

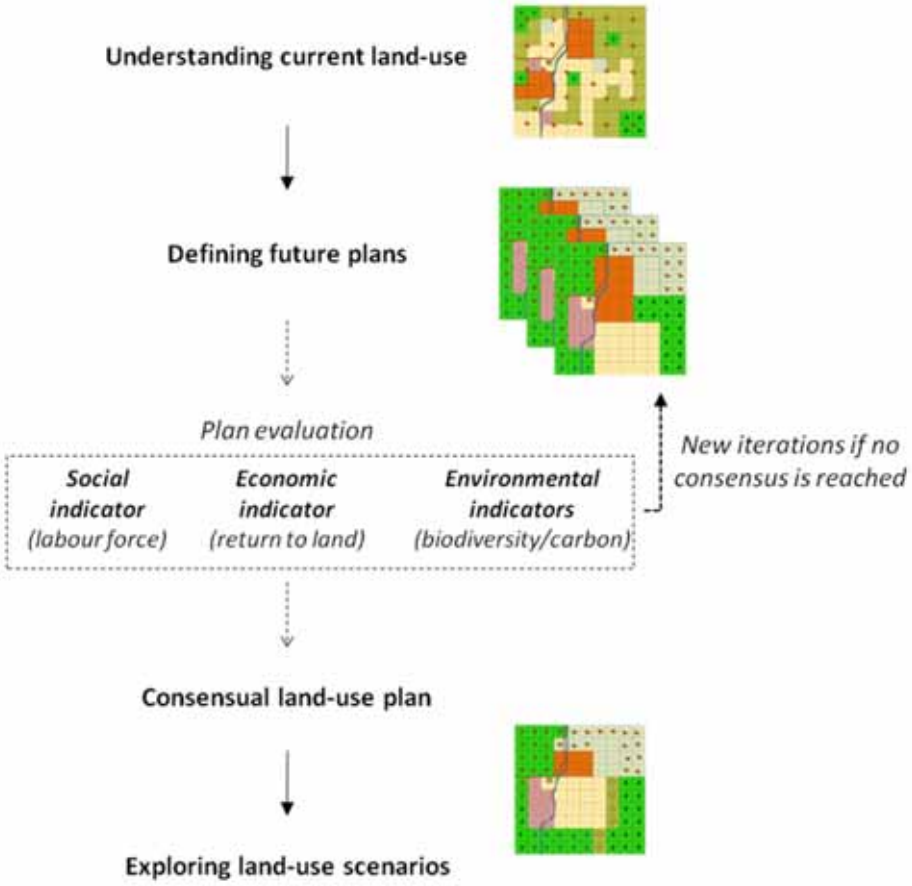

Figure 15. Successive stages in the economic calculation.

Table 8 represents the contribution of each income generating activity to the overall income of each type of farming system. To summarize, the four farm types from A to D represent a sequential shift of livelihood improvement and capital accumulation observed in many upland areas of northern Lao PDR. The first type (A) includes subsistence farmers dependent on upland crops under shifting cultivation and NTFP gathering for their livelihoods. The B type farmers are able to accumulate rice surpluses and invest in livestock. Then, type C has moved ahead with investments in tree plantations of teak or rubber while type D is involved in off-farm activities (e.g. trading) and thus is less dependent on the forest and agricultural land.

	A	B	C	D
Permanent crops %	47	34	7	12
Rotational crops %	58	27	8	7
Plantations %	11	11	55	23
Livestock %	7	48	15	30
NTFPs %	58	33	9	0
Off-farm %	21	2	17	60

Table 8. Relative importance of land-uses for the different types of households.

Written on the back of their farmer game card, the players discover at this stage which type they belong to and thus, which strategy they will need to adopt in the next iteration of the simulation to fulfil their requirements. The first calculations are done by hand to spark the logic of associating different variables with land surfaces. Then, to avoid arduous calculations, the facilitators switch from paper and hand calculators to computer assisted calculations using an Excel spreadsheet. As a result, the players get the return on labour for each household type according to the relative contribution of each land-use type to their income.

5.6.2 Designing future plans

Once the participants have understood the simulation mechanisms on the current land-use, they are asked to negotiate a future land-use plan that would increase the economic and environmental value of the landscape. After each round, the players choose between three different pins representing three levels of satisfaction regarding the current plan in comparison with the previous one and their expectations with respect to the role they play. If the new zoning improves their situation they show a yellow smiley, if it remains the same they show a green smiley and if it is worse they show a red smiley (Figure 12). The planning iterations continue until all players are satisfied (Figure 13).

In Muongmuay village for example (Figure 11), the zoning simulation went through four stages of negotiations (Figure 16).

Table 9 shows the evolution of the output variables. Figure 17 plots the income values and the landscape changes. Throughout the simulation, the players tune the spatial arrangement of zones in the landscape to improve the income of the respective household type they represent. We noticed that the percentage of agricultural (rotation and permanent) and forest areas (conservation and protection) evolved throughout the successive iterations. In Muongmuay (Figure 18) as in all other villages the same trend was observed, i.e. a gradual decrease in agricultural areas and an increase in forest areas until reaching the point of an equal share between the two types of land cover.

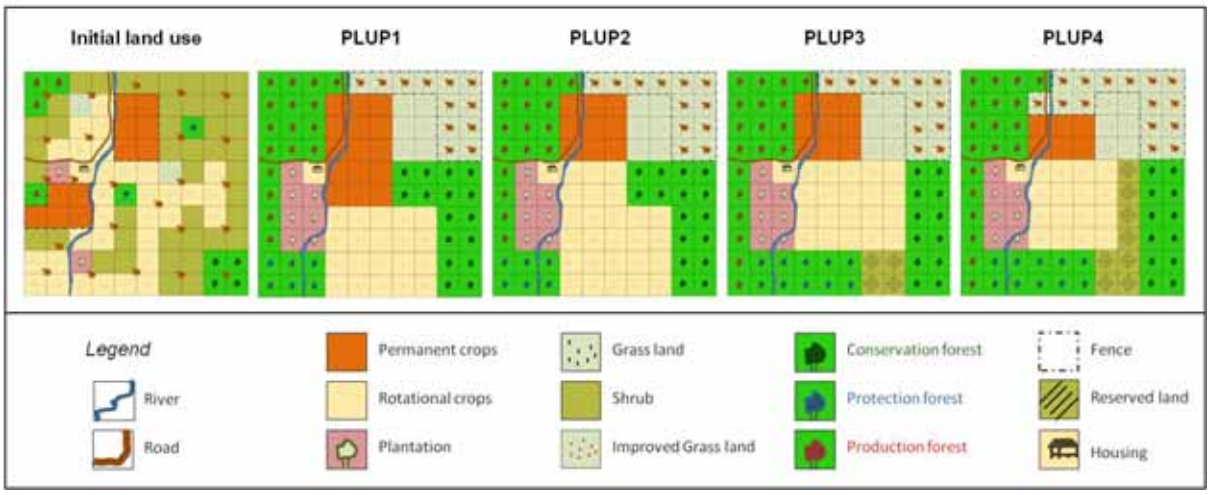

Figure 16. Successive land-use maps as defined by participants through negotiation.

	Initial land-use	**PLUP1**	**PLUP2**	**PLUP3**	**PLUP4**
Overall annual income (million kip)	240	422	407	402	380
Average annual income per labour unit (million kip)	12.6	19	23	24.8	31
Share A type households (million kip)	10.3	15.3	18.6	19.8	24.2
Share B type households (million kip)	13.9	19.8	23.9	25.8	32.5
Share C type households (million kip)	15	27	33.5	36.8	47.7
Share D type households (million kip)	22.1	32.5	37.9	42.1	55
Biodiversity value	169	200	200	200	196
Carbon value	171	207	207	207	203
Number of livestock	29.5	36	36	36	40.5
Labour force needed	18.95	22.2	17.7	16.3	12.2

Table 9. Output variables of land zoning simulation in Muongmuay village.

5.6.3 Exploring land use scenarios

The second phase of the role-play is introduced once the village land management committee has reached an agreement on a virtual land-use plan and learned how to negotiate conservation vs. development trade-offs with different village and district stakeholders. A scenario exploration exercise was conceived as a way to sensitize participants to the fact that their land-use plan is not a once-and-for-all plan, carved in the stone, but one which should be revisited regularly. This activity stresses the way in which PLUP adapts to external and unexpected circumstances. Two scenarios were suggested to the participants as being relevant to the specific context of land-use planning in the study region:

The *first scenario* is introduced by a facilitator playing the role of a foreign investor planning to invest in the village. He requests a land concession of 20 ha (from the total 100 ha of the village) to develop a rubber plantation. The first land rent proposed was 100,000 kip/ha. Village participants were recommended to negotiate the price, the total area and the spatial distribution of the concession in the landscape (one big block or fragmented plots) with the investor. Indeed, land-use planning is recognized as a way of preventing land grabbing by foreign companies. This is currently a burning issue in Lao PDR where neighbouring countries are negotiating land leases for tree plantations, mining and hydropower investments (Dwyer, 2007).

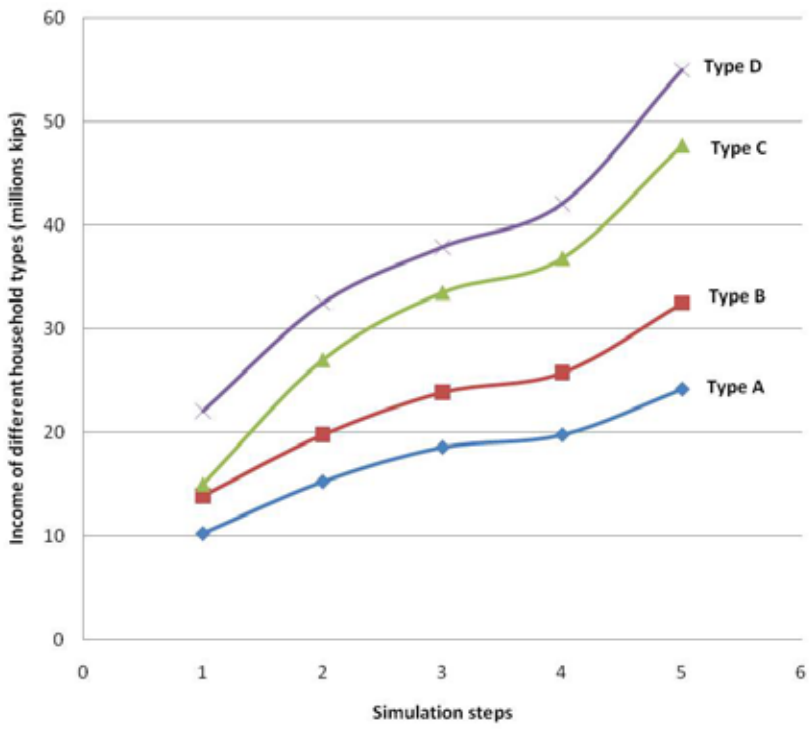

Figure 17. Evolution of income for different household types.

Some conclusions could be drawn from testing this scenario on six village land management committees. Participants always looked dubious when the scenario was presented. Two villages refused to adapt their land-use plan and protested against the low income received per hectare for the lease in comparison with the agricultural income they could generate themselves from this land. Explaining that the land belonged to their children, some players were concerned that reducing the village area by giving out a large share of their land to foreign companies would be detrimental to their future generations. Further, villagers argued that by paying land taxes to the government, they should have the right to turn away investors even those with district support. They realized that in the absence of formal village land-use plans and land registration, their land was still at the mercy of foreign and domestic investors.

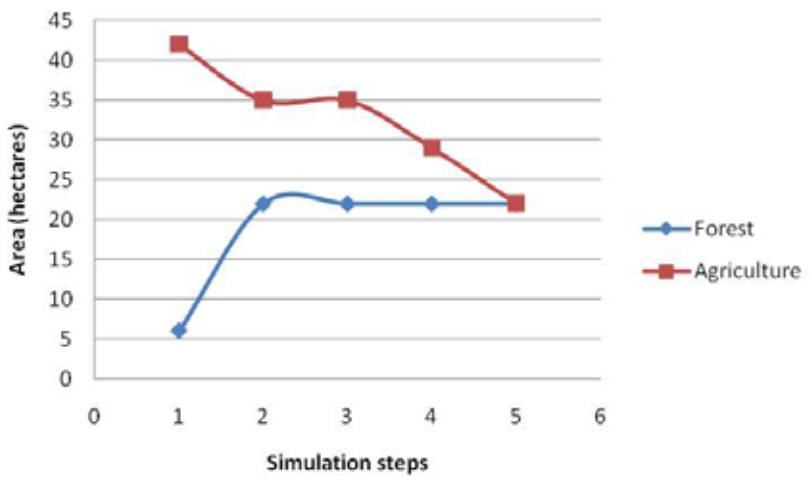

Figure 18. Evolution of agriculture and forest areas throughout the simulation.

In other villages, players accepted the project because it was backed-up by the district authority and they thought they could not resist. Nevertheless, they were determined to provide only the minimum of hectares from their plans and to strongly negotiate the price per hectare by always comparing with the lowest income generated by their agricultural practices (opportunity cost). The participants also emphasized that the negotiation for land lease should remain an individual deal between the company and the villagers willing to give away their lands.

The *second scenario* involved a payment for environmental services, i.e. carbon credits through the REDD scheme. This time, village participants were rewarded for their forest area at the rate of 1 million kip per ha per year. In every village the concept was approved while sometimes being questioned in terms of durability. While not being reluctant to increase their forest area, the players negotiated which land should be converted. It was clear that mainly community land should be targeted for forest expansion under a REDD scheme. Land tenure issues and payment redistribution mechanisms were discussed and agreed upon by all members of the community. As a result they converted mainly production forests (or village use forest) where they can access wood, wildlife and NTFPs and that are officially classified as village land while protection and conservation forests are considered as state land under the Land Law.

5.7 Key lessons

In all six villages of Viengkham District where 'PLUP Fiction' was tested in 2010, participants showed a great deal of interest in the role play. A two-stage validation of the learning approach was conducted. Debriefing sessions after the role play were organized with the village participants and village/district observers to collect their first impressions. Then, a few months later a survey was conducted with a gender balanced sample of villagers selected randomly, and with the twelve

members of the land management committee who had been involved in the PLUP Fiction role play. The feedback received from the members of the village land management committees who were involved in the experiment was really positive. Villagers had usually been confined to the role of observers, while in this exercise they were fully involved in all stages of the land-use planning process and became actors in the design of their village land-use plan. Through an inexpensive learning phase taking only a couple of days, the key elements of PLUP could be introduced to and manipulated by simple villagers who reported that they had progressively understood the zoning issues at stake and put themselves in the shoes of members of their village land management committee thanks to the role-play. They felt empowered by the landscape simulations and scenario explorations they went through. The participants felt confident with the results of the simulations as they had generated the parameters for their own village; they understood the sequence of actions and did the calculations themselves. They learnt that a plan has to be negotiated and they somehow felt like better negotiators. While players were working on an artificial landscape, they often referred to existing areas of their real village and used local names to describe places on the board. Having their village situation in mind, the way participants defined land-use arrangements was far from trivial. The knowledge gained from the zoning simulation was then of great value when the same people got involved in the actual delineation of zones for their own village the next day. Beyond the empowerment of the participants as members of the newly created VLMC, the usefulness of the method for the actual zoning the subsequent day provided a second stage of validation.

From a researcher's point of view, the exercise was successful in that it increased awareness of the impacts of land zoning on local livelihoods and the environment. The method has also proven capable of integrating biophysical and socio-economic data at the landscape level in a simple, yet knowledge intensive, learning tool. In fact, the results of more traditional interdisciplinary research conducted from 2008 to 2010 in the northern uplands region were encapsulated in the role play in such a way that the main findings could be delivered efficiently to the local population through a learning-discovery process. Land-use change analysis from satellite imagery, biodiversity studies, household surveys and geographic information systems, were successfully combined to create this unique learning experience relevant to PLUP implementation in mountainous areas. This preparatory work combined with the researchers' experience helped designing the learning approach that would best fit the local context. The validity of the approach is then limited to the areas that share the same characteristics as the study site, i.e. the uplands of Lao PDR or 75% of the country's territory. The long preparation phase guarantees the validity of the approach in the target landscapes and then allows villager engagement in a learning pathway relevant to their local situation in only one day with a trained team of a couple of facilitators.

The land zoning simulation should also be evaluated for its capacity to improve genuine participation and to increase participants' ownership of the results (Lestrelin *et al.*, 2011a). This sense of ownership

of local communities has been described as a key element of success in PLUP (Meadowcroft, 1997). Usually, training in land-use planning is only provided to the implementers. The feedback provided by the district staff who acted as facilitators or observers also pointed out the importance of villagers' empowerment (i.e. by providing the knowledge that will help them understand all the aspects at stake in PLUP) to the quality of local participation. Land-use planners should not consider 'PLUP Fiction' as an optimization tool aiming at finding the best land-use plan nor as a decision support system which would help them ground their decision in empirical evidence, but as a negotiation support tool by which multiple stakeholder groups negotiate their own pathway towards sustainable landscape management.

Part 3. Land-use negotiation platform

Chapter 6. Sharpening the understanding of socio-ecological landscapes in Participatory Land-use Planning. A case study in Lao PDR

Chapter 6 is reproduced from the article press:

Bourgoin, J. (2012) Sharpening the understanding of socio-ecological landscapes in participatory land use planning. A case study in Lao PDR. Applied Geography 34:99-110.

Plate 6. Mountainous landscape between Muongmuay and Huaykon villages (Viengkham district, Luang Prabang province)

6.1 Abstract

In the two decades since the 1992 Rio Conference, Land-Use Planning (LUP) has become recognized as a key instrument in putting discourses on sustainable development into practice. In Lao PDR, despite the implementation problems, it is still seen as a lever for securing land tenure, rationalizing extension services provision, and more recently, for implementing 'Reduced Emissions from Deforestation and Forest Degradation' (REDD) schemes. Impact assessments of past LUP have revealed weaknesses of local institutions in the effective implementation of land policies. In order to avoid the blind trust placed in delusive LUP success stories, methods for monitoring community participation and understanding of LUP activities have been developed in order to assess the *quality of the process*. Expanding on this perspective, this article proposes a method to assess the *quality of LUP outputs* and to visualize the gap between planning objectives and their actual achievements. This method, based on a refined analysis of past and present land zoning practices in Lao PDR, gives full prominence to the complexity of landscape mosaics and the way local populations actually use the land. Furthermore, this approach, developed and tested under real planning conditions, can also be seen as a safeguard and support for inexperienced implementers in their land-use planning practices, as a diagnostic instrument for quality assessment, i.e. level of accuracy of a land-use plan, and may finally pave the way towards becoming a tool for land-use planning certification.

Keywords: land-use planning, participatory landscape simulations, sustainable land management, Lao PDR.

6.2 Introduction

The emergence of participatory approaches as a cornerstone of land management and development programs is linked to the wide recognition of the drawbacks in "intrusive land management strategies" (Agrawal and Gibson, 1999: 630) and the utmost necessity of recognizing the value of local perception and knowledge (Chambers, 1983; Gadgil *et al.*, 1993; Agrawal, 1995; Hage *et al.*, 2010). Described by the United Nations Development Programme as the "central issue of our time" (Craig and Mayo, 1995: 2), participation is also recognized as the main lever to support dialogue and promote the voice of the powerless under the practice of 'community development' (Craig *et al.*,1990). In addition, the integration of local complexity and priorities in the planning process is expected to facilitate further implementation through community capacity-building and the empowerment of local communities (Craig, 2007; Neef and Neubert, 2011). However, certain means need to be defined to avoid rhetoric-only approaches and what Arnstein defined as "empty ritual[s] of participation" (1969: 216).

The methods of involving communities in the assessment of the socio-economic development needs of local populations either through Participatory Rural Appraisal (Chambers, 1994), involvement in Participatory Action Research (Selener, 1997; Reason, 1998) or more generally in Participatory Learning and Action (PLA) (Pretty *et al.*, 1995) are widely applied. The participatory component is usually intended to address local concerns while shifting the decision-making power from the researcher and practitioners to the communities. Promoting active participation beyond mere consultation of local communities, the tools developed under this paradigm encompass a range of village-based interviews and focus groups. Participatory mapping provides a bridging platform between scientists and local communities. This intuitive, adaptive and interactive tool facilitating discussions on local concerns, has been developed as an alternative to conventional mapping by involving local stakeholders in land management processes that influence their future well-being (Kalibo and Medley, 2007; Eksvard and Rydberg, 2010; McKinnon, 2010; McCall and Dunn, 2012). Nevertheless, for some long time, maps have been the exclusive "territory" of national elites who have used landscape representations to reformat, territorialize and assert control over nations' space (Cons, 2005). In the field of critical geography, many authors have highlighted the relationships between mapping and political motivations, and have defined a map as "an abstraction from concrete reality which was designed and motivated by practical (political and military) concerns" and as "a way of representing space which facilitate its domination and control" Lacoste (1973: 1). This "democratization of cartography" is known as counter mapping (Peluso, 1995) and as such, challenges top-down planning with local and community maps (Crampton 2010: 37). This approach proposes "maps of people's claims" (Peluso 2005: 9) over resources which are often used as negotiation tools to clarify tenure rights and mediate land conflicts (Rocheleau, 1995; Chapin *et al.*,

2005; Peluso, 2005; Cronkleton *et al.*, 2010). Since the late 1990s, the spread of geo-visualization tools for participatory planning have enabled non-experts to manipulate and explore spatial data (McCall and Dunn, 2012). Participatory Geographic Information Systems (PGIS) are now used to involve local communities in addressing a whole range of natural resource management issues, i.e. tenure rights, land conflicts and integration of tacit knowledge in resource management (McCall, 2003; Chambers, 2006; Rambaldi *et al.*, 2006; Castella, 2009; Bernard *et al.*, 2011; MacCall and Dunn, 2012).

