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Linking reforestation policies with land use change in Northern Vietnam: Why local factors matter

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Abstract

In many countries worldwide, similar state policies on land management have been implemented as a response to deforestation in mountainous areas. So far, few studies have examined to which extent these policies have actually contributed to reforestation. This is the focus of our analysis, based on a case study in Vietnam. Because land access and land use were traditionally governed by common rules, we examine land use changes from an institutional perspective. We use the Institutional Analysis and Development (IAD) framework, coupled with an historical perspective and the analysis of actors' perception and dominant narratives on land management and forests. Results show that national policies significantly interfered with local factors, leading to a complex course of decision-making and action. Substantial reforestation in the area was not a response by farmers to policy incentives but rather the unexpected outcome of the disruption of local institutions by these policies. We argue that, because national interventions have relied on false or exaggerated narratives and beliefs, their implementation is in conflict with the local reality in upland areas, leading to unpredictable and locally dependent outcomes. We defend hence the need for local level studies and also recommend considering local institutions for land use change analysis in contexts where land use systems are characterised by a high degree of human interaction.

Keywords: land use change; institutions; reforestation; northern Vietnam; Institutional Analysis and Development framework; uplands.

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1. Introduction

Since the 1980s, reforesting the so-called “barren land” has become a growing concern among policy-makers in many developing countries. In Asia, the governments of China, Laos, Indonesia and Vietnam have designed and implemented similar forestland policies, including settlement programmes, land classification, devolution of forest management and reforestation schemes. The central government in China has allotted 1.7 billion USD in subsidies for fast-growing plantations to be distributed by 2015 (American Forest & Paper Association, 2004). Donors have also largely engaged in these initiatives through establishment of forest plantations, capacity building and more recently direct budget support. In Vietnam, international organisations have committed more than 200 million USD for national forest sector development between 2006 and 2010 (Viet Nam News Source, 2005). Although several studies have challenged the success of these forest rehabilitation initiatives in reducing poverty and improving livelihoods (e.g. in China: Jianchu *et al.*, 2005; Weyerhaeuser *et al.*, 2005; and in Vietnam: Dinh Duc Tuan, 2005; Muller *et al.*, 2006; Sunderlin and Huynh Thu Ba, 2005), the literature has not devoted enough attention to how these policies have actually impacted on farmers’ land use decisions.

In Vietnam, official statistics acknowledge a significant rise in forest cover: 29.2% in 1985 (World Bank (WB), 1995) to 37.6% in 2005² (General Statistics Office of Vietnam, 2006). Most of these newly reforested areas have been established by the State on state-owned protection forestland³. However, in a period of increasing importance of the private sector in forest management and of growing demand for timber (Barney, 2005), it is of particular interest to understand how households make land use decisions, and to which extent these decisions have been driven by government policies or local drivers.

Although causes of deforestation have been thoroughly investigated, the literature examining driving forces for reforestation, and more especially the impact of policies on reforestation is limited (Bacha, 2003). Most studies of land use change have examined which aggregated social and economic driving forces such as population density, access to roads or poverty affect land use. Some have integrated individual household data (Geoghegan *et al.*, 2001; Muller and Zeller, 2002) but most have selected *a priori* explanatory variables, based on assumptions drawn from social science theory. As underlined by McCusker and Carr (2006), although it is useful to highlight to which extent socio-economic variables are driving forces of land use change, these studies seldom ask why these are the driving forces of land use change. We propose to go one step further by looking more thoroughly at how decisions are taken at the household and community level within a particular set of state-driven policies.

Using a case study of reforestation in the uplands surrounding three villages in northern Vietnam, we explore what have been the decisive and enhancing factors for land use changes in this area using the Institutional Analysis and Development (IAD) framework (Ostrom, 1999). Uplands in this area were allocated to households at the end of the 1990s but were managed previously as common land by villagers according to locally defined rules. Since we believe that these rules are important factors in explaining land use decisions, we chose to

² Figures on forest cover area are actually controversial; some observers refute substantial reforestation in Vietnam. Sunderlin, W. D., Huynh Thu Ba, 2005. Poverty Alleviation and Forests in Vietnam. Center for International Forestry Research (CIFOR), Bogor, Jakarta, Indonesia.

³ Forestland in Vietnam is land designated for forestry purposes but is not necessarily covered by forest.

focus on the role of the rules governing land access and land use, but we also took into account other local or regional factors.