Participatory Land-Use Planning (PLUP), a form of PLA, is aimed at translating land policies and development discourses into sustainable resource management (Rydin, 1995; Wang *et al.*, 2008). PLUP is supposed to guarantee the involvement of local stakeholders in decision-making thanks to the use of efficient visual and negotiation-support tools. Unfortunately, field experiences are rarely published and it is difficult to assess the quality of methods, processes and outputs objectively (Marchamalo and Romero, 2007; Fox *et al.*, 2008; Hessel *et al.*, 2009).

The Government of Lao PDR (GoL) recently enacted PLUP as a national priority (MAF-NLMA, 2009). However, PLUP is still often considered as a mere upgrade of the former LUP-LA (Land-use planning and Land Allocation) using high-tech tools such as Global Positioning Systems (GPS), Geographic Information Systems (GIS), or high resolution satellite imagery. But, Lestrelin *et al.*,(in press) have suggested that the district staff capacities for PLUP implementation together with the concurrent mandates of different implementing agencies present more problems than do the actual tools used in the field. The tight schedule imposed by the GoL to apply PLUP across the whole country by 2015 is also raising many questions regarding the value of the resulting land-use plans particularly since quantity seems to be favoured over quality of the process, especially in terms of community participation. Furthermore, this may confirm the opinion of certain detractors of Participatory GIS who disparage the inefficient use of information and communication technology in resource management (Abbott *et al.*, 1998; Chambers, 2006). In the absence of real, certified participation, this land zoning enterprise could well serve the interests of agri-businesses requiring free-space for concessions, in line with the government strategy to favour economic growth for the country to emerge from the ranks of the least developed countries by 2020, and *de facto* to legitimize 'land grabbing'. With a myriad of projects involved in PLUP and no harmonized methods, the quality of the work performed on land-use planning is difficult to assess. When people claim that they produce real maps and/or engage in more participatory processes, objective measurement and monitoring tools are even more necessary to improve both process and outputs. In a recent publication, Lestrelin *et al.*,(2011) highlighted the importance of defining objective criteria to gauge the participatory nature of a PLUP process rather than taking this for granted.

Along the same lines, this article proposes a methodological approach for an analysis of both the credibility and legitimacy of PLUP outputs. These terms, defined by Cash *et al.*,(2003), refer to the adequacy of scientific knowledge (credibility) used throughout the participatory process, and the local relevance required to sustain a concrete plan (legitimacy). Throughout the article, the terms accuracy and realism will be used to determine how well a land-use plan fits with the local situation. An inaccurate plan is thus defined has one being beyond the range of possible local implementation. Two research questions are thus addressed:

i. How can the quality of a PLUP output be assessed and the gap between PLUP principles and practices visualized? and
ii. What can be done to fill the gap and progress from hazy to sharp land-use plans?

In the first section, the discrepancies between current planning applications and their intended principles are acknowledged, while the second section introduces a new approach to participatory land-use planning aimed at providing not only a certified output in terms of participation and rational planning, but also a tool for the assessment of the quality of a land management plan. Here, the quality of the PLUP output is also defined as truly representative of the quality of the process.

Moreover, this innovative approach is also original in its multi-scale perspective of the planning process. The land-use planning and land allocation (LUP-LA) agenda was performed only at the village level, while the PLUP field activities performed at the village cluster (*kumban*) level make it possible to overcome problems related to confused land-use plans across scales (Lestrelin *et al.*, in press).

6.3 Hazy context of LUP in the uplands

6.3.1 How haziness in village land use and land tenure system affects PLUP outcomes

The GOL's goal of sustainable development translates in terms of policy objectives in balancing the trade-off between (i) poverty alleviation and (ii) economic growth in order to lift the country from the list of Least Developed Countries (GoL, 2006) while protecting the environment and restoring the forest cover from the current 41% to 70% of the national territory by 2020 (GoL, 2005). In rural areas where 80% of the population lives, subsistence farming based on shifting cultivation is still common due to the limited availability of flat lands suitable for irrigated paddy rice cultivation or diversification to commercial crops, and to poor market accessibility. Shifting cultivation is described as an agricultural practice that is "primitive, unproductive and harmful to the environment" (Haberecht 2009: 29), and as one which causes deforestation, soil degradation and erosion (Lestrelin, 2010). The GoL is deeply concerned about the social, economic and environmental impacts of deforestation. In fact, most of the rural population relies on the forests for timber, food, fuel, fiber,

shelter, medicines, and spiritual protection (GoL, 2005). But at the same time, forests contribute to the Gross Domestic Product through timber exports to neighbouring countries. Over the past few decades, successive land policies have aimed at settling, intensifying and modernizing upland agriculture with the underlying goal of eliminating swidden agriculture and moving from subsistence to commercial production so as to meet domestic needs and expand exports (GoL, 2006; Rigg, 2006).

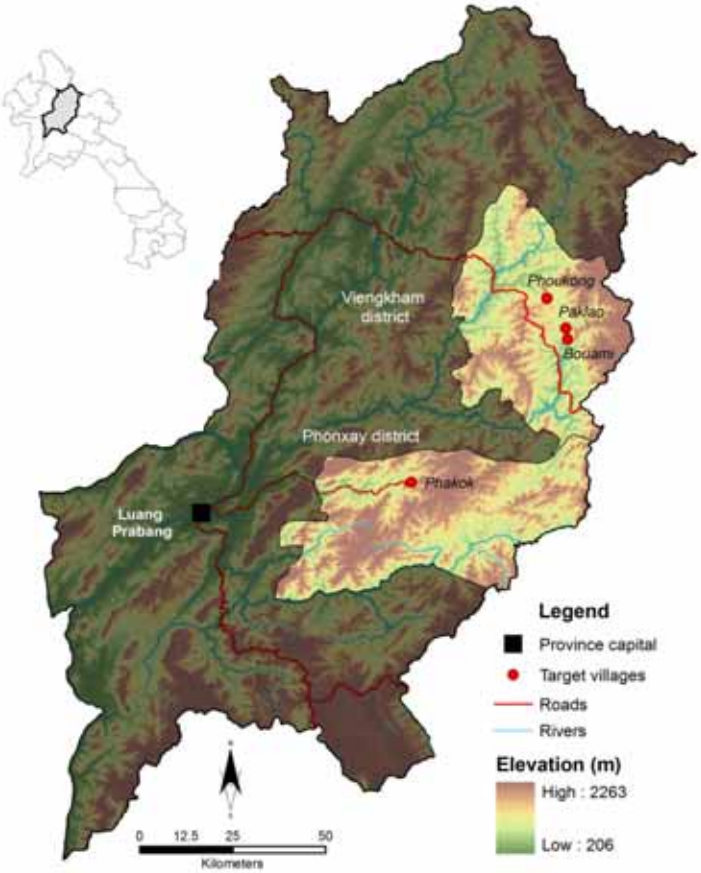

Figure 19. Location of the case study sites in Luang Prabang province.

Even though land is legally administrated by the state in Lao PDR, local management is commonly done through customary practices. In the early 1990s, land and forest allocation policies were designed to establish and clarify land-use rights and to provide incentives to local communities for sustainable resource management (Heltberg, 2002). The legal tenure framework established in the mid-1990s includes the issue of renewable certificates allowing the temporary use right of agricultural land (LSFP, 1997). Although the plans seemed rather straightforward and simple, when dealing with the uplands cultivated under rotational 'slash-and-burn' practices, the process proved more complex due its dynamic nature. The legally permitted practice of swidden agriculture has informally been rendered unsustainable under LUP-LA by necessitating local shifting cultivators to reduce their fallow

lengths to three years – also known as the 'three-plot policy' (Evrard, 2006). The reduction of the available productive areas has resulted in an artificial pressure on land access and thus the implementers of this policy have been forcing upland dwellers to change their cropping practices. These measures have affected local livelihoods as no convincing alternative cropping practices to cope with this drastic change were proposed (Sunderlin, 2006; Lestrelin and Giordano, 2007).

Through monitoring the impacts of land-use planning policies, many observers have acknowledged the gap existing between the theoretical benefits of land policies and their actual negative impacts on socio-economic development (Sunderlin, 2006; Lestrelin *et al.*, in press). This gap between theory and practice can be partially explained by the lack of human and financial resources (i.e. lack of trained staff to implement land-use policies and scarce amount of money to translate plans into action) together with the absence of follow-up activities (i.e. extension activities, monitoring) impeding the implementation and local adoption of land-use policies (Alton and Rattanavong, 2004; Ducourtieux *et al.*, 2005; Lestrelin *et al.*, 2011; Lestrelin *et al.*, in press). The direct consequence of these inappropriate measures was observed in the field where plans are either not used or simply lost, and where temporary land-use certificates are yet to become formal land titles. These observations motivated a broader analysis of the gap between official tenure rules and their applications.

6.3.2 Measuring the gap

Four villages in Luang Prabang Province were selected as research sites to examine the past and present implementation of land-use planning (Figure 19). In Viengkham district, Paklao, Bouami and Phoukong have been selected so that they cut across a gradient of accessibility and integration to market economy. Similarly, these villages cut a gradient of distance to a prominent National Protected Area (Nam Et – Phou Loey). The villages of Paklao and Bouami underwent LUP-LA in 2006 in a development project which supported the district staff financially and technically. The planning process was a two-day zoning process with a few village leaders without any field visit (Lestrelin *et al.*, 2011). The lack of resources and capacity of the implementing side seems to have hindered a process of which the only visible output is a wooden board at the entrance of both villages displaying the location and areas of the different land-uses within the village administrative boundaries (Figure 20 a, b). The villages of Phakok (Phonxay District) and Phoukong experienced a national pilot implementation of PLUP in 2009 and received abundant project support in the application of the national guidelines on land-use planning (MAF-NLMA, 2009). There, socio-economic assessments through village census and focus groups were coupled with field surveys assisted by GPS. Geographic Information Systems technology was further used to create digital land-use maps (Figure 20 c, d).

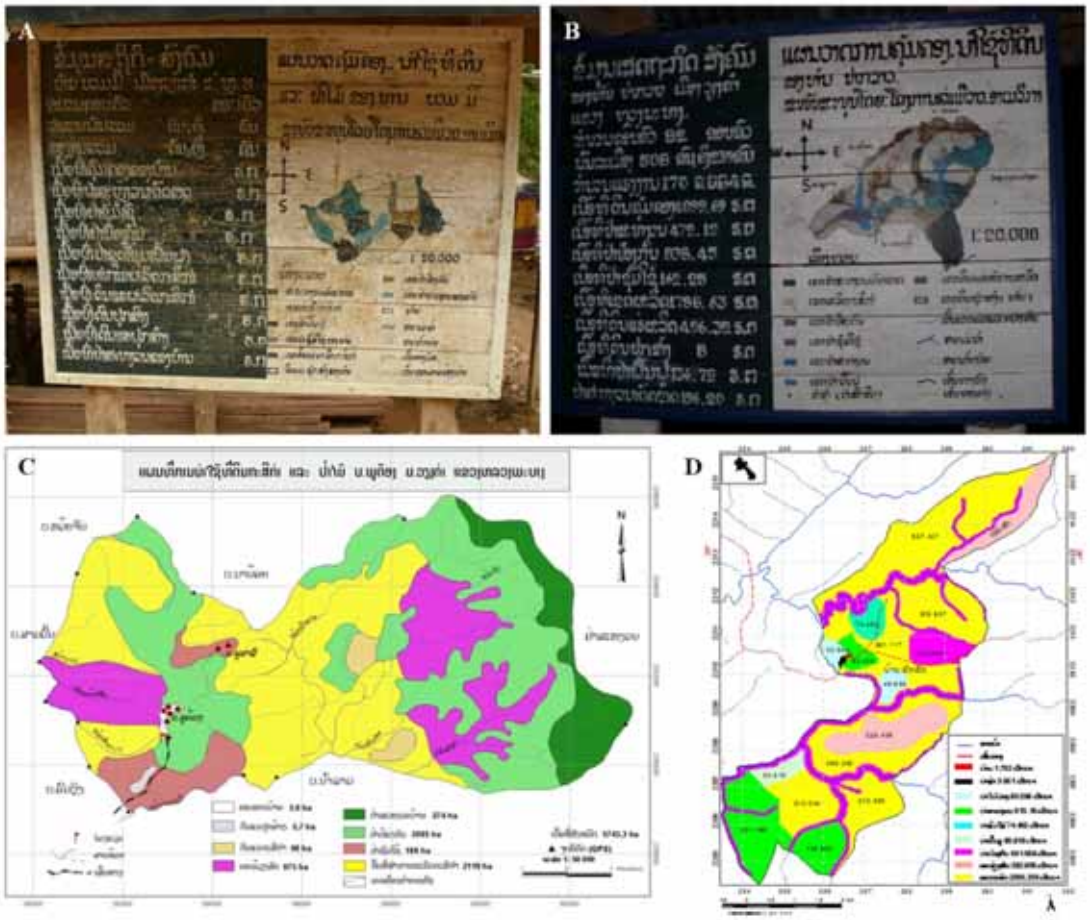

Figure 20. Land-Use Maps for Bouami (a), Paklao (b), Phoukong (c), and Phakok (d).

In these four villages, retrospective surveys were conducted to gather information on the local land-use. The data collection focused on plot areas, numbers and locations as well as the labour force available to each household. The survey revealed that the average number of hectares of agricultural land per household is 4 ha in Paklao, 5.1 ha in Bouami, 4.4 ha in Phoukong and 3 ha in Phakok. Thus it would appear that the national strategy enforcing the reduction of shifting cultivation and fallow periods has been effectively implemented (Lestrelin *et al.*, 2011). However, a comparison of the numbers gathered from household surveys with those acquired from the outputs of the past zoning discloses evident discrepancies between the two sources of information (Figure 21). For Bouami and Paklao, satellite imagery analysis corroborates the existing gap. In a context of shifting cultivation, ground surveys and secondary information (e.g. old land-use maps, forest cover maps, and digital elevation models) were used to support analysing Landsat images for 2009 (Kongay *et al.*, 2010; Castella *et al.*, 2011). In addition, the 'landscape mosaics' approach helped creating generalized land-use types (Hett *et al.*, 2011). This analysis shows that in Bouami and Paklao 1,370 ha and 1,908.7 ha respectively are classified as land under agriculture. This gives an average land area per household of 22.1 and 28.5 ha per household comparable to that found in the land-use plans displayed on the wooden boards (Table 10). The existence of this discrepancy between the area declared as agricultural

lands by the people and the area available is a recurrent issue that experts also raise at the national level: “land-use plans [from LUP-LA] do not depict the reality and it seems that an incomprehensible gap exists between what people say they have and what they actually use as agricultural land” (personal communication, 2010).

	Paklao	**Bouami**	**Phoukong**	**Phakok**
Land-use planning	LUPLA 2006	LUPLA 2006	PLUP 2009	PLUP 2009
Agricultural area from village survey (ha)	268	317.8	314	273.2
Agricultural area from village map (ha)	1,788.6	1,166.6	2,118	1,709.4
Agricultural area from satellite analysis (ha)	1,908.7	1,370	No data	No data
Number of households	67	62	72	90

Table 10. Land-Use Planning Data for Target Villages.

6.3.3 Hypotheses on the origins of hazy land use plans

Two hypotheses can be advanced on the origins of this gap. Either there are flaws in the land zoning methodology and practices or villagers do not declare all their land, maybe as a strategy to avoid land taxes. Field observations show that it may well be a combination of both. Historically, implementers and villagers have learnt to be adaptive to successive land-use policies, and to human and financial resources limitations. In the 1990s, the district was asked to enforce the policy for the eradication of shifting cultivation in order to increase forest cover and accelerate the development of rural areas. With no alternatives to upland rice being offered this experiment became a poverty trap. In order to escape from this trap, local communities responded by communicating false figures on land-use, yields and labour force to please the district authority. In the 2000s, the process was given a ‘participatory’ label. While a certain variability exists in local policy interpretation, the implementers were in general more inclined to approve current land-uses as future plans. As a result local communities received the land they asked for. This was in contrast to the previous period, when the three-plot policy was strictly applied, leaving local communities with a limited range of options to avoid the poverty trap (Lestrelin and Giordano, 2007. These options included changing their cropping practices (in particular through a shortening of the fallow period), moving to other locations in search of flat land for growing paddy, or resisting the policy changes by declaring resources to match to policy requirements and which did not reflect those on which they were really dependent. Neither of the two parties is fooled by the other’s game but over time they have learnt how to manipulate the rules. Land-use planners are entangled in the local interpretation of national guidelines, and district staff do not delude themselves while confessing that “only 30% of the census data collected each year

in the villages can be trusted" (Bounthan 2010, pers. comm.). A tacit agreement seems to exist between communities and implementers to merely satisfy the administrative directives and record the planning activities by setting up a board representing land zones at the entrance of the village. Both sides behave as passive resistant entities sustaining the haze on local land-uses and overlooking the potential benefits of LUP outcomes.

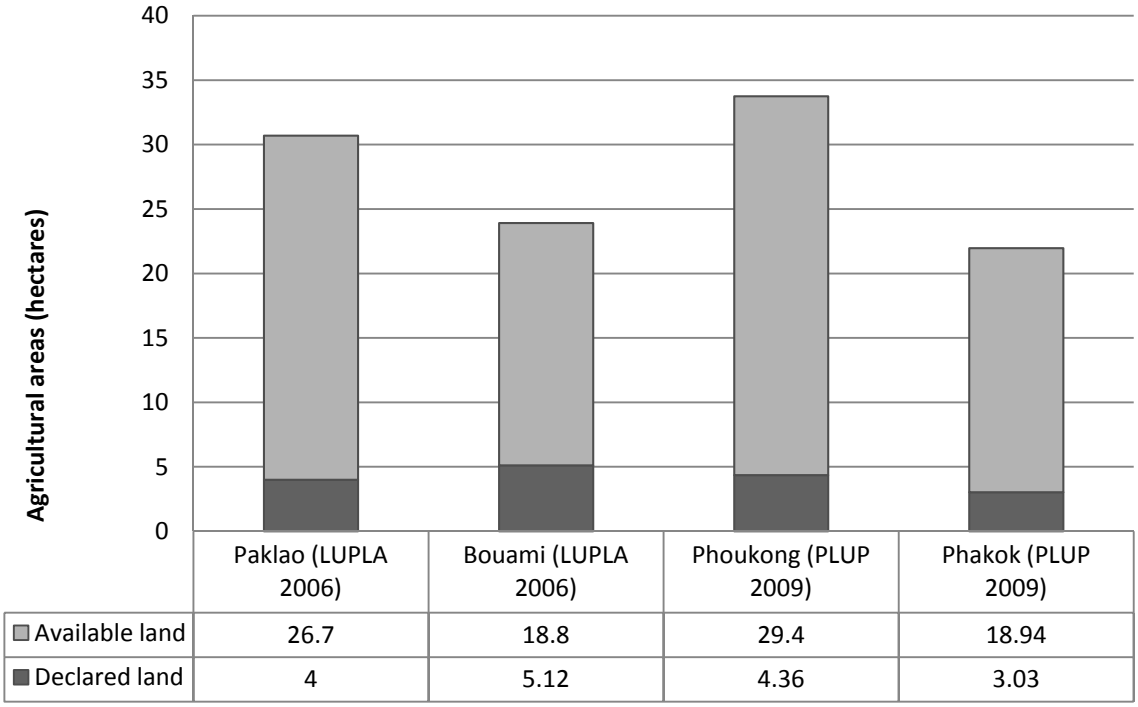

Figure 21. Comparison of Agricultural Areas from Surveys and Land-Use Maps.

6.4 From hazy to sharp

In 2010, new methods articulated around clear principles were developed to enhance PLUP quality, particularly in terms of community engagement in land zoning (Bourgoin *et al.*, in press). Participatory Learning and Action approaches were promoted to establish legitimate sets of plans and a zoning method was used to engage local stakeholders in land zoning negotiations. Presented in detail in this section, the PLUP diagnostic methodology, called the 'Fitness Assessment Tool', was invaluable in improving the quality of this participatory process and also, in enhancing the relevance of planning outputs. In addition, it can also be used as a measurement instrument to assess the credibility of land-use plans conceived by other methods.

6.4.1 Assessing the credibility of PLUP outputs

The National Agriculture and Forestry Research Institute (NAFRI, Lao PDR) participated in an action-research project proposing a reflective process supporting the local implementation of land-use

planning with the support of international research partners and in partnership with Provincial (Provincial Agriculture and Forestry Offices - PAFO) and District (District Agriculture and Forestry Offices and Land Management Authority – DAFO and DLMA) line agencies. Field activities took place in the six villages of the Muongmuay cluster in the district of Viengkham (Luang Prabang Province) and were aimed at developing alternative methods for implementing land-use planning. The rationale was to provide a better way to deal with community participation, knowledge integration and multi-stakeholder negotiation (Bourgoin *et al.*, in press). A negotiation platform was developed around key action-research activities to tackle land-use gaps explicitly and assist village zoning activities in combining both socio-economic and geographic information (Selener, 1997). The first activity was the delineation of the village boundaries. A combination of three-dimensional models of the landscape and global positioning technology was used. Then socio-economic data was collected through associated learning activities by means of a role-playing game in order to involve villagers in a land zoning simulation (Bourgoin and Castella, 2011).

6.4.2 Socio-economic data

A stratified random sampling of 30 households was conducted in all six villages. By including all classes of poverty (low, medium, high), the survey aimed at capturing the composition of villagers' annual income and an understanding of their linkages with the land-use. The socio-economic data collection was further used to build a specific village typology where four household types share financial and spatial resources differently and therefore have a distinctive impact on land-uses (Castella *et al.*, 2011). Household types were defined according to their degree of dependence on a particular sector of activity and specific components of their village landscape, i.e. upland crops under shifting cultivation, livestock, tree plantations and off-farm activities. Important while discussing future village land-use, information on population trends was also recorded during focus groups with the members of the village authority (Bourgoin *et al.*, in press).

6.4.3 Geographic information

As mental representations of rural landscapes allow subjective views dependent on perceptions and cultural contexts, a boundary object was needed in order to provide a common visual interface for people with different backgrounds and experience to learn and negotiate (Rambaldi, 2010). Topographic maps are often used to support participatory mapping exercises, however despite the depiction of obvious landscape features, people face difficulties positioning themselves with a two-dimensional support, often misinterpreting geographical features (Rambaldi *et al.*, 2002). In order to facilitate a broad comprehension during zoning activities, a three-dimensional physical model (3D model) was used for the delineation of zones. Using pins and yarn of different colours, village members proceeded to delineate zones on this model, debating the location and size of each land-use

area in 5 to 10 years. Once a plan covering the whole village area is achieved, the data is captured and entered in a geographic information system (GIS). As the landscape is not a flat surface, radial displacement is deflected by taking a series of perpendicular photos above the 3D model in order to minimize data loss and errors associated with geo-referencing (Rambaldi and Callosa-Tarr, 2002). The images are stored in computers and imported in geographic software (open-source Quantum GIS and commercial ArcGIS). The different land-uses are captured by on-screen digitizing and converted into vector layers. GIS scripts operate the calculation in hectares of each zone within the village boundary and store the information in the layer's attribute table. During the development of this method, a sensitivity analysis was conducted to assess if the region's topography had a significant influence on the area calculation. Three-dimensional analysis was undertaken using the '3D Analyst' feature of ArcGIS, combining a Digital Elevation Model (DEM) and the land-use polygons (n=159). A statistical analysis using R compared the areas generated from 2D on-screen digitizing and 3D surfaces. Using a non-parametric test (Mann-Whitney-Wilcoxon), it was concluded that no significant difference existed between the two methods (p-value of 0.69) and conveniently, on-screen digitizing was used for the rest of the experiment.

6.4.4 Knowledge integration in a negotiation support model

The combination of geographic and socio-economic data is achieved through the use of a simple spreadsheet model that can be easily manipulated by non-experts. The program is compatible with Microsoft Excel or Open Office (open source) and displays a clear user interface. Initially developed as a research tool, the model has been gradually adapted for routine use by district staff and distributed in its final version in Lao language to field implementers (i.e. national researchers and/or district/province government staff).

The Fitness Assessment Tool (FAT) simulates household land requirements in relation to a proposed village land-use plan. Technological and physical conditions are defined by the village community. The tool has been designed in such a way so as not to impinge on participation or discussions between actors. Proposing ballpark figures, the FAT can be easily understood, manipulated and thus, eases discussions. The notion of planning credibility is introduced to gauge the feasibility of a land-use plan or in other words, appraise the gap between land-use plans and current socio-economic situations.

In practice, all the information gathered during interviews is formatted in spreadsheets and several tables are created to crosscheck information obtained from different sources (e.g. random household surveys, exhaustive village census, focus group discussions, participatory mapping). The percentage of each household type is combined with their corresponding share of income from agricultural activities, livestock and non-timber forest products. The entry point for the integration of village data and geographic information is the area of each land-use as villagers are involved in many land related

activities. In each village, the data analysis provides information on the extent to which the different household types depend on each sector of activity for income generation. With the hectares of each land-use gathered from the land-use plan, the model links geographic data with the level of reliance and the expected income per hectare for each household type in a particular village.

These multiple parameters are integrated with the spatial arrangements of the landscape by using several equations:

(1) $$\mathrm{I_x} = \sum_{i=1}^{n}\sum_{j=1}^{m}\left(S_{xi} \cdot A_j \cdot R_i\right)$$

where, $\mathrm{I_x}$ is the income attributed to the household group *x*, having *i* activities on *j* land-uses. S_{xi} is the share of activity, *i* is the total income of the household type *x*. A_j is the area of land-use *j* and R_i is the return on activity *i*.

The *n* activities include rotational and permanent agriculture, collection of Non-Timber Forest Products (NTFPs) and livestock. The return value associated with these activities is expressed in kip/hectare (with US$1 = 8030 kip in June 2011). As livestock cannot be represented spatially, the return estimate, $\mathrm{R_{livestock}}$ is described in equation 2.

(2) $$\mathrm{R_{livestock}} = \frac{K_j \cdot p}{f}$$

where, K_j is the livestock carrying capacity of each land-use (maximum head of cattle/ha), *p* is the average price of one head of cattle and *f* is the livestock selling frequency (in years).

The total income corresponding to a single activity *i* is thus:

(3) $$\mathrm{I_i} = \sum_{x=1}^{y} I_{xi}$$

The off-farm income cannot be assessed spatially but it depends on the village status and wealth. In order to have an adaptive value for this activity, *k* is defined as a constant share[18] of the income generated by the agricultural activities (4).

(4) $$\mathrm{I_{off\text{-}farm}} = k \cdot \sum_{i=1}^{n} I_i$$

In an extensive agricultural system like the uplands of Lao PDR, the limiting factor of economic development is not land scarcity but labour availability. The credibility of a plan is evaluated by the ratio between the labour force predicted by the model and the labour force actually available in the

[18] This *k* value has been estimated from field surveys in six target villages of the district of Viengkham. More generally, it has seemed to be relevant for the whole of the northern uplands of Lao PDR.

village. The estimated labour force needed to implement the proposed land-use plan can be calculated as shown in equation 5:

$$(5) \quad \mathrm{LF}_{\mathrm{plan}} = \sum_{j=1}^{m} (A_j \cdot LR_j)$$

where, the labour force (LF) is directly related to the labour requirement (LR) per hectare.

The future village labour force can be extrapolated from population growth information. Assuming that the proportion of labour force in the total population remains constant over the planning period, the population growth factor can also be used as a labour force growth factor ($\mathrm{LF}_{\mathrm{real}}$).

The accuracy or realism of a land-use plan is defined as a measure of fitness comparing the projected labour force in 10 years with the labour requirement related to the plan (6).

$$(6) \quad \mathrm{Realism} = \left(\frac{LF_{real}}{LF_{plan}} \right) \times 100$$

The model also estimates environmental values of the land-use with biodiversity and carbon indexes. A scoring system allows local communities to assign an environmental value to the land-use type in their village landscape as displayed in Table 11. The scoring system is introduced to the village community during the 'PLUP Fiction' zoning simulation (Bourgoin and Castella 2011).

LAND-USE	**Agricultural income (kip/ha)**	**NTFPs return (kip/ha)**	**Livestock capacity (head/ha)**	**Labour requirement (man/ha)**	**Biodiversity index**	**Carbon index**
Conservation forest	0	0	0.5	0	4	4
Grassland	0	100,000	1.5	0.1	1	1
Permanent crops	2,500,000	200,000	0.5	1	1	1
Shrub	0	0	0.5	0	2	2
Production forest	2,500,000	5,000,000	0.5	0	3	3
Protection forest	0	2,500,000	0.5	0	4	4
Rotational crops	1,000,000	1,500,000	1	0.25	1	1
Plantations	4,000,000	100,000	0	0.1	1	2
Livestock area	0	100,000	1.5	0.25	1	1
NTFP plantations	0	3,000,000	0	0.1	1	1

(1USD = 8.030 kip in June 2011)

Table 11. Model Parameters for Bouami.

By its very nature, this model can also be used as a diagnostic tool to analyse the quality of former land-use plans through a retrospective analysis. For example, the land zoning conducted by the district agriculture and forestry officers in 2006 in the village of Bouami can be examined. The model was used to integrate the areas of each land-use defined on the wooden board (Figure 20a) together with village socio-economic data. The resulting estimate (from equation 6) revealed that the current labour force would have been able to use only 29% of the delineated agricultural land zones of the landscape.

This unrealistic figure illustrates poor local consultation and reflects the poor integration of village socio-economic information in the design of the land-use plan.

6.5 Rationalizing the process for improved outputs and outcomes

6.5.1 Insuring data quality

The provision of feedback on the realism of their plans to members of the village land management committee during land zoning allows villagers to finally realize the importance of providing correct information at the onset of the planning process. This article uses the example of Bouami village to illustrate the participatory process conducted in all six villages of the target *kumban* and which yielded similar results. The village population is decreasing at an annual rate of 1.5% on average. The labour force evaluated at 112 people in 2010 was set to become 96 people in 2020. This first zoning iteration computed by the model gave an estimated total labour force of 461 people needed to implement the plan. Under similar technological inputs (e.g. no fertilizers, no tractors), the accuracy of the plan is evaluated (equation 6) at 23% meaning that only this percentage of agricultural land could be exploited given the limitations of the future village labour force.

How is it possible to explain such a large discrepancy at the early stage of the zoning negotiation? First, the villagers tended to over-estimate the extent of agricultural areas because they were afraid they would not have sufficient land to crop or that some areas (steep or stony) may not be suitable for cultivation. Second, the data provided during village and household surveys may have been inaccurate because of the reasons previously described (i.e. shifting levels of compliance/resistance to land policies depending on how strict the district staffs are in the local implementation of national regulations).

After acknowledging the results of the first zoning iteration, the villagers decided that the plan was not optimal and took the initiative to look at the raw survey data used in the model. After going through the socio-economic census, the villagers conceded that the data was inaccurate and decided to update the values for the labour force, agricultural areas and fallow length. Table 12 shows that the census data underestimated shifting-cultivation areas as villagers had provided numbers intended to satisfy government regulations. The villagers admitted that they usually give wrong figures to avoid paying taxes that are calculated on the basis of the labour force and the area under shifting cultivation. This can be observed in Table 12 where data from the village census appear to be more accurate than the information gathered through individual questionnaires.

In a second step, the participants proceeded to make another refinement by recognizing that the landscape could not be fully exploited. Based on the physical terrain represented on the 3D model, the group made a rough estimation of the percentage of the land area that could be used effectively for

agricultural purposes. Satisfied and confident about the new figures, the villagers engaged in the second round of land zoning.

	Village census	**In-depth survey of 30 households**	**Update during PLUP**
Average area of upland rice per household (hectares)	5 ha	3 ha	7.3 ha
Village labour force (number of people)	112	136 (by extrapolation)	192

Table 12. Agricultural Information for Bouami Village from various sources.

In a second step, the participants proceeded to make another refinement by recognizing that the landscape could not be fully exploited. Based on the physical terrain represented on the 3D model, the group made a rough estimation of the percentage of the land area that could be used effectively for agricultural purposes. Satisfied and confident about the new figures, the villagers engaged in the second round of land zoning.

6.5.2 Insuring quality of the zoning process

At the end of the day, the group in Bouami village made four significant zoning iterations that were necessary in order to reach an agreement. Table 11 displays the gradual refinement of land-use plans and shows a steady diminution in rotational crops together with an increase in the diversification of agricultural activities throughout the process. At first, the villagers tended to over-estimate their capacity to cultivate large areas through swidden agriculture or permanent crops. In another technological context, the demand for an excessive labour force would be compensated for by increased mechanization and/or the use of chemical inputs in the intensification of land-use. The shift from traditional agriculture was followed by the establishment of tree plantations representing long-term investments with low labour force requirements. Village production forests from which villagers could collect more NTFPs were expanded as a result of the conversion of old fallows. Through plans 3 and 4, clarifications were made by acknowledging that all the agricultural land could not be utilized by the village because of labour force limitations, and that certain areas had to be classified as reserve land and put on hold for the next generations or migrants. Working in such a forward-looking manner allowed the villagers to design credible land-use plans based on a refined knowledge of the current village situation. This is illustrated in Table 13 which highlights the continuous increase in accuracy resulting in a plan with an 89% fit to the local situation.

A final scenario envisaged by the village land management committee consisted of increasing the fallow-length in the model from 3 to 6 years in order to get closer to the current village land management. The model produced an estimate of 99% accuracy. Despite its good representation of the local reality, this figure based on the fallow length deviated widely from that in the national

regulations and thus proved difficult to publicize in a PLUP. It was agreed to keep plan 4 as the final one.

The results of the model were summarized using key indicators derived from the equations in section 3.1 and could therefore be incorporated in a comparative framework (Table 14). *Landscape Income* relates to the level of income generated by the whole range of land-use types in the village while *Grass-root Income* refers to the financial returns for households mostly dependent on shifting cultivation and NTFP collection. Displayed as percentages, their value is related to the maximum income value generated by a landscape exploited with optimal efficiency (by the whole village for the first indicator and by Type A households for the second). The third indicator measures the plan's e*nvironmental value* which combines those biodiversity and carbon indexes as defined earlier (Table 11). The fourth indicator, referred to as *stabilized swidden*, relates to the share of non-forest land not used under rotational agriculture (GoL, 2005). The last indicator measures the *realism* of the land-use plans (equation 6).

	Plan 1	**Plan 2**	**Plan 3**	**Plan 4**
Land-use efficiency (%)	23	51	85	89
Land-uses (hectares)				
Conservation/Protection forests	1,242.26	1,185.67	1,185.67	1,185.67
Grassland	272.8	373	373	373
Permanent crops	194.23	57.43	30.7	30.7
Plantation NTFPs	0	87	87	87
Production forest	307.2	414.75	414.75	414.75
Rotational crops	1,145.9	921.77	875.5	847
Plantation trees	107.1	156.97	183.7	183.7
Reserve land	77.46	150.34	196.6	225

Table 13. Land-use Evolution Through Successive PLUP Iterations in Bouami Village.

Notwithstanding the increase in credibility through the successive planning iterations, the process is also characterized by improved values for all of the other parameters as illustrated by Figure 22. Indicators related to the landscape structure such as *environmental value* and *stabilized swidden* display no drastic changes due to the ten-year time-frame scenario planning. However, under short-term perspectives, the economic values of the landscape and the *grass-root income* experience obvious improvements. A comparison of the evolution of LUP in Bouami reveals that the values obtained from the 2006 LUPLA plan were similar to those from the first iteration of PLUP in 2010 (Figure 22). The expected improvement is therefore encapsulated in the successive zoning iterations providing room for the villagers for negotiation in the design of a consensual plan that is more relevant to their own situation. Additionally, the method helps to visualize the impact of the two land-use planning approaches on the different household types within the village. Figure 23 displays the income levels of the four household types in the successive land-use plans. Characterized by efforts

towards local participation, PLUP outcomes, in addition to being realistic at 89%, provide on average 64% more income than does the inaccurate LUPLA.

Similar results have been obtained at the level of each of the five other villages in the village cluster and also at the village cluster level through combining all six of the individual village land-use plans. The accuracy of first plans in the six villages is only 40.3% on average in contrast to that of an average of 87.5% in the final plan. Figure 24 shows that the successive planning iterations induced a systematic shift from a landscape dominated by swidden agriculture to a more heterogeneous mosaic of land-uses. For instance, the *kumban* final plan (Figure 24) displays a higher diversity of land-use types including tree plantations, NTFP domestication, cash crops and improved pasture areas.

Indicators formula	**Remarks**
$\text{Landscape Income} = \left(\frac{\sum_{i=1}^{n} I_i}{\sum_{i=1}^{n} I_{i\_optimal}} \right) \times 100$	'Optimal' refers to a 100% realistic plan
$\text{Grass-root Income} = \left(\frac{I_A}{I_{A\_optimal}} \right) \times 100$	'Optimal' refers to a 100% realistic plan
$\text{Environmental Value} = \left(\frac{\sum_{j=1}^{m} (A_j \cdot S_j)}{0.7 \cdot 4 \cdot A_{village}} \right) \times 100$	Sj is the score of land-use j. The maximum value is represented by 70% of the village area under conservation or protection (score=4)
$\text{Stabilized Swidden} = \left(\frac{1 - A_{swidden}}{A_{village}} \right) \times 100$	A village is the total village agricultural area (in hectares) A swidden is the area under swidden agriculture (in hectares)
$\text{Realism} = \left(\frac{LF_{real}}{LF_{plan}} \right) \times 100$	LFreal is the labour force estimated in the village in 5 years' time

Table 14. Assessment Indicators for the Quality of a Land-use Plan.

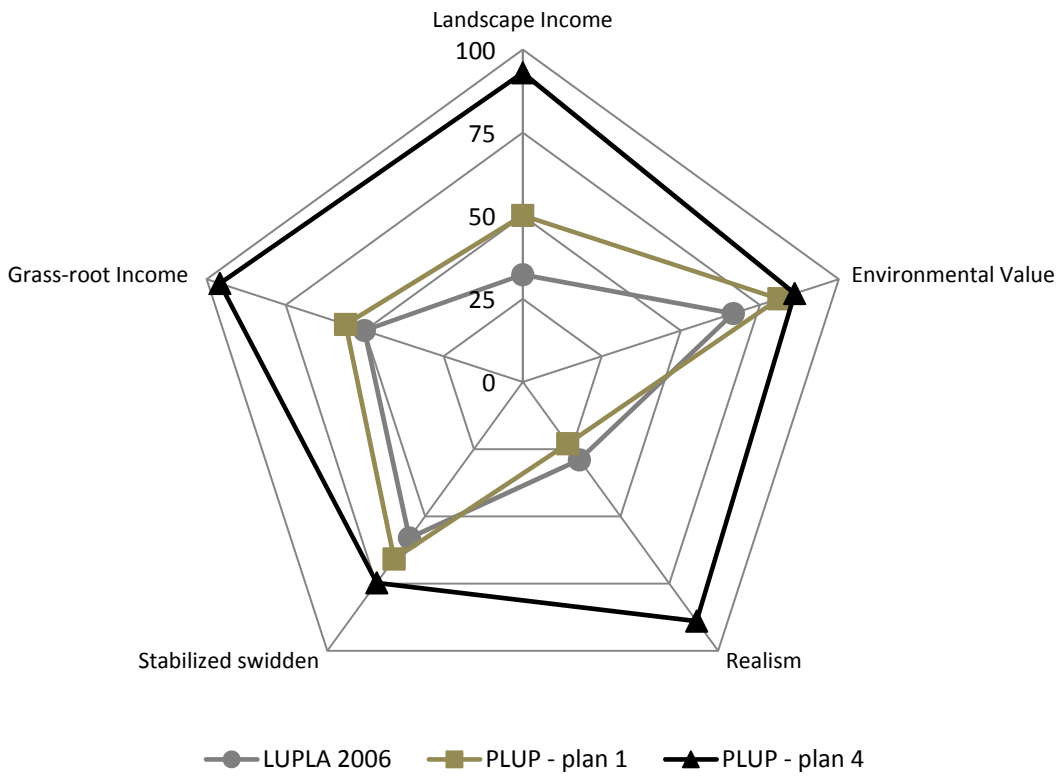

Figure 22. Comparison PLUP and LUPLA in Bouami Village.

6.6 Discussion

By providing feedback on the strengths and weaknesses of their successive land zoning to PLUP implementers, and village communities and district staff, all stakeholders are empowered in negotiating land-use plans. Field experience has demonstrated that local communities are quite suspicious when outsiders (foreigners and/or Lao governmental staff) come to survey their village and they seem reluctant to deliver accurate information about land management. An iterative zoning process is proposed here as a gradual way of making the villagers feel comfortable with the aims and objectives of PLUP and to clarify the link between spatial land-use patterns and village socio-economic context. Social learning and trust building through participatory activities seems to provide better quality inputs that will fundamentally “lead to higher quality decisions” (Reed 2008: 2420).

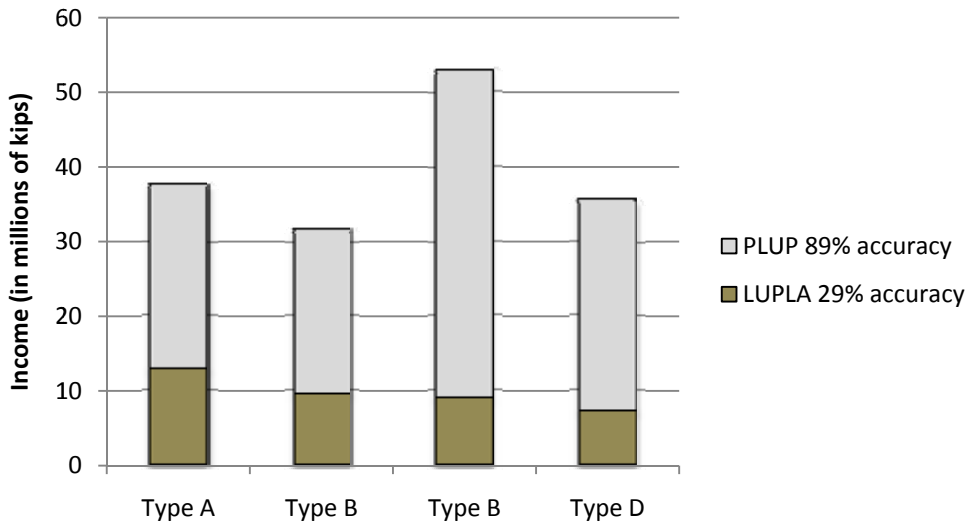

Figure 23. Income Differences between Various Household Types Resulting from Different Land-Use Planning Practices. The accuracy value comes from the Fitness Assessment Tool which also provides income estimates for the different household types.