We start by presenting the methodological advantages of using the IAD framework for studying land use change in situations where there is a high level of human interaction. We narrate the land use story in our case study area, based on our findings from anthropological research and the analysis of policy development, and we use the IAD framework, coupled with an historical perspective and the analysis of actors' perceptions and dominant narratives, to explain the course of decision-making and action that has taken place. Although it is not our aim here to evaluate the impact of reforestation on livelihoods, we assess the long-term durability of tree plantations recently planted by farmers, based on the current state of institutions and on farmers' perceptions. Then, we contextualise our findings by examining the prevailing narratives⁴ in national forestland policies in Vietnam. Finally, we draw our conclusions on the relevance of institutional analysis to study land use change in similar land management contexts and on the importance of local factors over national policies.

2. Using the IAD framework to study land use change

Land use change literature is characterized by a considerable number of studies and models attempting to analyze which factors are the dominant driving forces of land use. However, with a few exceptions (e.g. Bray *et al.*, 2004; or in the field of multi-agent systems, see Janssen, 2002; Manson, 2006), this whole set of literature holds a common feature: its poor suitability to understand land use systems characterised by a high level of human interaction, e.g. common land, or private land where use or management depends on rules shared by several actors. Institutional aspects have been sufficiently covered in analyses of natural resources management (e.g. for fisheries or forest management (Gibson *et al.*, 2000; Ostrom, 1990)), but they have been frequently neglected when considering land management and more particularly land use change. Within the 19 land use change models that Agarwal *et al.* (2002) have reviewed and compared among a bibliography of 136 articles, most of them show a limited consideration of institutional factors. When they are taken into account, they are very often limited to land tenure. These models fit situations where individual decision-making is dominant, but they are not adapted to other contexts in which collective arrangements are continuously shared and modified by several actors.

As McCusker and Carr (2006) observe, scholars have not explored in detail the social processes that are hidden behind the considered socio-economic or institutional variables. Few studies have actually attempted to answer the question: "why are the observed factors the driving forces of land use change in this situation and not in another situation?" To answer this requires a thorough analysis of power and knowledge relationships. It is particularly crucial to analyse social processes when decisions regarding land use do not only depend on one individual but also on norms and rules that are shared by several actors. One attempt to characterise these social processes or human interactions in a systemic way is institutional analysis (Ostrom, 2005). The term "institution" is used in this context as the usually accepted academic definition. In common language, institutions are often assimilated to organisations such as the National Assembly, government agencies, etc. Here institutions should be understood as the "rules of the games" (North, 1990, p.3) and are distinguished from organisations which are compared to the "players" of the game who use the rules in a way to

⁴ The term narrative refers to a message that tells a particular story. It establishes causal links between a set of events or a particular environment with human action. See Roe, E., 1994. Narrative Policy Analysis, Theory and Practice. Duke University Press, Durham; London.

win the game (ibid). In this paper, institutions encompass rules-in-use governing land access and land use in the study area.

The IAD framework developed by Elinor Ostrom and her colleagues (e.g. Kiser and Ostrom, 1982; Ostrom, 1990; Ostrom *et al.*, 1994) has been used for a wide range of institutional settings, notably as a basis for developing a theory of common-pool resources management. We selected this framework because of its extended use and refinement that has allowed a rigorous and reliable assessment to be made (Ostrom, 1999). In addition, we found that it provides a number of advantages compared with other institutional frameworks such as the extended environmental entitlements framework (Leach *et al.*, 1999) and the sustainable livelihoods framework, which has also recently been used as a basis for institutional analysis (Messer and Townsley, 2003).

First, the IAD framework links local with higher levels of decision-making i.e. those, where central (governmental) policies and constitutional rules are decided. It is structured into three levels: i) the operational level, where decisions directly affect natural resources management; ii) the collective-choice level, where decisions impact the rules that affect the operational level; and iii) the constitutional level, where decisions impact the rules that govern how decisions are taken at the collective-choice level (Figure 1). We will focus in this paper on the operational and collective-choice levels as the first step of analysis.