This article not only develops a relevant methodology to PLUP, but also goes further by presenting a way of rationalizing the PLUP process itself. As demonstrated in Bouami village, the framework of combining socio-economic and spatial information in a GIS could be used as part of a PLUP certification scheme. The methodology developed in the uplands of Lao PDR, is relevant to places in relative isolation from markets and technical innovations while the rationale and GIS tools developed could be also be used in other land-use planning contexts.

Lestrelin *et al.*,(2011) advocated that an assessment of participation is necessary for the objective monitoring of the level of village community engagement in a planning process that is still often termed "participatory" since that was its stated intention. However the assessment of the practice of real participation requires additional safeguards and control measures. Once the work is completed with no monitoring system embedded in the process, i.e. in the negotiation framework described here, there is little possibility of any control over the quality of the process. But a real physical output, such as a land-use map, can still be evaluated in terms of its feasibility given the current landscape features and local resources (i.e. technological level, capital, labour force available).

The admission of failure of past land-use planning approaches relates to the constant search for suitable plans through a process of optimization. Most planning exercises have taken place at the national or regional level, grasping the biophysical heterogeneity of the landscape but overlooking the complexity of social situations. Such top-down plans designed and applied without any integration of local priorities, are unlikely to be implemented voluntarily, and often meet with passive resistance from local communities. In contrast, the bottom-up approach presented here demonstrates that a consensus can be found through an iterative and participatory exercise. This compromise exists between the bounds of the current land-use plan proposed by the villagers and the government land-

use policy applied by the district. Essentially, it also presents a trade-off between scientific credibility and legitimacy vis-à-vis local communities (Bourgoin *et al.*, in press).

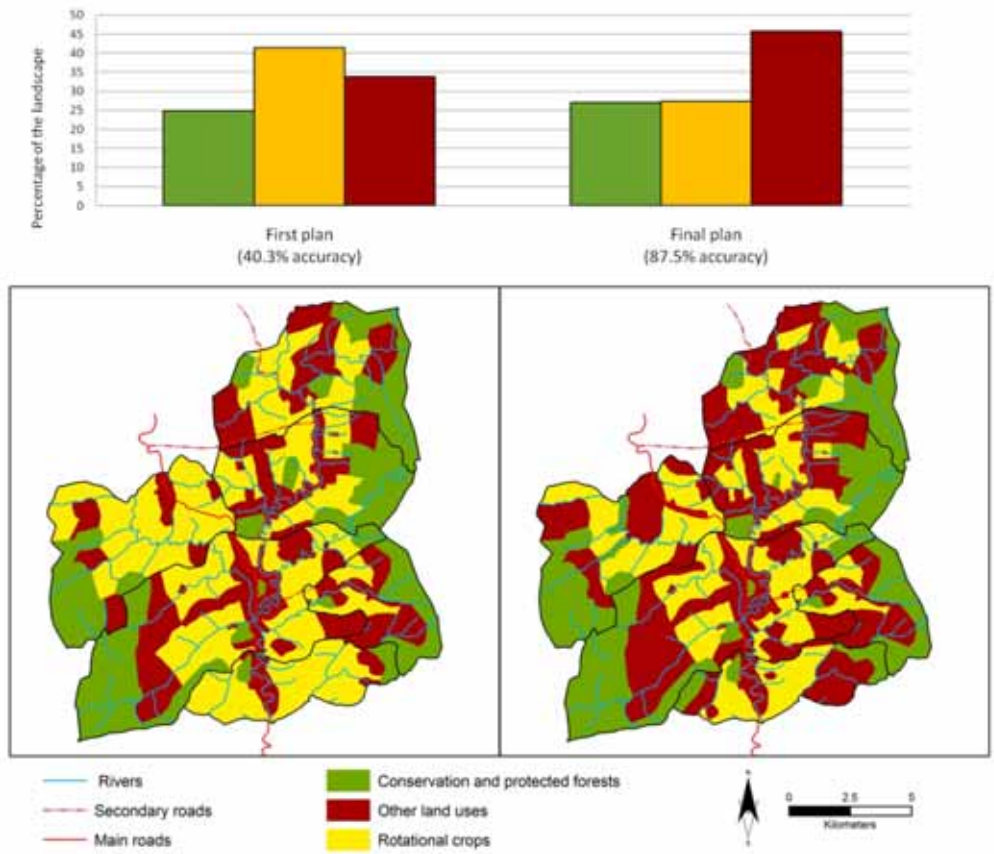

Figure 24. Landscape Evolution through the PLUP Iterative Process.

Although the solution to land-use planning may be sub-optimal from a bio-physical point of view, its main advantage is that not only is it endorsed by the authorities, but also by the local communities. Local relevance and understanding are factors necessary to anchor the land-use planning process and outputs in a long-term perspective (Reed, 2008). Nonetheless, there are implicit unavoidable shortcomings and simplifications. The process deliberately overlooked large scale climatic, political and economic drivers with an important impact on land-use change (Lambin *et al.*, 2001; Lambin and Geist, 2006) since such difficult concepts are hard for local stakeholders to grasp and manipulate. Nonetheless, the simple nature of the approach makes the tool flexible and adaptive to a range of situations in rural developing countries.

Within the context of rural planning, models should be assessed on their operational value. For instance, the robustness of highly accurate and integrative holistic simulations is constrained by a few unreliable parameters such as the local census data. It is preferable that models facilitating a process such as PLUP need the capacity to be able to engage in wise decision-making instead of relying on intrinsic scientific qualities that leave local stakeholders out of the scenario.

From an analytical perspective, the Fitness Assessment Tool could prove efficient in discriminating between legitimate and sterile representations of land-use plans. If 'all models are wrong but some are useful' (Box, 1976), the facilitative approach undertaken with local communities helps in the creation of land-use plans that reach a high level of practical feasibility within the allocated time frame, and the skills and resources available. The involvement of the villagers in this iterative activity increases the ownership of outputs and readiness for compliance. Under the current national planning measures, assessment seems to be crucial in order to ensure that the planning activity can make it possible for the plans to be logically applied for the sake of improving local livelihoods. In fact, many concerns are emerging from the research community in Lao PDR regarding the forthcoming elaboration of PLUP at the village level to the national scale.

Under strong political pressure, the National Land Management Authority (NLMA), under the Office of the Prime Minister has the mandate to perform PLUP in the 47 poorest districts of Lao PDR by 2011 and throughout the entire country by 2015. With limited time allocated per village and non-updated training, it is likely that the same drawbacks observed in past and current pilot projects will be repeated. This article advocates that an ex-post analysis of a LUP is possible while providing support to government staff to use such a method as a PLUP routine. Currently, staff members from the District Land Management Authority and Department of Forestry and Agriculture are being trained to use this method on a routine basis in the district of Viengkham.

Just as for the measurement of participation (Lestrelin *et al.*, 2011), so should the assessment of the accuracy of a land-use plan become a standard procedure because the development of 'sharp' plans increase the usefulness of land-use planning projects, and the likelihood of implementation and follow-up activities beyond the bounds of traditionally delusive success stories.

The development of future land-use alternatives is motivated by a local desire to improve living conditions and livelihoods for a diversity of households in the village. In the past, the lack of monitoring and follow-up activities were identified as major constraints to sustainable landscape management and described as hindering the success of land-use plans (Lestrelin *et al.*, in press). In addition, one can wonder if the problem of local ownership of plans does not lay higher up with the creation of land suitability maps that have been proven to be disconnected from the local reality, and of no use for extension services. The methodology proposed in this article can assist in clarifying undisclosed land tenure systems and in providing knowledge of the local views and needs envisaged within a ten-year time frame. Beyond the collective mapping and definition of land management rules attached to each land-use type, extension activities have to be developed to translate spatial agreements and good intentions into concrete action. Having realistic plans will facilitate the work of government institutions like the National Agriculture and Forestry Extension Services (NAFES) and

international organizations (iNGOs) to implement development and agricultural extension projects in a clear setting, using land-use plans that have emerged from the local demand and context.

On another level, Reduced Emissions from Deforestation and Forest Degradation (REDD) has been flourishing in Lao PDR and elsewhere as a payment for carbon efficient land management practices. But entangled in international paradigms, the implantation phase is struggling with questions related to the demarcation of boundaries, community lands and resource rights as well as the anticipation of disputes between the state and communities without land titles (Phelps *et al.*, 2010; Dooley *et al.*, 2011). Moreover, local consultation remains, in general, mainly procedural and the legal frameworks supporting national strategies and sub-national implementation are overlooked. To overcome these constraints and succeed in affiliating a global scheme with local objectives, REDD must depend on existing national land policies to develop sub-national approaches. In this regard, PLUP is currently perceived as a key instrument for REDD implementation at the local level, providing guidance over rights to land, territories and resources. REDD could also provide first and foremost the long-term incentives prerequisite for compliance with land-use plans and lengthening of monitoring activities. A potential synergy is thus anticipated between the two mechanisms (Chokkalingam, 2010). However, only credible and participative plans will have a chance to really address local livelihoods.

6.7 Conclusion

The approach reported in this article aims at developing an efficient means to measure the output and outcome of a PLUP process as key components of an impact pathway. Allowing adaptive refinements of the land-use plans by the village land management committee through negotiation facilitated by district staff improved practical management of trade-offs between conservation and development objectives that previously were out of reach of village communities. At the rural village-wide scale, the method described in this article can help rationalize agricultural land development initiatives by creating land-use plans that are realistic with regard to local capabilities (both human and technological). Indeed, field experiences have shown that participation should not be romanticized. Safeguards are required from both sides (i.e. planners and communities) for a genuine engagement in formalizing and sharing their common vision of their future landscapes and designing innovative resource management strategies to implement their land-use plans together.

Part 4. Beyond land-use planning

Chapter 7. Democratizing REDD+ with participatory land-use planning in Lao PDR

Chapter 7 is reproduced from the article in revision:

Bourgoin, J., Castella, J-C., Hett, C., Lestrelin, G., and Heinimann, A. Democratizing REDD+ with participatory land-use planning in Lao PDR. To be submitted in Ecology and Society.

Plate 7. Secondary village along the track to Bouami and Paklao (Viengkham district, Luang Prabang province)

7.1 Abstract

Reduced Emissions from Deforestation and forest Degradation and enhanced forest carbon stocks (REDD+) is a performance-based payment mechanism currently debated in international and national fora of environmental policy and planning. Built under the precept of conditionality, REDD+ payments should be a function of the level of compliance of land stewards to carbon-efficient management practices. Yet, it is now widely recognized that intricate land governance and unclear carbon rights may hinder REDD+ implementation at the sub-national level. Solutions are needed to avoid perverse incentives resulting from the commoditization of carbon and, importantly, to identify and secure the rights of legitimate recipients of future REDD+ payments. Based on research in Lao PDR, this paper proposes a landscape-level approach to address conflicts related to benefit sharing and carbon tenure which hinder the implementation of REDD+. Different land tenure scenarios and their implications for carbon ownership are explored through the application of the approach in Northern Lao PDR. Equity issues are approached through an assessment of the interactions between tenure regimes and variations in the potential beneficiaries of REDD+ payments and co-benefits. Our case study shows that a decentralised governance of natural resources is crucial to avoid the marginalization of rural communities in the REDD+ process. It demonstrates that participatory land-use planning is an important step towards a transparent engagement of local communities in negotiating REDD+ schemes. Local participation and agreements on land-use plans are also a sound basis for developing efficient measurement, verification and reporting systems for REDD+.

Keywords: REDD+, landscape-level approach, carbon tenure, equity, PLUP, Lao PDR.

7.2 Introduction

Human induced rise of atmospheric carbon is a major driver of climate change (Kyoto Protocol, 1997). To act against and cope with the change, comprehensive mitigation and adaptation plans have been conceptualised at the international level. Since the Bali conference of the parties in 2007, Reducing Emissions from Deforestation and Degradation (REDD+) has become an essential mechanism in global attempts to reduce carbon emissions from land-use change in tropical forest countries. The rationale is to provide developing countries with financial incentives to reduce forest carbon emissions. In theory this should go hand in hand with biodiversity conservation and socio-economic development in areas with low agricultural potential and limited market access (Campbell 2009). The concept of paying local forest users for avoided deforestation and forest degradation and enhancement of carbon stocks has been supported by a wide range of actors (e.g. scientists, development practitioners, policy-makers, local communities). A framework based on Effectiveness, Efficiency, and Equity (3Es criteria) has been designed to measure the outcomes of REDD+ proposals in terms of carbon sequestration at a minimum cost while contributing to sustainable development (Angelsen *et al.,* 2009). However, there are growing concerns about the feasibility to translate the international paradigm at national and local scales. Many scholars tend to moderate the general enthusiasm by referring to the lessons learnt from past Integrated Conservation and Development Projects where so-called 'win-win' outcomes have remained elusive (Blom *et al.,* 2010; Hirsch *et al.,* 2010).

Conditionality of carbon payments is inherently related to fundamental issues of national and local governance. If a global REDD+ architecture is currently debated in international fora, institutional weaknesses continue to undermine eligible countries to endorse this economic lever. REDD+ policies need to be country-specific as the socio-political context will determine future reform trends. A recent and extensive literature advocates for governance improvements while conceding that corruption and power struggles are likely to undermine payments for ecosystem services (PES) by fostering unsustainable activities like deforestation (Angelsen *et al.,* 2009; Cotula and Mayers, 2009; Streck, 2009). Within these institutional reforms, the clarification of land rights is described as essential to REDD+ (Gregersen *et al.,* 2010; Larson, 2011). Under insecure tenure, the recent commoditisation of carbon and the potential increase in land values make the clarification of carbon rights, a significant issue (Wunder *et al.,* 2008). For these reasons, participatory land-use planning is often perceived by implementers of pilot projects as a prerequisite for REDD+.

In addition, the principle of free, prior and informed consent (FPIC) has also gained prominence. The involvement of local communities in forest governance is considered a requirement for any REDD+ initiative (Anderson, 2011). Improving carbon sequestration will necessitate changes in land-use with serious implications for local communities whose livelihoods are dependent on forest resources. Thus,

it seems intuitive and compelling to involve local forest users in the design of REDD+ projects and in particular the clarification of forest tenure and the planning of future land uses (Agrawal *et al.*, 2008; Kanowski *et al.*, 2011). As it is believed that community involvement in REDD+ has the potential to improve carbon sequestration and equity in co-benefits (Charnley and Poe, 2007; Chazdon, 2008; Agrawal and Angelsen, 2009), decentralised apporaches to governance could contribute to open the discussion on the allocation of carbon rights. Thus, enhanced local particpation would prevent the capture of REDD+ benefits by elites from outside the community (UN General Assembly, 2007; Sikor *et al.*, 2010; Anderson, 2011). However, efforts to translate these principles into practice has been difficult so far while how to involve locals in REDD+ planning has become one of the most prominent concern (Brown *et al.*, 2008; Cotula and Mayers, 2009; Streck, 2009). For instance, many observers have been disappointed by the REDD+ readiness programs engaged by the World Bank's Forest Carbon Partnership Facility (FCPF) (Dooley *et al.*, 2011). Similarly, it has been underlined that the United Nations REDD+ programme (UN-REDD) was not respecting its own pledge of social commitments. In a recent article, Dooley *et al.*, (2011) also emphasized the trend towards the recentralisation of resource control with a constant overlook of indigenous rights. The lack of meaningful consultation and engagement of local communities was also pointed out, as undermining the principles of the FPIC.

In Lao PDR, several projects are engaging in REDD+ activities and clearly highlight PLUP as a way to include local communities in identifying local REDD+ strategies (MAF, 2011). However the current legal system of Lao PDR appears poorly adapted to the commoditisation of landscape assets through payments for ecosystem services such as the REDD+ scheme. By national legislations, "the State is charged with the centralized and uniform management [of land and forests] throughout the country" (Land Law, 2003: Article 3). Land and forests are under the "ownership of the national community" (Land Law, 2003: Article 3) and only leases can be allowed for certain types of land-uses. Whether people can benefit from the right of usage or usufruct, it is stated that "land-use rights of an individual or organisation [can] be terminated if the land is requisitioned by the State" (Land Law, 2003: Article 63). Despite the efforts invested by the Government of Lao PDR (GoL) since the 1990s into a progressive decentralization of land management responsibilities to the district and village authorities, the recognition of customary practices advocated in literature has been largely disregarded (Schlager and Ostrom, 1992; Mendelsohn, 1994; Wiebe and Meinzen-Dick, 1998).

In this system, land tenure regimes are directly associated to the different land-use types identified through land-use planning. For instance, forests under protection or conservation are considered as state land whereas degraded forests and agriculture lands have a communal status. Table 15 presents several tenure regimes for the main land-uses for our case study.

Tenure system	Communal lands	Private lands	State lands
Land-use type	Production forest, Sacred forest, Agricultural land	Plantations	NPA Buffer, Conservation forest Protection forest

Table 15. Tenure systems for the main land-use types.

Based on a case study in northern Lao PDR (presented in Section 2), this article introduces a new approach for visualizing carbon density patterns in a shifting cultivation landscape. From there, Section 3 examines a range of carbon ownership scenarios and discusses their potential impact on REDD+ benefit sharing. Finally, by extrapolating on the innovative approach to PLUP proposed by Bourgoin *et al.*,(in press), Section 4 describes how action- research can inform national decision-makers, e.g. perceptions, expectations, and issues related to local REDD+ implementation, and to influence national level tenure reforms that are necessary for large scale implementation of REDD+.

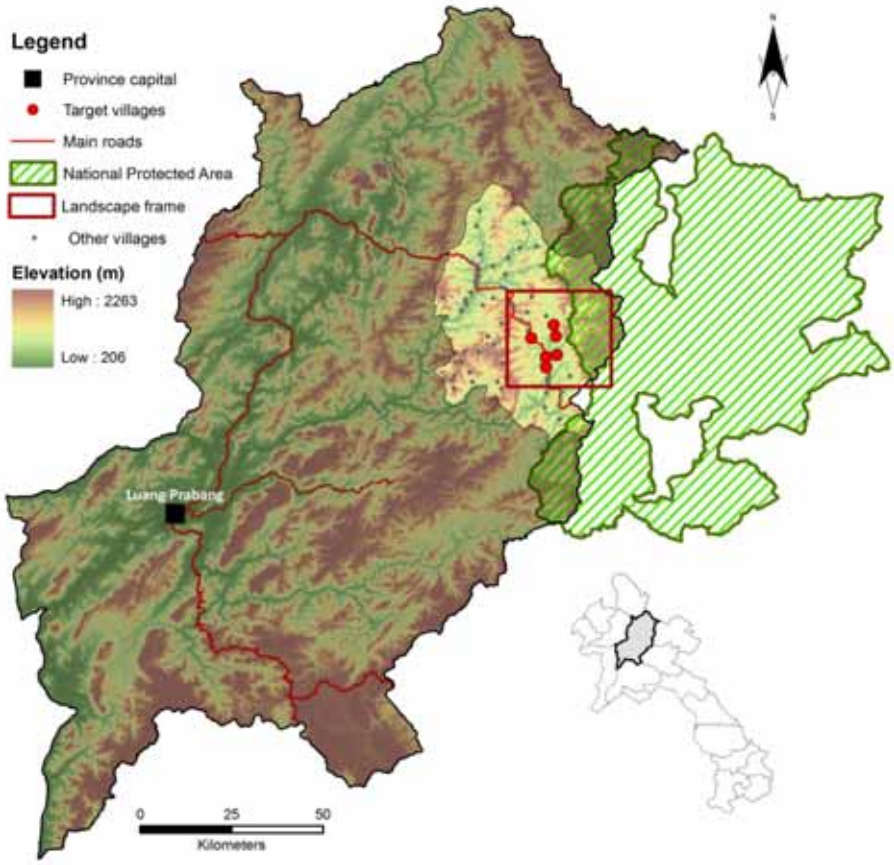

Figure 25. Landscape study area in Viengkham district, Luang Prabang province, Lao PDR.

7.3 Case study

The case study site is located in Luang Prabang Province in northern Lao PDR in a region characterised by a predominance of subsistence shifting cultivation (Figure 25). The district of Viengkham has a low accessibility to major roads and markets and local incomes are essentially derived from livestock farming and the sale of Non-Timber Forest Products (NTFPs). Due to the diversity of land-use situations at the local level, understanding drivers of land-use change requires considering both the national and sub-regional scales. Perceived as an effective way to link different governance levels (Pfund, 2010), a landscape approach is chosen to compromise between local management and national regulations (Figure 25).

Historically, agricultural-forest mosaics have been covering the landscape in Viengkham district (Figure 26a). Swidden agriculture with long fallow periods (over 10 years) was common in this area of low population density, leaving the densely forested mountain chain of Phou Loey, located on the eastern part of the case study, under low deforestation threat. However, as shown by remote sensing data, a gradual segregation between agricultural and forest lands has occurred over time (Figure 26b). Agriculture has concentrated along the road while forest has been preserved in less accessible or protected areas (Castella *et al.,* 2011). Different land policies have contributed to shape this segregation process. Since the 1990s, village relocation closer to roads - in an attempt to increase villagers' access to market and state services - has increased the pressure on agricultural land. Relocation processes were controversial, with the dual objective to improve people's access to state services (Evrard and Goudineau, 2004) while consolidating "state control over the land" (Vandergeest 2003: 48). Agricultural land scarcity was also exacerbated by decreases in the fallow period with the implementation of the 'three-plots policy' associated with the land-use planning and allocation programme (LUP/LA) with the goal to grant households with land-use certificates. This policy did not encounter the expected success in terms of improving local livelihoods by promoting agricultural intensification and diversification over traditional swidden agriculture (Ducourtieux *et al.,* 2005; Lestrelin and Giordano, 2007). In fact, it restricted each household to three plots for rotational crops, de facto limiting the fallow period to a maximum of three years and pushing the system beyond its limits of sustainability. In 2008, the boundaries of the national park were expanded by almost 70%, and villages in the vicinity were relocated. This translated into further segregation of the landscape with, on one hand, regeneration of forest resources in strictly protected areas and, on the other, degraded landscapes dominated by intensive agricultural activities in the most accessible areas (Figure 26b). While forest regeneration has obvious positive implications for biodiversity in protected areas, the reduction in complex landscape mosaics that used to retain a large share of the original forest biodiversity is detrimental to the poor upland communities that relied on NTFPs as a safety net in periods of shortage (Landscape Mosaics Project, 2010).

Land cover mosaics	Evolution of land cover under management (10 years)						
	NPA Buffer	CPS forest*	Production forest	Ag.land	Plantations	Reserve	Build-up areas
Fallow < 10y	2	2	2	1	2	2	6
Fallow >10y	3	3	2	1	2	2	6
Forest fallows	4	4	3	1	2	3	6
Degraded forest	5	5	3	1	2	3	6
Natural forest	5	5	3	1	2	3	6
-	6	6	6	6	6	6	6

* CPS: Conservation, Protection and Sacred forests

Table 16. Land cover attributes.

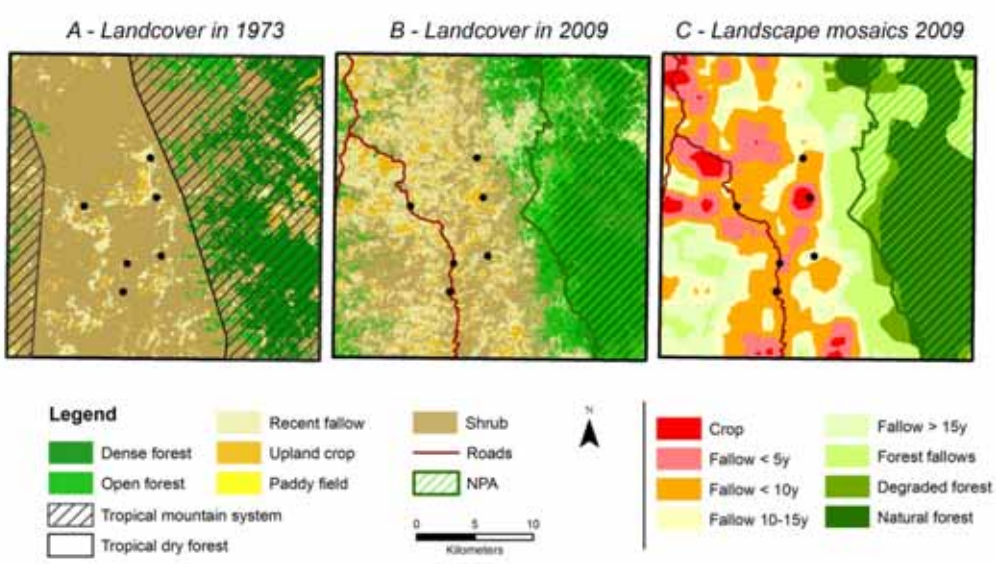

Figure 26. landscape change (A, B) and the intensity of agricultural practices (C).

7.4 Methods

In response to the uncertainty associated with the implementation of REDD+, a range of scenarios were explored with different levels of benefit sharing.

i) *Top-down REDD+ mechanism*: This could favour disincentive-based forest laws. Strengthening command-on-control over forested areas would be more efficient in terms of effectiveness of sequestration and efficiency by reducing costs of improving governance in areas outside national protected areas with low carbon stocks. In fact, many authors criticize 'pro-people' approaches due to endless issues of weak decentralised governance and cumbersome institutional reforms.

ii) *Command-and-control*: As stressed by Borner *et al.*,(2011), the enforcement of disincentive mechanisms can prove highly detrimental to local communities that depend on forests for their livelihood (e.g. NTFPs collection, hunting). The authors advocate for a combination of command-and-control 'sticks' with PES 'carrots' in order to increase equity. In the situation of villages bordering a national park, local communities could be involved in managing the buffers of the park while being involved in social control over illegal logging, poaching and forest encroachment by the agricultural frontier.

iii) *Pro-poor mechanism*: In order to optimize carbon sequestration in community managed landscapes, REDD+ project should focus on complex agriculture-forest mosaics where most of the forest degradation occurs (Castella *et al.*, 2011). A 'pro-poor' approach should also prevent 'land grabs' by private investors motivated by the commoditisation of the forests' carbon (Palmer-Fry, 2011). Through an empowerment process, local decision-makers could become real partners in REDD+ negotiations, facilitate community-based monitoring and ease discussions around REDD+ implementation issues (Danielsen *et al.*, 2011).

To account for both carbon sequestration and benefit sharing, land cover and land-use must be considered simultaneously through an approach combining satellite imagery and on-the-ground analysis. Figure 27 describes the methodological approach used in this article.

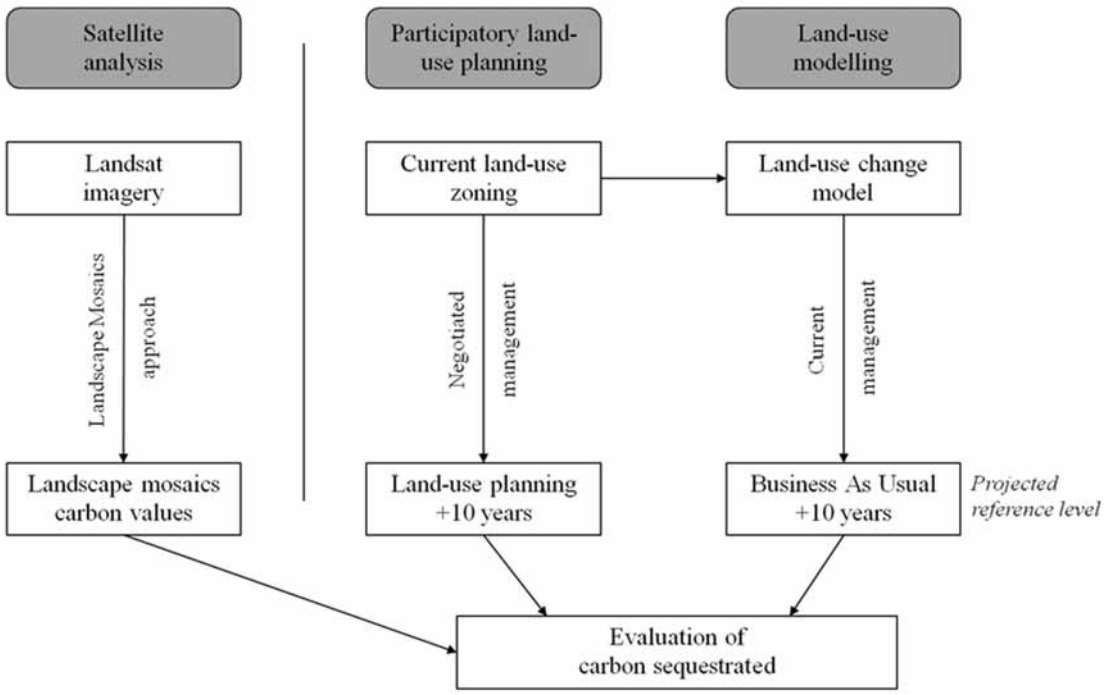

Figure 27. Methodological framework.

7.4.1 Carbon mapping

The methodology for land cover mapping is based on the visual interpretation of a chronological series of Landsat satellite images combined with ground truth surveys conducted in 2009 and secondary information (e.g. forest cover maps, digital elevation models) to discriminate fallows systems from young regenerating forests (Kongay *et al.,* 2010). As seen in the previous section, the converging effects of conservation-development polices had prominent consequences on the intensification of swidden systems. Despite the established impacts on deforestation and forest degradation, changes in swidden intensity have often been disregarded as plots under swidden could not be easily mapped (Padoch *et al.,* 2007; Griffiths, 2009). To address this methodological gap, Hett *et al.*,(2011) proposed a method to quantify both the extent and intensity of swidden systems in order to inform land-use planning processes. The methodological approach named 'landscape mosaics' captures the spatial and temporal variability of swidden agriculture by avoiding pixel-based interpretation of land-cover/use and rather use a moving window to distinguish land-use patterns at a larger scale (Messerli *et al.,* 2009). This approach to swidden mapping allows working with land-use types providing insight on the management of complex landscapes rather than addressing changes at the land patch level (Figure 26c).

The amount of carbon in the landscape was estimated by associating landscape mosaics and the carbon values for the two ecological zones (i.e. tropical mountainous and dry forests) that compose our study landscape (Figure 26a). Due to lacking information on the carbon value per ha of each landscape mosaic, simplified categories (table 16) are derived from the IPCC biomass data (see Hett *et al.,* 2010).

7.4.2 Land use planning

Participatory land-use planning was conducted in the six villages of the village cluster of Muongmuay (Figure 28) within the landscape window (Bourgoin *et al.,* in press). The planning approach is centred on a negotiation support platform that involved multiple-stakeholder groups into land-use discussions and clarification of land-carbon ownership rights. Spatial visualisation tools were used to enhance local participation to LUP. Participatory 3D Modelling brought a vertical dimension which facilitated landscape comprehension and intensified interactions around a physical media. It also became a basis for negotiating the delineation of village boundaries and land-use zones. A learning approach based on a role-playing game named "PLUP Fiction" was used to increase the awareness of local stakeholders on the possible consequences of their land-use planning decisions on their livelihoods (Bourgoin and Castella, 2011). Thus, people with different backgrounds and experiences could better understand the relationships between landscape and resources management. Finally, a socio-economic and environmental assessment tool based on a Geographic Information System (GIS) allowed multiple stakeholder groups to explore alternative landscape-change scenarios. Prior to discussing

future land-use arrangements, current land-use systems resource management strategies were identified and detailed. Then through an iterative planning process, villagers reached agreement on consensual land-use plans for the next 10 years (Figure 29). The different agricultural land-uses practiced by the villagers were clustered in the class ‘fallow < 10 years’ for which a carbon value was available (Table 16).

To determine the enhancement of carbon stocks through negotiated land-use management, a reference scenario was used for simulating Business As Usual (BAU) emissions. A deterministic land-use change model was used to define the forward looking carbon reference and to estimate the land cover after 10 years of the same land-use management (Figure 27). In a GIS, the model associated the changes in land cover occurring under different management strategies by using an expert-based transition matrix that generated new land covers (Table 16).

7.5 Results

By relating carbon values to landscape mosaics, the satellite imagery analysis shows the repartition of carbon stocks in the landscape. The total estimated value is 2,146,113 tonnes of carbon (tC). Using the overlay function in a Geographic Information System (GIS), the existing administrative geometry can be superimposed on the carbon intensity layer. While covering 30% of the window, the NPA located in the eastern part of the landscape encompasses 70% of the total amount of carbon. Nevertheless, we observe that a significant share of the carbon stocks is found outside of the national park, in agricultural areas dominated by shifting cultivations under traditional customary land tenure (Figure 28). This observation corroborates the assertion made by Hett *et al.*, (2010) estimating that the share of carbon stock in Lao PDR is greater in agriculture-forest mosaics than in national protected areas.

Tenure system	Communal lands	Private lands	State lands	**Total**
Carbon sequestration under BAU	- 3086 tC	1712 tC	85694 tC	84320 tC
Carbon sequestration under PLUP	2630 tC	7225 tC	95335 tC	105190 tC

Table 17. Carbon sequestration under different management strategies (BAU, PLUP).

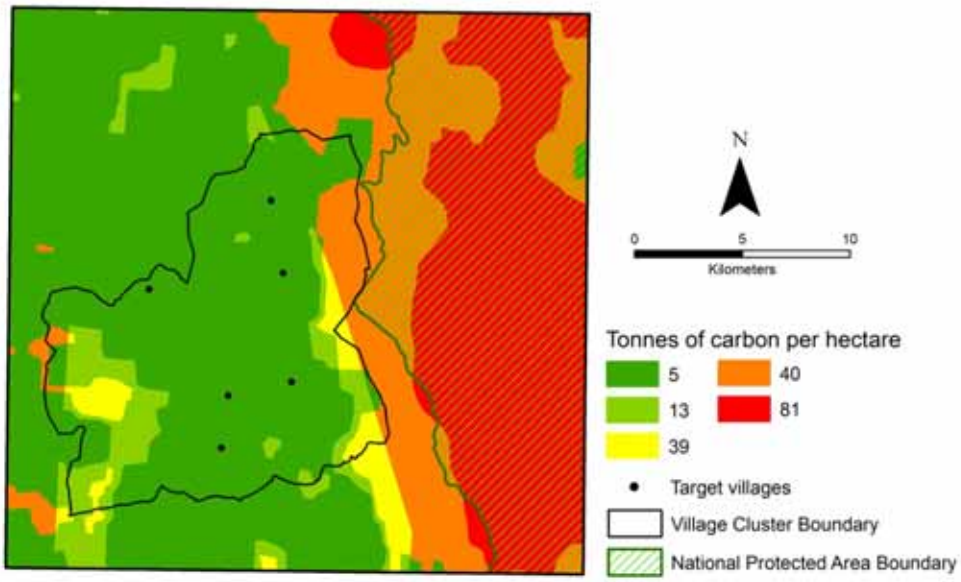

Figure 28. Landscape and village cluster carbon values.

At the village cluster scale, the land-use plan negotiated by the villagers and endorsed by the government's local officers can be overlayed on the landscape carbon values estimated from the current land cover mosaics. Within the village-cluster boundaries, a value of 240,076 tons of carbon stock is estimated (Figure 29). This 'village-cluster carbon stock value' has been chosen as the reference level to visualize the impact of participatory land-use planning on carbon sequestration. The land-use plan elicited through participatory modelling can be classified under the landscape mosaics categories (Table 16). The comparison between current and estimated land-use/cover stages highlights an increase of 44% in carbon storage after 10 years implementation of the land-use plan. To assess the value of having a negotiated planning, the amount of carbon stored through PLUP needs to be compared with the BAU projected reference level. The difference in sequestration between the BAU projection and the negotiated plan is 20,870 tons of carbon (Table 17). This variation is explained by the decrease of extensive cultivation and the increase in forested areas (Table 16). When overlaying the tenure geometry presented in Table 15, on the PLUP map (Figure 30a), we observe that 90% of the carbon can be found in state forests while 10% is managed by villagers in communal or private forests.

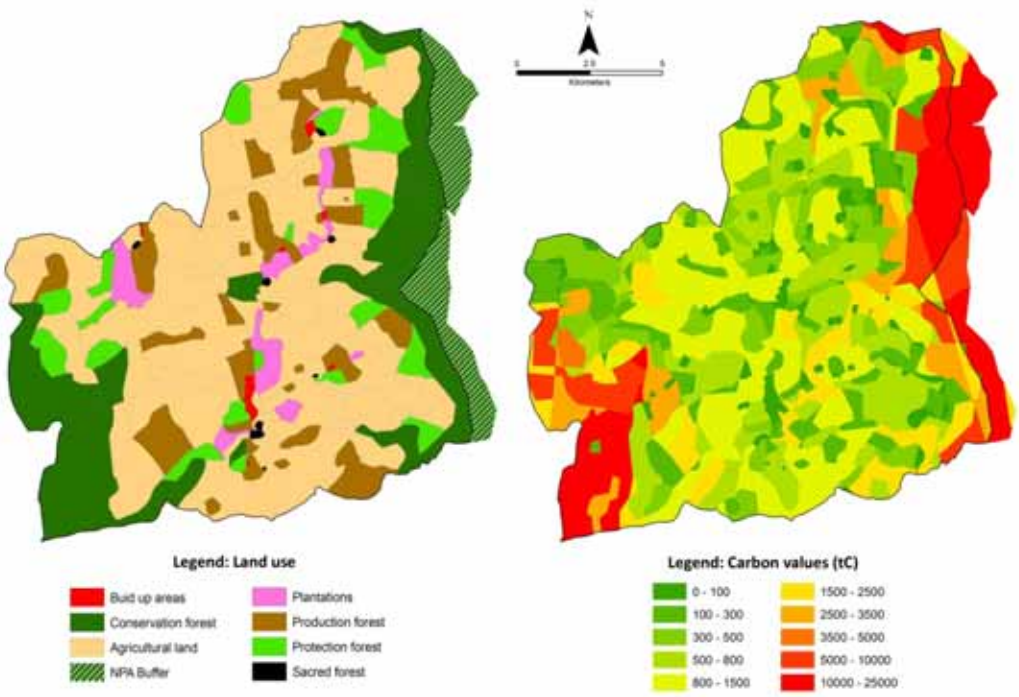

Figure 29. Participatory land-use plan (A) and its associated carbon values (B) for the village cluster of Muongmuay.

7.6 Discussion

Engaging villagers in planning for REDD+ through PLUP might bring a strong sense of ownership for the community both in terms of process and outcome. In our example, during the successive iterations of the participatory planning process, villagers agreed to increase the size of production forests or in other words accepted to regenerate certain fallow areas where they could still collect NTFPs and hunt. Thus, in this case study, the negotiated approach allowed for more carbon storage than a BAU model and ensured, with a low investment, the consent of local communities (Anderson, 2011). Essentially, PLUP represents a way to concretely provide local communities with access to decision-making and involve them in a transparent process (Lyster, 2011), from initial phases of planning to plan implementation and monitoring (Danielsen *et al.*, 2011). Nevertheless, whereas the participatory process seems crucial in terms of enhanced legitimacy, efficiency and effectiveness of implementation, it is still doubtful it will benefit equity, the last parameter of the '3Es equation' (Angelsen *et al.*, 2009). As presented in this article, the existing tenure rights for forested areas are largely in favour of state lands under the current legal context. Then, if the state is the main recipient of carbon credits, it is still irresolute how those financial benefits will be shared amongst national and sub-national stakeholders in a context of weak governance. To improve the fairness of co-benefits distribution and provide the incentives necessary to ensure the durability of the process beyond the inception phases, participatory approaches will need to be complemented with national tenure reforms

(Larson, 2011; Palmer, 2011). Whereas REDD+ mechanisms are putting most efforts in maximizing the effectiveness of carbon storage, overlooking equity could be detrimental for the durability of REDD+ projects by alienating local communities and increasing potential land conflicts and deforestation (Angelsen *et al.,* 2009). As presented by Cotula and Mayers (2009: 23), it is urgent to put "local tenure and social justice centre-stage" in order to start interacting with national decision-makers and highlight potential weaknesses in current land and forestry laws if the country wishes to engage in REDD+. The current legal system should be harmonized with REDD+ principles. It should also go beyond the illusion that markets and economic incentives alone will safeguard forest health (Borner *et al.,* 2010). Policy innovations at the national level should acknowledge the need to share costs and benefits of REDD+ between the state and individuals (Palmer, 2011). A co-management agreement established at the national level could be translated on-the-ground by a shared management of forested lands within village boundaries (Carlsson and Berkes, 2005). Through this partnership, social control could efficiently be mixed with current command-and-control approaches (Borner *et al.,* 2010). Balancing powers could prevent potential drifts towards unsustainable measures from both sides.

The tenure map on Figure 30b shows that under co-management, carbon sequestration and the potential co-benefits attached to it, would be more balanced between communal and state management. Recognising the value of communal lands could further highlight the importance of rotational shifting cultivation in carbon sequestration and constitute a first step towards the demystification of swidden agriculture in political circles (Van Noordwijk *et al.,* 2008). As emphasized by Hett *et al.,* (2011: 609), a REDD+ scheme "could be used for a reversion to long crop-fallow periods, raising the carbon stocks at landscape level". Swidden agriculture remains excluded from current land registration processes and REDD+ could foster a new legitimacy for this traditional practice by taking into account the importance of agricultural mosaics in carbon sequestration.

The approach presented in this article is constrained by the non-stochastic nature of the land-use change model, overlooking variations in land-cover changes and thus overestimating the sequestration of carbon under BAU. The methodological framework is innovative in combining satellite imagery derived land cover maps with participatory approaches to negotiate future land-use plans under a REDD+ scenario. This approach is consistent with Ostrom and Nagendra (2006) who suggest engaging multidisplinary research and multi-scale approaches in understanding social-ecological systems. It provides means to negotiate the implementation of a carbon scheme and to gather information on the factors that may prevent achieving the 3Es. Lessons learnt from multiple locations through different projects should influence national policy-makers. On-the-ground empirical knowledge could feed policy formulation processes and foster reforms that would enable a more effective and more equitable REDD+ (Karsenty and Ongolo, 2011; Palmer 2011).

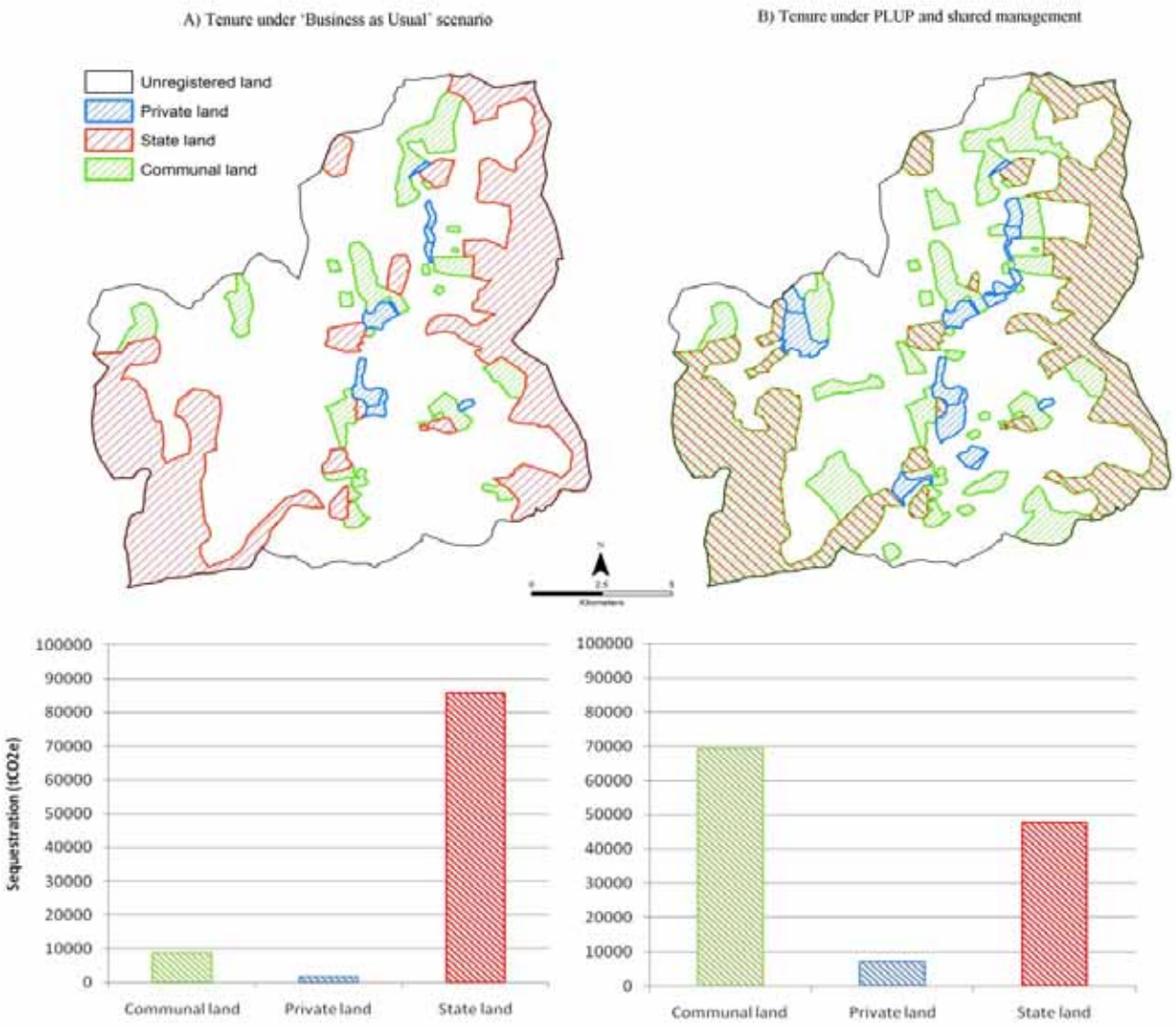

Figure 30. Tenure regimes under different scenarios.

7.7 Conclusion

Our research showed that PLUP informed by landscape analysis could play a key role in empowering local communities with relevant scientific knowledge and participatory tools to negotiate REDD+ arrangements. By facilitating local understanding of socio-environmental issues and allowing stakeholders to reflect on their future, this innovative approach may provide a valuable alternative to 'silver bullet' methods inaccessible to local stakeholders. It could contributes to reshaping power and knowledge relations that have long 'handicapped' land-use planning implementation in Lao PDR and that could potentially undermine the realization of REDD+. Importantly, the PLUP-based approach to REDD+ allows for a more democratic access to the knowledge that is required for negotiations on carbon sequestration at the local level.

This paper brings lessons for those who take participation as an end in itself. Notwithstanding that clear tenure rights and community participation are critical elements to the success and sustainability of REDD+, it only represents one step towards an effective and equitable REDD+. Tenure reforms made at the national level will ultimately be responsible for addressing local people's individual and collective rights.

Part 4. Beyond land-use planning

Chapter 8. Engaging with local communities in design their future landscape. A model of Science-Policy-Practice interface in local land-use planning

Chapter 8 is reproduced from the article in revision:

Castella, J-C., Bourgoin, J., Lestrelin, G., Bouahom, B., and Douangsavanh, L.. Engaging with local communities in designing their future landscapes: A model of Science-Practice-Policy interface in local land-use planning. To be submitted in Landscape Ecology.

Plate 8. Land-use negotiations on a 3D landscape model
(Viengkham district, Luang Prabang province)

8.1 Abstract

An essential task of participatory action-research, especially in developing countries, is to help closing a policy implementation gap that leads to large discrepancies between policy frameworks and local practices. Too often, official regulations, laws and decrees fail to translate into concrete action on the ground. Loose institutional linkages between research, extension and local communities are pointed as the main underlying reason for this gap. All stakeholders call for enhanced participation as a way to bring together scientists, development practitioners and local communities in negotiating competing claims on natural resources and designing realistic pathways towards sustainable development. Despite such general consensus about the value of participation, the latter cannot be decreed nor imposed. It needs to be considered as an emerging quality of a collective learning process. In this paper, an experience of participatory land-use planning conducted in Lao PDR illustrates the analytical framework that was developed to facilitate the interactions between three groups of stakeholders, i.e. scientists, planners and villagers, in designing future landscapes. First, a multi-level diagnostic study aimed at drawing lessons from past experiences of land-use planning in the country. Second, intensive interdisciplinary research was conducted over a two-year period. Scientists together with development practitioners and local community members investigated historical changes in landscapes and livelihoods, assessed forest biodiversity and local use of natural resources, and explored future landscape scenarios. Third, a landscape design approach was developed. Emphasis was put on developing an approach that is generic and adaptive enough to be applied nationally in accordance with the participatory land-use planning (PLUP) guidelines developed by the government. The set of tools and methods developed through action-research facilitated the emergence of real participation from initial consultation and cooperation stages towards co-learning and collective action. Both the activity of landscape design and the resulting patterns can be improved by incorporating landscape science in strategic multi-stakeholder negotiations.

Keywords: participatory land-use planning, action-research, landscape governance, Lao PDR.

"Any discipline which is concerned with rational intervention in human affairs [...] must both establish theory and engage in practice. Theory and practice will exhibit a groundless relationship, each generating the other, with neither being prime. This mutual development of theory and practice calls for action research in real situations, research in which the researcher has to allow the situation to take him (her) where it will, research whose focus is the change process itself rather than some hypothesis under test." (Checkland 1985).

8.2 Introduction: Promises and premises of participatory land-use planning

8.2.1 Innovative mechanisms to reconcile competing claims on natural resources

Since the Rio Conference on sustainable development in 1992, land-use planning (LUP) has been considered as a key policy instrument to engage local communities in designing their future landscapes while decentralizing the governance of natural resources (Meadowcroft, 1997). Under the banner of sustainable development, a large range of LUP approaches have been tested and many lessons have been drawn (Silberstein and Maser, 2000; Sayer and Campbell, 2004; Wollenberg *et al.*, 2008). In the meantime, new issues have come to the fore of the global policy agenda such as climate change, biodiversity depletion, land degradation and land use intensification driven by international market trends. Powerful global corporations are involved in large-scale land acquisition, buying or leasing land that may or may not be cultivated and/or occupied. Very often, local communities are not consulted in negotiations. 'Resource grabbing' then happens when local people are deprived from the resources they used to get access to without proper compensation. There is a thin line, and often an overlap, between what would be considered as land grabbing or as lawful resources reallocation. Land-use planning is therefore still very high on the global agenda as it is expected to reconcile competing claims on natural resources (Giller *et al.*, 2008), while securing land tenure and clarifying property rights so that relevant policy instruments can be applied.

Among emerging policy instruments, payments for environmental services has gained prominence in the recent years, at least in scientific and policy discourses, if not yet in practice. Natural resources and landscape functions are gradually commoditized in an attempt to get their value recognized and to create market incentives for preservation that operate alongside existing regulatory frameworks (Kinzig *et al.*, 2011). These new policy instruments often negotiated at the global level (e.g. climate change mitigation through avoided deforestation – REDD attempts to Reducing Emissions from Deforestation and forest Degradation) have generated a great deal of research to accompany their effective application on the ground. Beyond initial policy explorations - and often speculations - lessons have been drawn from past, similar experiences (e.g. integrated conservation-development projects and forest tenure reforms in the case of REDD, Blom *et al.*, 2010; Larson, 2011) and from pilot LUP projects attempting to translate policy principles into concrete actions on the ground. The integration of top-down and bottom-up approaches to policy implementation has shown its relevance

in reconciling multiple perspectives of actors intervening at different scales and harmonizing strategic decisions and land-use plans elaborated at different levels. One of the main lessons from these experiences is that the pathway towards sustainable landscape governance has to be negotiated by multiple groups of stakeholders involved in a complex network of social and spatial interactions distributed across scales (Ernstson *et al.*, 2010).

8.2.2 Observed mismatch between the rhetoric and the reality

Landscape science has tackled these challenges by addressing land management issues at multiple scales (Cash *et al.*, 2006) and by embracing the increasing complexity of the socio-ecological systems and governance mechanisms through interdisciplinary approaches integrating social and natural science perspectives (Moss, 2000; Liu *et al.*, 2007; Giller *et al.*, 2008). Concepts such as adaptive co-management, social learning, multifunctionality, resilience or polycentricity provide theoretical frameworks to an emerging transdisciplinary landscape science that actively engages with diverse stakeholder groups, i.e. policy makers, lay citizens and other interest groups. Behind information and knowledge sharing, participation allows the slow growth of relationships within which people take responsibility for their landscapes (Sancar, 1993). As trust develops between people, it lowers the transaction costs of collective action, reduces individual's apprehension of novelty, and reinforces the expectation of reciprocity in relationships. Individuals invest more in natural resource management (NRM) activities, and they learn more as they take action. Consequently, the 'P' of Participation is now attached to all tools used for local implementation of the policy instruments. Participatory land-use planning (PLUP) has become central to multi-stakeholder negotiations that address the spatial dimensions of resource management.

While all parties agree on the principle of participation, the latter is not easy to translate into reality. Many experiments show that a proper diagnosis of the problems, while necessary, is not sufficient to overcome them (Faysse, 2006; Wollenberg *et al.*, 2009). Despite strong engagement of scientists in action-research, bringing cutting edge science to the production of locality-specific relevant scientific knowledge, there is often a missing link with decision making. Integrative landscape research is challenged by the increasing overlap between landscape research and landscape planning and resulting hazy boundaries between research and application (Tress *et al.*, 2005a). In developing countries, the use of intervention methods developed in other contexts (e.g. in developed countries) also led to a gradual disconnection between research-led, high-tech approaches and more pragmatic, locally-designed processes.

As a result, the contribution of landscape science to landscape governance is still limited with regard to the high level of expectation, especially to help solving the growing number of land-use conflicts and environmental problems in landscapes at local, regional, national and international levels (Tress *et al.*, 2005b; Opdam, 2010; McAlpine *et al.*, 2010; Conrad *et al.*, 2011). Despite the scientific advances

in landscape ecology, the emergence of new policy instruments in response to evolving development problems, the tools and methods applied on the ground by field practitioners and land-use planners have essentially remained the same (e.g. PRA, local diagnostic studies, land suitability assessment and zoning, field extension). Innovative methods developed through pilot projects led by interdisciplinary research teams have often failed to translate theory into concrete changes in everyday practice of decision makers, especially in developing countries. Beunen and Opdam (2011) urge to investigate the role of scientific knowledge in local landscape planning, while Nassauer and Opdam (2010) call for innovative transdisciplinary approaches that would generate scientific knowledge relevant to participatory landscape design.

8.2.3 Generating actionable knowledge: a key role for landscape science in LUP

In this paper we tackle these two issues from the perspective of a participatory action-research project that engaged scientists, development practitioners and local communities in negotiations of landscape changes. During negotiations, stakeholders engage in an iterative process of knowledge co-production (i.e., of 'knowing') through which they gradually change their understanding of the situation, build agreements and consequently adapt their practices (Steyaert *et al.,* 2007). Social learning is about changing 'understanding' through interactions between multiple knowledge and evolution of the individual worldviews through border crossing between knowledge systems (Robinson, 2004; Fazey *et al.,* 2005). Boundary objects, or boundary spanning objects, are concrete artefacts (e.g. maps, 3D landscape models, role play games) that help people co-producing actionable knowledge during collective interactions (Vinck, 2009). Boundary objects have shown their relevance in facilitating the necessary translation of different forms of knowledge so that they can easily be mobilized, manipulated and reinterpreted by the different groups of stakeholders during the negotiation process (Carlile, 2002; Cash *et al.,* 2003). They can thus improve the coordination mechanisms across disciplines (Star and Griesemer, 1989) and they facilitate the mediation process between multiple stakeholders (i.e. researchers, practitioners, policy makers, local authorities and communities) (Cash *et al.,* 2003). In a PLUP context, a multi-stakeholder 'negotiation platform' may be composed of (i) a physical space and time allowing interactions between individuals, (ii) boundary objects that support mediation through facilitated communication, translation, visualization, etc., and (iii) a group of people in charge of negotiating land-use plans on behalf of their respective stakeholder groups that may be supported by a boundary organization. A boundary organization may be a formal institution dedicated to facilitate stakeholder interactions within complex negotiation arena or an ad hoc institution that emerges in response to a problem that needs to be tackled collectively. The case presented in this paper has been largely framed in the theoretical framework introduced here so that actionable knowledge could be produced and visible impact could be achieved. It may take time before actual impact on landscapes and livelihoods can be documented. Cash *et al.,*(2003) suggest that a decade should be a reasonable time span to assess impact. However, the relevance of the scientific

knowledge produced through our research to multi-stakeholder negotiations and to collective action can be assessed by confronting the landscape design processes and products to the conceptual framework proposed here as reference. It is expected that useful lessons can be drawn from regular interactions between theory and practice along the collective learning process.

The case study described in this paper was conducted in Lao PDR from 2008 as an action-research pilot and was then out-scaled under the leadership of field practitioners in 2011 onwards. We first introduce the socio-ecological system in which the action-research was initially embedded. Building on the results of a diagnostic study conducted in 2009, we point out the contextual issues that impeded the translation of PLUP rhetoric into practice. We analyse ex-post how the scientific knowledge generated by a team of researchers and local practitioners was mobilized during local-level participatory land-use planning. Then we describe the emergence of an innovative PLUP negotiation platform that aimed at overcoming the obstacles identified during the previous planning stage. An analytical framework is proposed to draw general lessons from this experience. Finally, we argue that science can contribute to bridge the gap between policies and practices if it focuses on participation, negotiation, and co-learning processes rather than simply gathering information and collating comprehensive databases under the belief that scientific knowledge will be useful for unidentified actors at a later stage. A key element for bridging the abovementioned gap is to 'operationalize' landscape science (e.g. to make the socio-ecological costs/benefits of LU plans legible to planners and local populations).

8.3 Lost in translation between policy and practice

Since the early 1990s, a Land-use Planning and Land Allocation (LUP/LA) program has been implemented throughout Lao PDR. By increasing land tenure security, LUP/LA was expected to encourage private investment, agricultural intensification and commoditization and, importantly, to stabilize slash-and-burn shifting cultivation and preserve the country's natural resources (Vandergeest, 2003, Fujita and Phanvilay, 2008; Lestrelin *et al.*, in press). Through these processes, the central government formally recognized customary rights to use natural resources and provided local institutions with important responsibilities (e.g. land distribution, registration and tax collection, monitoring and conflict resolution). Hence, in line with the sustainable development paradigm, greater consideration for local claims, knowledge and institutions was expected to foster more balanced and environmentally sound development trajectories (e.g. WCED 1987). However, according to various studies, the implementation of LUP/LA in Lao PDR did not always encounter the success predicted by the Laotian authorities (Ducourtieux *et al.*, 2005; Fujita and Phanvilay, 2008; Lestrelin, 2010; Lestrelin *et al.*, 2011). Firstly, uncoordinated action led to incoherence in the superimposed plans. Secondly, the absence of stabilized method and instruments (but also funding and expertise) led to systematic local reinterpretation of the guiding principles (MAF-NLMA, 2009). These issues are

illustrated below through case studies in Phonxay and Viengkham districts of Luang Prabang province.

8.3.1 Inconsistencies in the application of land use planning methods

As described by Lestrelin *et al.*,(in press), successive territorialisation projects have led to overlapping geometries and important complexity in Lao PDR' land-use planning system. Historically, LUP implementation procedures and end products have been very much contingent on the outcomes of multilateral 'negotiations' between central and sub-national planning agencies, local populations, private investors, international development organizations and NGOs. From this complex process – through which plans are defined, contested, resisted and reinterpreted by a diversity of parties – has emerged an extreme variety of local situations. In particular, land zoning differs quite significantly depending on the local political economic context and the situation of villages relative to development objectives uphold by the state and other networks of influence.

8.3.2 Limited participation leads to poor local accountability and low impact

Certain common grounds emerge nonetheless as the recurrent outcomes of limited human and investment capacities. Importantly, local participation to the planning process and local understanding of the plans remain often very limited (Lestrelin *et al.*,2011). Hasty implementation and the limited facilitation skills of implementers do not allow for villagers to fully grasp the issues debated and get involved in the crucial stages of land zoning and drafting village plans and regulations (GTZ 2004). For scholars like Thongphanh, villagers are sometimes "merely informed about what is going on" (2004: 11). In turn, limited participation results often in an important confusion regarding land zoning, allocation and management decisions and provides little incentives for local populations to comply with land-use plans. Further, these incentives are reduced by a frequent absence of follow-up activities. Indeed, the enduring lack of technical and financial capacity of implementation agencies also means that there is little opportunity for extension and other support activities (GTZ 2004; Fujita and Phanvilay 2008). In many cases, local populations are thus simply requested to comply with plans and regulations – that they did not contribute to define and/or do not fully comprehend – without being provided the necessary means to do so. Another important consequence of the limited capacity of implementation agencies is that monitoring systems, when established, tend to focus exclusively on local accountability and, importantly, do not constitute a basis for revising established plans or improving planning procedures (Evrard 2004). Hence, without effective feedback and adjustment mechanisms, monitoring can become a mere coercive exercise of recording and sanctioning deviant behaviour.

8.3.3 Uncoordinated planning and conflicts between superimposed plans

Besides limited incentives for local populations to comply with land-use plans, the efficiency of LUP is also compromised by an absence of coordination between planning agencies at the sub-national level. Without a common approach to planning and allocation and with very limited exchanges on their respective roles and activities, the mandates of the two agencies tend in fact to be defined according to their current, principal geographic focus – i.e. NLMA would be in charge of LUP in urban and peri-urban areas while Agriculture and Forestry services would be the key players in rural areas. The negative outcomes of unclear planning mandates and the critical lack of coordination between planning agencies are further aggravated by the fact that, in practice, LUP in Lao PDR is characterized by an almost exclusive focus on the village scale. While the village represents the 'traditional' spatial unit for managing the people and its resources (Taillard 1989), with the abovementioned limited investment capacity that characterizes Lao PDR' LUP arena, it becomes in fact the only realistic scale for LUP. If some planning experts are certainly able to delineate land-use zones on maps and build Geographic Information Systems (GIS) at the province, district or watershed scales, they hardly have the means to materialize land-use plans apart from village-level interventions. Limited technical capacity of implementation agencies represents also a major constraint for LUP integration. Alongside facilitated communication and negotiation, a more integrated and multi-scalar approach linking village-level LUP with higher scales and other planning efforts would certainly assist in solving land conflicts and livelihood issues arising from superimposed plans and non-coordinated interventions. The realization of these objectives, however, would certainly require much heavier investments – e.g. in staff capacity building, communication and coordination, post-implementation support, enforcement and monitoring – than is actually the case.

8.4 Action-research in PLUP: A case study in Lao PDR

In 2007, governmental attempts to draw lessons from the past resulted in the transformation of LUP/LA into PLUP. An official PLUP manual was released in 2009 by the two main institutions in charge of land-use planning: the Ministry of Agriculture and Forestry (MAF) and the National Land Management Authority (NLMA, merged in 2011 into the Ministry of Natural Resources and Environment). The manual puts a high priority on participation of village communities in the planning process (MAF-NLMA, 2009). According to a recent study by Lestrelin *et al.*,(2011) however, PLUP implementation remains very similar to LUP/LA as practitioners are still lacking a clear operational framework. Despite the strong political will and genuine interest of implementers, the process generated little impact in terms of increased participation. Researchers from the National Agriculture and Forestry Research Institute (under MAF) were called upon to help overcoming the problems identified. With the support of the Centre for International Forestry Research (CIFOR) and the Institute of Research for Development (IRD), an action-research project aimed at reducing the gap

between PLUP principles and practices was launched in 2008 under a global biodiversity platform (Landscape Mosaics, 2010).

8.4.1 Methodological approach

First, a diagnostic study was conducted in two districts, Phonxay and Viengkham, of Luang Prabang province to understand the socio-ecological context in which the successive land-use planning approaches have been implemented and how they have evolved in time (Figure 31). Luang Prabang was one of the first two provinces (with Sayabouri) where LUP/LA had been initially tested in the early 1990s and where PLUP was implemented in 2010. Individual interviews and focus group discussions with key land-use planning stakeholders investigated the processes, outputs and outcomes of former LUP/LA and new PLUP (Lestrelin *et al.*, 2011). Household surveys were conducted to understand livelihood strategies and how they were influenced by policy processes, i.e. village resettlements and/or merging, eradication of shifting cultivation.

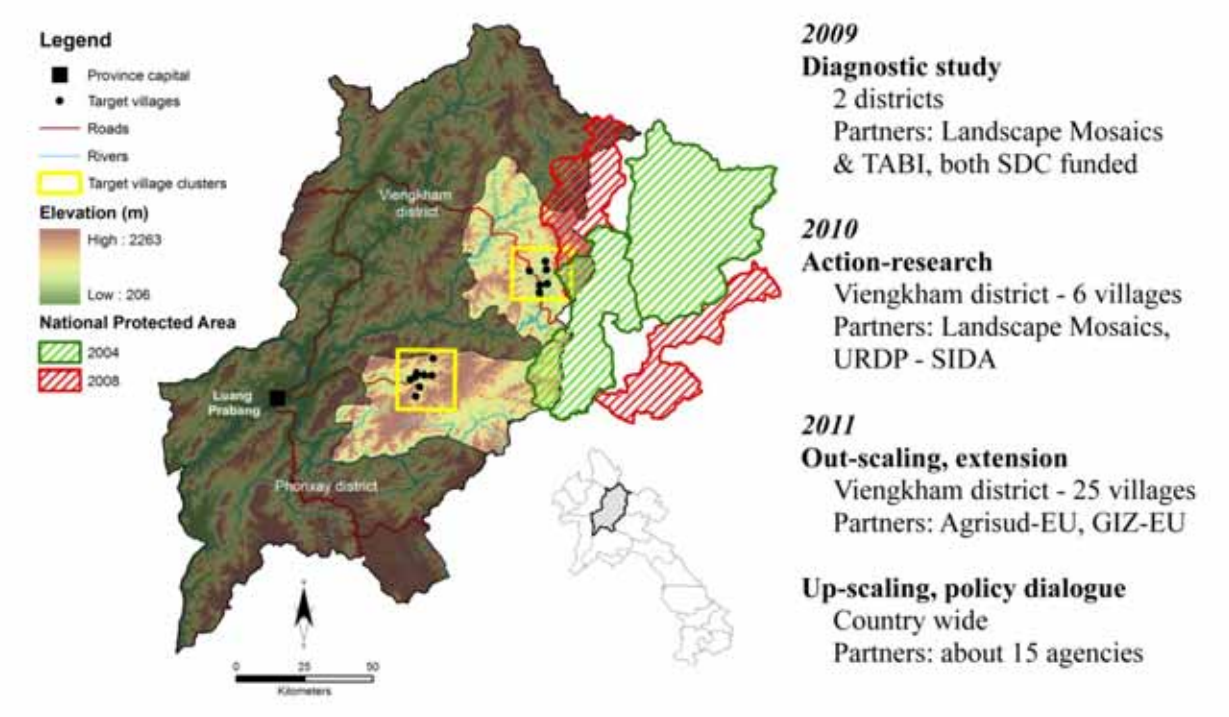

Figure 31. Case study sites in Lao PDR.

In our three study villages of Phonxay district for instance, LUP/LA was conducted as part of a provincial project aimed at improving local participation to planning. Land-use plans have been largely based on local claims and existing land-uses and land zoning has been rather favourable to agricultural activities. Thus, the ratio ‘agricultural land/total land’ was 73% in Hua Muang, 82% in Houay Si Neua and 71% in Donxay village. This contrasts significantly with the three other villages studied in Viengkham district, in the vicinity of the Nam Et-Phou Loey national protected area (NPA). Here, the influence of the NPA has led to more conservation-oriented outcomes with a ratio

‘agricultural land/total land’ that varied between 44% in Donkeo, 46% in Paklao and 66% in Bouami villages. These are obviously a few chosen examples illustrating the way multiple reinterpretations of the same policy engender a considerable diversity of local situations relative to LUP implementation. The very existence of this diversity suggests a strong capacity of Lao PDR’ LUP arena to adjust policy to specific contexts and objectives.

Second, landscape-scale knowledge was generated through analysis of chronological series of remote sensing data (Castella *et al.,* 2011) combined with field surveys and participatory assessments (Pfund *et al.,* 2011). A large range of methods, e.g. participatory mapping, visioning exercises, multidisciplinary landscape assessment (Sheil *et al.,* 2002), photovoice (Belcher and Roberts, forthcoming), were used to engage community members in discussions about landscape structure and management. This process could identify trends and likely implications, as well as people’s expectations, aspirations and concerns regarding land-use planning (Colfer and Pfund, 2010). These activities were conducted at different periods and places, or independently by different disciplines, leading to what was called the project’s “knowledge puzzle”. At this stage, it was not obvious at all for project members how this knowledge would then be invested into the PLUP action research.

Third, the results of the diagnostic studies on LUP implementation and landscape management were used to prioritize the research issues related to the PLUP implementation gap (i.e. between principles and practices). Three objectives were identified for targeted action-research:

- To better integrate monitoring and learning processes,
- To facilitate communication and negotiation between stakeholders,
- To link village-level PLUP with above levels and coordinate/harmonize with other planning interventions.

A negotiation support platform was then developed through an adaptive learning process that took place over one year in the village cluster of Muongmuay in Viengkham district in 2010. The platform was co-constructed with three groups of stakeholders: a multidisciplinary team of researchers, development practitioners from province and district line agencies (MAF & NLMA), and local communities. The method gradually emerged from trial-error processes whereas tools were tested, gradually refined and then validated collectively and integrated in a sequence of actions that makes up the successive stages of the PLUP process. The multi-stakeholder negotiation platform was finally made of a combination of participatory and spatially-explicit tools that are described in details in Bourgoin *et al.,* (in press).

Members of the village land management committee were involved in a series of learning and design activities. After elicitation of local knowledge related to landscapes and livelihoods, a role-play called ‘PLUP Fiction’ involved the villagers in a learning experiment based on a virtual landscape (Bourgoin

and Castella, 2011). Focus group discussions were used to generate the parameters of a role play game that simulated land-use planning. By playing the 'PLUP Fiction', participants gradually became better negotiators in the land zoning process. Actual village land zoning took place subsequently on the basis of a participatory 3D model that provided a realistic representation of their village landscape (Rambaldi, 2010). Participatory 3D modelling was used as a 'boundary object' to visualise alternative landscape scenarios and facilitate negotiation between stakeholder groups. A Geographic Information System was coupled with a simple cost/benefit analysis model that was parameterized by the villagers themselves. Facilitators could capture real-time information on the different areas of the land-use plan under discussion and present corresponding socio-economic and environmental returns. Successive rounds of negotiation led the participants to a final pattern of land zoning that satisfied the different stakeholders, despite their initially contradictory objectives and competing claims. The whole land-use planning process took one week of constant interactions between the implementation team and the village community. Through iterative design, local stakeholders gradually refined their landscape plan and tested the introduction of innovative cropping and animal husbandry systems by changing the parameters of the simulation. The final stage of the planning process consisted in building capacity of local stakeholders (i.e. district planners and local communities) to engage them into a long term monitoring which is necessary to regularly revisit their plans.

Our action-research stopped at this pilot stage (in December 2010). Yet, for landscape science to achieve visible impact on landscape governance, researchers together with their partners have to go beyond the initial phase of knowledge generation to transform single experiments into more generic, actionable knowledge that can be applied at a larger scale.

8.4.2 Analytical framework

Three complementary generalization pathways were explored in the subsequent phase of the project that started in early 2011. The co-learning process continued in a less structured, more flexible mode as compared to what was previously imposed by the somehow constraining institutional framework and management rules imposed by the project logical framework and donors. The analytical framework proposed by Clash *et al.*,(2003) is used here to put the context-specific knowledge system into a more general perspective. Local legitimacy, policy salience and scientific credibility guided the action-research experience and structured the set of follow-up activities that are presented below.

(1) Legitimacy for practitioners. Researchers teamed-up with a development NGO (Agrisud International) to out-scale the initial experience by replicating the innovative PLUP process in a larger number of villages (n = 25) than the initial 6 case studies. The method had to be adapted to a smaller team of implementers: 4 district staff as compared to the 10 individuals (including national and international researchers and provincial staff) who were involved in field work in the previous period. Researchers were involved in the simplification of the approach through co-learning in real

implementation situations with village communities. They were involved in capacity building of their district partners so as to give them larger autonomy in the implementation process. Focus group facilitation skills were improved so that local staff felt more confident in their interactions with villagers. They also learnt technical skills such as constructing 3D models of village landscapes with villagers, zoning land-use, computing parameters in Excel files and GIS software (Quantum GIS). Beyond the technical skills they gained through practice, district staffs were empowered vis-à-vis village communities by the agricultural extension activities they could propose on behalf of the development project for each land-use zone collectively defined. They generated actionable knowledge that could lead to real outcomes beyond the landscape planning exercise. Last but not least, they contributed to the development of a handbook and toolbox of PLUP field implementation based on their experience (NAFRI, 2011). This document now serves as a training support for PLUP practitioners in other districts and at the national level. They proved that the job was feasible by district staffs and they could gradually assert their legitimacy in the face of the other stakeholder groups.

(2) Salience for policy makers. Local PLUP experiments demonstrated the salience of the proposed negotiation platform in responding to the challenges of PLUP implementation as presented above and in Bourgoin *et al.*,(in press). The contextual relevance of the method was guaranteed by its very process of bottom-up emergence through action-research. But up-scaling required drawing and sharing lessons that would help generalizing and institutionalizing the approach beyond Viengkham District, up to the national level. The researchers thus engaged in a policy dialogue at the national level that involved a large number of projects coordinated by bilateral and multilateral cooperation agencies and NGOs working with the same line agencies, i.e. MAF and NLMA. The objective of such dialogue was to get feedback from diverse PLUP implementation initiatives that followed the publication of the PLUP manual so that experiences could be shared and methods could be harmonized. A limited number of working groups were set up on key topics of interest:

a. Reconciling land-use plans developed at multiple scales
b. Improving local communities participation in land-use planning
c. Harmonizing land-use zoning techniques and methods
d. Land registration and titling
e. Knowledge management: data collection and dissemination
f. Beyond planning: plan implementation and monitoring

Singular project experiences were thus incorporated into a comparative framework to address broader policy perspectives and adjust the instruments that were initially proposed to the real conditions of implementation, including financial and human constraints. Field guidelines are under preparation based on the result of the field knowledge harmonization process.

(3) Credibility for the scientific community. Generating scientifically sound knowledge from pilot experiments requires confronting the contextual, empirical results to a theoretical framework. In the case of action-research, theory and practice are co-constructed in an interactive process of contextualization and de-contextualization (Checkland, 1985). Consequently, the scientific credibility of the result emerges from this adaptive co-learning process between theory and practice. Two categories of knowledge need to be scientifically validated in the context of land-use planning: knowledge about resources use and the environment on one hand (i.e. input and outputs of LUP) and methods about participation and negotiation on the other hand (i.e. process). Bourgoin (2012) addressed the former category and suggested criteria for data quality check. Lestrelin *et al.*,(2011) developed an approach to measure the level of participation in land-use planning. Indicators are proposed to assess the quality of the community engagement in LUP and to compare different methodological approaches and/or implementation protocols.

An original model of Science-Practice-Policy interface emerged from the repeated interactions between theory and practice all along the process described above. The methodological framework described in this paper arose from the practical case study and at the same time generic rules were made relevant to the specific context. Practice gradually improved our method, and influenced the local negotiation processes and the national policy agenda.

8.5 A model of Science-Practice-Policy interface in PLUP

The initial diagnostic survey emphasized the need to engage local communities in negotiating their land-use plans. But in the absence of clear implementation guidelines, government officials tend to shape how local participation is construed. As changes in discourses did hardly translate into change in practices, innovative methods were in high demand to actually apply the principles of PLUP, i.e. enhanced participation, and integration of scales (rationalizing land-use plans across scales) and knowledge (rationalizing multiple stakeholders' perspectives).

8.5.1 Social learning through the design of a negotiation platform

The initial research posture of the scientists involved in the participatory action-research was rather linear. Beside the diagnostic study on past LUPLA and PLUP implementation, reported above and in Lestrelin *et al.*,(in press), participatory 'landscapes & livelihoods' research was expected to provide knowledge about the functioning of the socio-ecological system and motivate a rational planning by encompassing the perspectives of both scientists and local communities. While local perspectives on land management were recognized, the initial landscape research design admittedly led to a 'knowledge puzzle' made of many layers of disconnected information. Participatory maps of soil qualities, spatial distribution of non timber forest products (NTFPs), land-use systems and changes over the past decades were available at the village and village cluster levels. Chronological series of

land cover maps (1973, 1979, 1988, 2003, 2007 and 2009) had been prepared based on remote sensing data. ALOS high resolution satellite images were also available for the most recent period (Castella *et al.*, 2011). Many quantitative and qualitative data had been collected in the target villages to characterize the livelihood systems and understand how they were influencing landscape changes.

This wide range of data was expected to help achieving a better integration of conservation and livelihood aspects in land-use planning (Frost, 2008). A large range of methods were deployed based on 'state of the art' landscape research. They were selected and combined in successive workshops involving a large range of scientific disciplines so that a consensus could emerge about the interdisciplinary research orientations and implementation mechanisms. But despite the clear objectives and collaborative planning focus of the overall Landscape Mosaics project, the concrete land-use planning process remained vague for all project participants during the initial two years of intensive data collection (2008-2009). Nonetheless, PLUP principles as introduced in the PLUP manual (MAF-NLMA, 2009) were guiding data collection. Researchers' interactions with local stakeholders were expected to catalyse the knowledge generated by the different disciplines during the planning process.

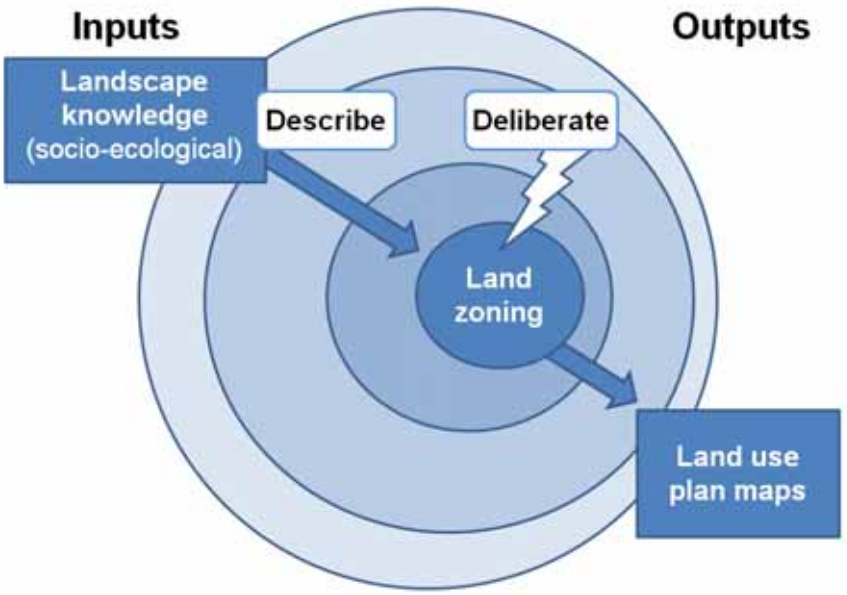

Figure 32. A linear model of land-use planning.

The diagnostic study conducted during the first attempt by the project team to implement the new PLUP approach, in Phoukong village of Viengkham District in March 2010, revealed many flaws in the participatory approach that made its implementation inconsistent with its guiding principles. The implementers had not much experience in participatory land-use planning and they strictly applied the tools from the manual to the map (Figure 32). The linear implementation process had limited consideration for the context. There was a tendency to focus on the participatory procedure itself,

while overlooking the socio-economic data collected during the preparatory phase and the reactions of local people during the planning process, which influenced the effectiveness of the process and its outcomes. On the other hand, limited understanding by local participants about landscape planning in general, and the intentions of researchers and practitioners in particular, led to very limited inputs from the members of the village land management committee. Consequently, the land-use plan was done by the district practitioners with technical support from a GIS specialist from the national research team. Only the use of digital map and GPS points made it different from former LUPLA methods. The local people remained simple observers of the process and participation could only be accounted as their presence in the room.

8.5.2 Multi-stakeholder negotiation: the centrepiece of PLUP

The lessons drawn from this first experience were used to improve PLUP implementation within the existing institutional context and local capability. Various stakeholders were involved in the co-construction of a negotiation platform for land-use planning. The challenge was to translate participation from mere meeting attendance into strategic negotiation (Giller *et al.*, 2008). Beyond our initial assumptions that communicative action would lead to shared understanding and co-learning (Habermars, 1981; Röling, 1994), we had to acknowledge the power imbalance due to differentiated access of stakeholders to economic and political knowledge resources. In a context of collective planning and learning, participation needs to be conceptualized as strategic negotiation involving participants with unequal capacities and opportunities to intervene, mobilize resources and influence outcomes (Giller *et al.*, 2008; Neef and Neubert, 2011). The negotiation emerged through a bottom-up, reflexive process that started with the development of a role play game, 'PLUP Fiction'. This 'boundary object' is a learning tool for practitioners to understand the local context in which the land-use planning takes place while local communities are engaged in a PLUP discovery process. They discover PLUP and are introduced to the practical implications of land-use planning for livelihoods, landscape management, and the socioeconomic development of their village (Bourgoin and Castella, 2011). The game somehow facilitates the 'free prior and informed consent' for PLUP implementation in their village. Through 'PLUP fiction' both groups also become better negotiators.

Other boundary objects are then used to facilitate local community engagement in the planning process. In mountain regions such as in our case study sites, landscape visualisation with a 3D model as shown its relevance in getting local people actively involved in spatially-explicit land zoning (Rambaldi, 2010) Our experience shows that most members of the village land management committee, who were often left out of the discussions because of their limited capacity to comprehend landscape features on a topographic map or a satellite image, could be brought back into the negotiation by using a relief model of their village landscape as a boundary object. All boundary objects used in the process to collectively describe the landscape, explain planning and explore

scenarios, generated shared actionable knowledge that was mobilized during the land zoning negotiations (Figure 33). Our experience revealed that the combined use of boundary objects in the negotiation platform was conducive to the iterative process of scenario development, assessment, rejection, and finally adoption once all parties agreed with the output of the negotiation (Bourgoin *et al.*, in press). The model proposed in Figure 33 allowed diverse stakeholders to rationalize the negotiation through an iterative planning process. Providing feedback on the socio-economic and ecological implications of the scenario showed essential to make the stakes visible for all groups of stakeholders and to trigger the next round of discussions. Without feedback, all groups may camp on their respective positions with no idea of their potential long term impacts on the village landscape and livelihoods.

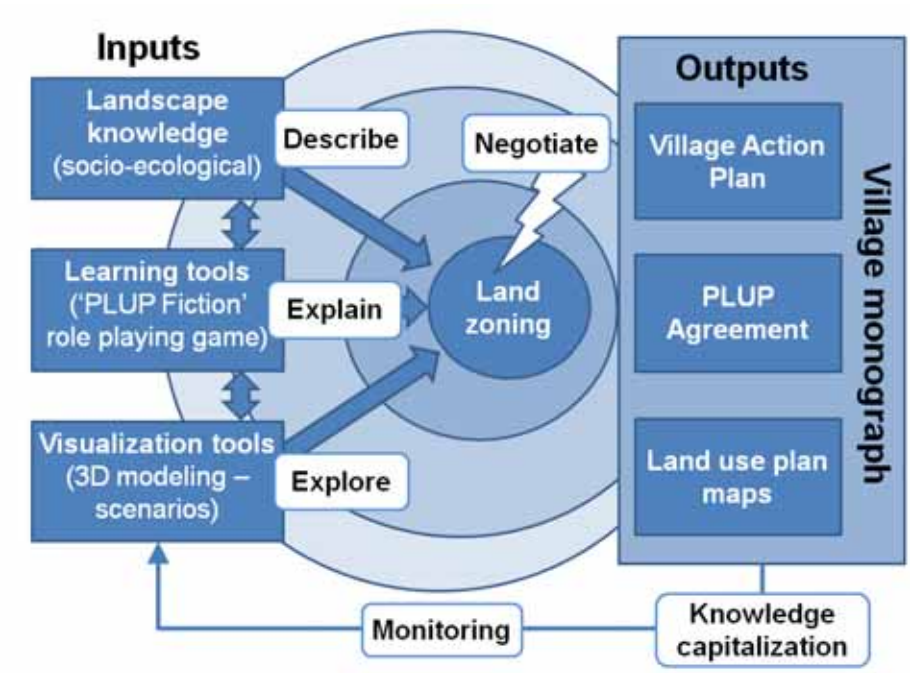

Figure 33. A platform for strategic negotiation in land-use planning.

Moreover, when land-use planning was implemented without proper training of the local participants and/or on the basis of 2D maps only, the first plan that was pushed forward by the most influential individuals was usually adopted by the whole group through a passive and consensual process. As mentioned above, two periods can be identified in terms of who imposed their views in the final product of the zoning process. Initially the district staff imposed strict application of the 3-plot policy, leaving little room for negotiation on the quantity of land allocated to rotational agriculture. The discussion turned essentially around the spatial distribution of land-use types on the landscape, not on their relative surface. With the emergence of more participatory planning approaches, the few village members who could read a map would impose their views, allocating very large areas of land to agriculture and resulting in large discrepancy between the area measured on the map and the one

obtained through interviews with individual households (Bourgoin, 2012). Both processes resulted in unrealistic land-use plans, which was considered as one of the main obstacle to their actual implementation and a major cause for the failure of the LUP-LA approach (Fujita and Phanvilay, 2008; Lestrelin *et al.*, in press).

8.5.3 Knowledge networks supportive to landscape design

Another lesson from our experience in landscape design is that participants tend to retain only the information that is salient, from their perspective, so as to not overload the negotiation with redundant or unnecessary information. We could thus observe what kind of knowledge was mobilized and how it was used during the negotiation, i.e. the generative dance between knowledge and knowing (Teulier and Hubert, 2004). Three kinds of knowledge were mobilized to gradually fill the gap between the two extreme scenarios presented above (i.e. constraining 3-plot policy vs. the hazy 'participatory' business as usual). Planning stakeholders progressed through successive iterations towards a shared solution that was finally materialized as a consensual landscape design. In the process they used the:

- Description of the socio-ecological system (structure of the livelihoods in terms of land, labour, capital, problem census, population trends, etc.),
- Parameters of the land-use types, i.e. inputs in labour and capital per hectare and outputs in monetary value from agriculture, livestock and NTFP collection, used by PLUP Fiction role play,
- Pictures of landscape patterns on the 3D model corresponding to successive scenarios negotiated (areas under different land-uses) and digitized on-screen with a GIS software.

Other data, such as official land suitability maps, participatory NTFPs and soil maps, high resolution satellite images were systematically made available to the participants but were not used. When asked why they did not use this empirical data, respondents from the village land management committees involved in PLUP told that they already knew the spatial distributions of soil quality, NTFP, wildlife, etc. They mobilized this tacit knowledge during the zoning negotiation but they did not need to have it represented on a 2D map as they could already visualize it on the 3D map from their intimate knowledge of their village landscape. We also found out that it was not necessary to provide highly accurate data as the knowledge accuracy used to make decision was levelled to the coarsest one. For example, there was not much reaction to the overlay of a high definition satellite image on the 3D model to visualize 'current land-use' as people felt they already had it in mind. The high level of detail provided was constraining their thinking.

Actionable knowledge was the one they had generated collectively during the learning phase and that did not need to be contested between parties. It was consensual enough to focus the negotiation on the land-use scenarios and not the knowledge itself. The knowledge generated through the negotiation

was also considered as actionable by all parties. Concretely, it led to a collective action plan that describes the concrete activities that will be developed by the village community with the support of local practitioners for each land-use type so that the plan can be implemented and can achieve the expected impact. An agreement, signed by all parties, stipulate their respective engagements, together with implementation criteria that can be monitored. The input and output knowledge generated throughout the week of PLUP is then encapsulated in a village monograph (Figure 33) that serves as a reference for the monitoring by all parties involved and also to decide when the land-use plan needs to be revisited when the previous one is found obsolete.

PLUP knowledge is generated and managed by a network that emerges through the negotiation platform. PLUP impacts on landscapes and livelihoods depend to a large extent on how the actionable knowledge generated is carried over by the network to other villagers who did not take part in the intensive planning process and other stakeholders such as private investors. Through the PLUP process, the participants gain legitimacy vis-à-vis other people in negotiating land issues. They are empowered as land-use planners. Members of the village land management committee are then expected to manage land conflicts, report and sanction deviant behaviours, and guarantee compliance to the plan vis-à-vis third parties. This emerging local institution supported by the relevant knowledge network is key to the success of PLUP (Figure 34).

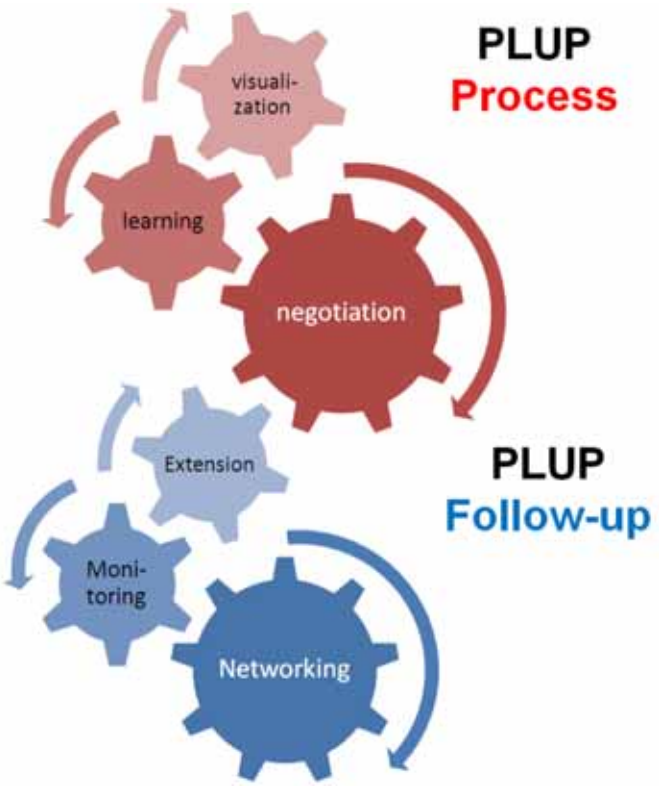

Figure 34. The key elements of PLUP success (i.e. good negotiation and networking) and determining factors (i.e. visualisation/learning and extension/monitoring).

8.6 Conclusion: Towards a new landscape design model

Through landscape design, different groups of stakeholders are negotiating the spatial organization of landscapes so as to reconcile competing claims on natural resources. This is achieved by negotiating trade-offs between different needs, demands, values and land-uses. When research and policy actors intensively engage with 'ordinary' citizens, their technocratic and elite ideas about public participation can shift towards a more inclusive direction. Beyond scientific knowledge, scientific posture is essential to support local planning and inclusive decision making in landscape design. Landscape visualization and learning tools have proved useful to: (i) enhance participation, i.e. from mere meeting attendance to strategic negotiation, (ii) empower all stakeholders groups through the emergence of an ad hoc knowledge network, and (iii) increase local legitimacy and policy salience through scenario exploration.

The knowledge network that emerges through the landscape design process is a boundary organization that becomes visible in its capacity to make 'situated decisions', here and now. A real challenge is to nurture and sustain such boundary organization with staff turn-over and institutional changes. Too often new forms of participation are applied with limited consideration of the context in which they operate. There is a tendency to focus on the participatory procedure itself, at the expense of ignoring contextual factors, such as the role of local bureaucracies, which can influence the effectiveness of the process and its outcomes. Local administrations should be better integrated into the boundary organization that supports social learning in landscape design. A committed adhocracy should gradually emerge through enhanced legitimacy gained from practice in facilitation of multi-stakeholder negotiations. Finally, better science and greater expertise are not necessarily the key ingredients for enhanced planning and impact. What is primarily needed is the development of new forms of partnership, and new tools for creating political dialogue between a greater number of actors (Robinson, 2004).

Part 5. Synthesis and Conclusion

Chapter 9. General discussion

Plate 9. Sunrise in Phakok (Phonxay district)

9.1 Overview

This thesis began with a brief summary on the general perception of land-use planning as a tool of sustainable development. Changes in the structure and functioning of ecosystems have resulted from the growing demand for goods and services of an increasing population (Vitousek *et al.*, 1997; Chapin III *et al.*, 2000). In response to degradation and over-exploitation, the concept of sustainable development has gained important ground in the field of land-use planning (Meadowcroft, 1997). In the 1960s, the main instruments for the assessment of land development potential and the optimization of land allocation between different economic sectors evolved under the sustainable development paradigm towards the establishment of a territorial balance between socioeconomic development and environmental conservation (Randolph, 2004). In Lao PDR, successive land-use policies have been tested to respond to conservation-development challenges in relation to on-going land and forest degradation processes. Nevertheless, past approaches to land-use planning/land allocation have been seen as counterproductive, exacerbating poverty and deforestation trends (Evrard and Goudineau, 2004; Ducourtieux *et al.*, 2005; Lestrelin and Giordano, 2007). This thesis bridges the gap between political discourses and their translation to action at the local scale (Part 2, Chapters 2-3). By using a range of landscape boundary objects, we could improve local participation (Part 3, Chapters 4-6), and we explored the link between land-use planning and development/environmental national priorities (Part 4, Chapters 7-8). This final chapter presents a synthesis of the main findings of the research and the contribution it can make to on-going land policy debates by showing, through concrete experiments, how the policy-practice gap can be reduced. This chapter also presents recommendations for applied research on land-use planning and for an enhanced role of science in landscape governance. Finally, the main limitations to this study are discussed as a guide to future research, followed by a short conclusion.

The primary aim of this thesis was to investigate how land-use planning could be applied more effectively to better manage conservation-development trade-offs by i) taking into account existing socio-political contexts, ii) engaging local communities in landscape design, and iii) facilitating land-use negotiations at multiple levels. To achieve this, I addressed three key research questions that frame the main research findings summarized below.

Q1. What are the mismatches between international discourse and the local implementations of land-use planning in the uplands of Lao PDR?

A review of the political ecologic approach to land-use planning (Chapter 2) revealed that although land-use planning is generally presented as a key instrument to safeguard environmental resources and services through time and generations (FAO, 1993), it is also strongly influenced by debates over society-environment interactions and can be used to enforce state territorialisation projects. In Lao PDR, land policies have been used to rationalize rural land-uses and limit environmental degradation.

However, limited resources and capabilities for implementation as well as poor local participation and understanding have ultimately led to limited incentives to comply with land-use plans. Based on case studies in Luang Prabang province, the evolution of land-use planning was analysed through the lens of local participation (Chapter 3). Participation was defined as both a qualitative and quantitative asset. Monitored throughout successive land-use planning policies using an innovative framework made of key indicators, participation has remained limited and uneven, biased towards district practitioners or village elite. With an exclusive focus on planning at the village scale, conflict resolution, landscape management and social networking were overlooked. Ultimately, past and current implementations of land-use planning could hardly succeed in dealing with the many socioeconomic and environmental challenges faced by Lao PDR.

Q2. How to facilitate decentralized resource governance through the development of an innovative participatory land use planning approach?

A good understanding of the policy context combined with empirical studies can provide a framework for intervention. Facilitating negotiation between stakeholders for improved legitimacy of the process was among the most prominent issues that needed addressing. To avoid the constant local re-interpretation of policies due to deficient implementation standards, a framework was developed around the principles of participation and integration of scales and perspectives, to implement participatory land-use planning in accordance with the national guidelines (Chapter 4). A land-use negotiation platform was built to overcome scientific and practical challenges of land-use planning. To facilitate negotiations between stakeholders, a landscape simulation tool based on a role-play game was developed (Chapter 5). This simulation entitled 'PLUP Fiction' was aimed at promoting learning for a heterogeneous sample of a village population, as well as raising a common understanding of the issues at stake when the spatial organization of landscape changes. Participatory 3D Modelling was used to involve several stakeholder groups in discussing and negotiating boundaries at the landscape scale. Combined with a spatially explicit model that links socio-economic data and landscape arrangement it provided locally relevant and scientifically credible outputs (Chapter 6). By sharing and integrating scientific and local knowledge, landscape boundary objects enabled better integration of local views. The approach was also well received in villages and the learning and visual tools enhanced ownership of both process and outputs. By involving villagers from a range of social positions, gender and ethnicity, the process aimed at involved marginalized groups without impinging on the traditional chain of command.

Q3. What is the importance of land use planning in translating global and national regulations into local actions?

To answer this research question, participatory land-use planning activities conducted at the village scale were related the theoretical framework proposed by Cash *et al.*, (2003) and to existing land

policies. For instance, the implementation of the Reduced Emissions from Deforestation and Degradation (REDD+) scheme is struggling with questions related to the demarcation of village boundaries, community lands and resource rights as well as the anticipation of land conflicts, e.g. disputes between the state and communities without land titles. Chapter 7 demonstrated the benefits of using participatory approaches to involve local communities in negotiating carbon sequestration through land-use planning. Notwithstanding that clear tenure rights and community participation are critical elements to the success and sustainability of REDD+, it only represents one step towards an effective and equitable process. Tenure reforms made at the national level will ultimately reshape local people's individual and collective rights. The innovative approach to participatory land-use planning that is introduced in this thesis as a model of science-practice-policy interface (Chapter 8) fulfils its task of a tool for decentralised governance.

9.2 Landscape ecology in practice

This thesis contributes to the field of Landscape Ecology by including some of the key issues and research priorities of the discipline highlighted by Wu and Hobbs (2002). When research is often criticized for its lack of integration in societal issues, this action-research project has been developed to answer particular land-use planning issues in Lao PDR. Questions on the role of participation in decentralised governance are often national research priorities in developing countries (Agrawal and Ostrom, 2001). Grounded in national development agendas, this research aimed at engaging local communities in collaborative management of natural resources. Land-use planning in Lao PDR is becoming a prerequisite to provide land registration and extension services in villages. It has also been presented as basis for the implementation of payment mechanisms for ecosystem services (Chapter 7). Beyond policy salience, this work was applied by communities at the local level. Villagers interviewed at the start of the project were seeing land-use planning as a critical issue to solve their inter-villages conflicts related to agriculture plots and livestock disputes. They perceived that setting clear and negotiated boundaries through land zoning was a way to secure their land in a context of intense pressure from foreign investors.

As advocated by several landscape ecologists, the need for integrating several disciplines is compelling while dealing with complex socio-ecological systems (Naveh, 2000; Wu and Hobbs, 2002; Ostrom and Nagendra, 2006). In this project, the institutional analysis aimed at clarifying the understanding of the impact of land policy processes on livelihood strategies (Chapter 2). On-the-ground research was conducted to collect empirical livelihood data in several villages, and to engage local stakeholders in landscape planning. Satellite imagery and GIS analyses were complemented by village-scale participatory mapping to incorporate research results in larger scale scenario planning activities. This integrated approach is defined by Wu and Hobbs (2002: 358) as "a salient characteristic of landscape ecology".

Opdam (2010) acknowledged that scientists should put more efforts in rethinking the science-practice interface. In this thesis, I demonstrate that landscape ecologists should not concentrate on seeking questions to answer in order to export their methods but rather develop innovative methodologies that fit a particular context. Further, if science is to be used to improve the decision-making capacity of local actors, the accessibility of knowledge also needs to be decentralised (Beunen and Opdam, 2011). In Chapter 3, the participatory framework was developed to ensure knowledge transfer based on the three characteristics proposed by Cash *et al.*, (2003), namely credibility, salience and legitimacy of information. To increase the legitimacy of scientific knowledge in the local context, visual and learning boundary objects were developed. These 'knowledge tools', used as vectors of information, built bridges between scientists and local stakeholders (Nassauer and Opdam, 2008).

Within the growing literature on landscape ecology principles (Wu *et al.*, 2002; McAlpine *et al.*, 2010), this thesis highlights that science and practice can co-exist through scientific involvement in addressing locally relevant issues. Further, I argue that the role of science is to design innovative ways to translate landscape knowledge so that it can support local stakeholders in decentralised decision-making.

9.3 Towards integrated landscape governance

In addition to the involvement of scientists in action-research, the association between developing cutting edge science and providing context specific knowledge relevant for practical decision-making is often overlooked (Opdam, 2010). In developing countries especially, the use of intervention methods created in other contexts (e.g. in developed countries) lead local decision-makers interested in pragmatic solutions to be gradually disconnected and disinterested from research inputs. This study addresses one of the priorities faced by development researchers, namely the need to foresee practical and relevant applications with long-term perspectives (Wu and Hobbs, 2002).

Developed at the village scale, the bottom-up planning process needed to articulate all stakeholders' viewpoints to increase legitimacy at higher decisional scales towards an integrated landscape management system. Institutional designs should not be overlooked as they are likely to ensure the durability of the methods and tools developed through action-research, which goes beyond the capacities and time frame of a research project.

Several activities were undertaken during the time of the project to anticipate the progressive withdrawal of scientists.

Over successive field missions, the reflexive loop involving methodology assessment and adaptation according to villagers' reactions, included national research institutions(e.g., National Agriculture and Forestry Research Institute), practitioners (e.g., development projects and extension agents from the District Agriculture and Forestry Office), local authorities (e.g., land management officers and district governor's office), and village communities. The aim was to train a team of

national experts to use the methodology in a few villages and then to replicate the PLUP process so as to cover the whole district (out-scaling). Capacity building on basic computer science and GIS was provided to district officers with limited knowledge. For the approach to be replicated in the field without external support, a trade-off had to be found between cost and efficiency of land-use planning. For instance, implementers received extensive training in open-access softwares (e.g. Quantum GIS). Behind the landscape design, the support of the authorities at different levels was important to have a process fully endorsed.

At the national level, the lessons learnt from field experience have been used to engage other research groups and national decision-makers in discussing principles and tools of PLUP. A policy-dialogue has been established, with regular workshops organised at the central level to relate land-use planning with other national preoccupations and discuss potential reforms on land tenure and land registration.

9.4 Limitations and future research

While the negotiation platform developed for the case study sites in Lao PDR have been framed by principles that can be used universally, the main limitation of this approach lies in the context-specific nature of the tools developed. Providing the right knowledge in the right context (Nassauer and Opdam, 2008) required designing boundary objects through 'trial and error' approaches, costly in resources. The relevance of the tools is bounded by the context for which they have been developed and will only fit similar contexts in Lao PDR or other mountainous areas facing similar challenges. Another limitation was created by the institutional setting of the project. For the sake of capacity building and co-production of action-research outputs, many 'trainee observers' from governmental institutions attended as mere observers. The inertia created by a mix of interests within the outnumbered team made the research process slow and the collaboration complex. The process was also hampered by the fact that implementers from local institutions often tend to concentrate their efforts on topping-up their salaries rather than involving themselves in capacity building and learning activities. However, the low wages of the government staff can account for the lack of altruism and the tendency to profit from the project.

In this thesis, multi-stakeholder negotiations aimed to re-organise agriculture-forest mosaics and reconcile competing claims on natural resources. If the effectiveness of the process was measured by developing methods to gauge the credibility of outputs, it may take time before actual impact on landscapes and livelihoods can be documented. For Cash *et al.*, (2003: 8086), "perspectives of a decade or more may be necessary to reliably evaluate the impact of science". In the meantime, new forms of partnership and new tools will be necessary to sustain and expand the knowledge network that emerged through the participatory approach created in this thesis.

To create good conditions for success, future research needs to focus on monitoring. In a country where land-use policies has been used as a coercive 'top-down' instrument, the participatory process developed in this thesis required developing innovative ways to involve local communities in landscape planning. Regardless of the positive reaction it generated from villagers and government representatives, the project limited its extent to the district scale. There seems to be no reason why a trained team could not implement PLUP in other mountainous areas of the country. Up-scaling to provincial and national scale may require further capacity building to support monitoring activities, especially supervising the implementation of negotiated plans. Research could investigate the reasons for adoption of alternative land-uses. Understanding the successes or failures of village action plans would also provide insights on what to improve in the process linking research and development agencies.

9.5 Conclusion

Land-use planning/land allocation processes have long been considered as counterproductive, exacerbating poverty and deforestation trends in Lao PDR. In this context, the main objective of my research was to investigate how land-use planning could be applied differently to better manage the ecosystems - livelihood trade-offs through land-use negotiations at village and landscape levels involving multiple stakeholder groups. This thesis makes an important contribution to understanding the mismatches between international discourses and local implementation of land-use planning in the uplands of Lao PDR. Furthermore it provides ways to facilitate local management of natural resources through the development of an innovative participatory land-use planning approach. This thesis also highlights the role of scientific knowledge to bridge the gap between policy and practice. In the short term, the negotiated land-use plans might preserve villagers from the current land grabbing caused by the recent commoditization of the land. In the long run, they might be used as a basis to promote conservation agriculture and implement market-based incentives rewarding forest protection.

Further research will be necessary to monitor and analyse the changes of land usage and ultimately assess the value of participatory land-use planning as an instrument for decentralized governance of livelihoods and landscapes in agriculture-forest mosaics.

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