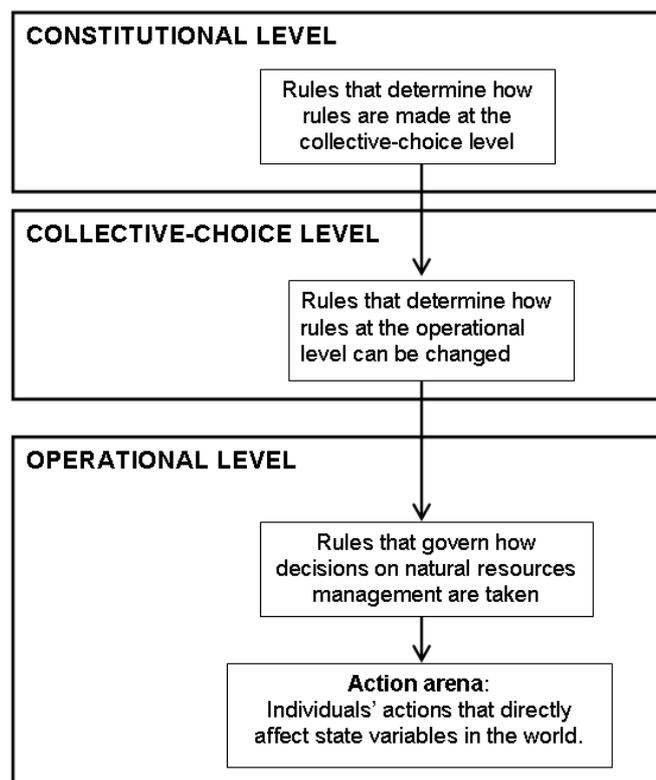


Figure 1. The three levels of analysis in the Institutional Analysis and Development (IAD) framework

Second, the framework’s categorisation of the exogenous variable impacting on the action arena (Figure 2) into material conditions, rules and attributes of the community is particularly efficient in analysing human behaviour and individuals’ actions. Material and biophysical conditions are the physical state of the environment in which actors evolve; attributes of the community can be broadly assimilated as cultural determinants; rules are “shared understandings that refer to enforced prescriptions about what actions (or states of the world) are required, prohibited or permitted” (Ostrom, 1999, p. 50).

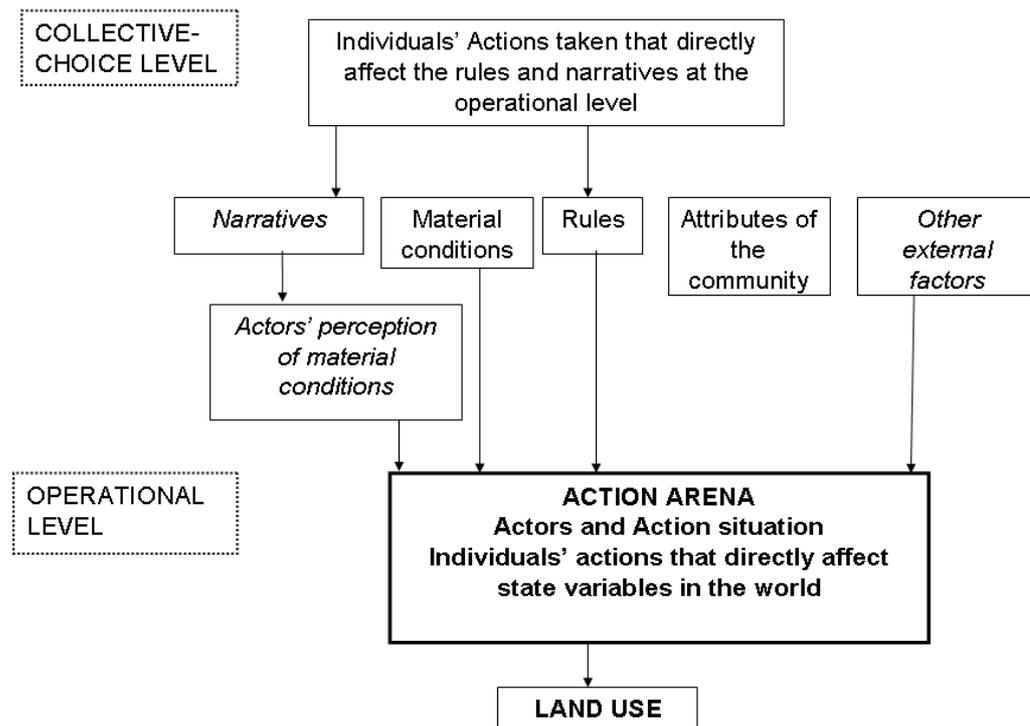


Figure 2. Framework used for this analysis, adapted from the IAD framework (Ostrom, 1999)

For the purposes of this research, we made a number of modifications to the framework proposed by Ostrom (these modifications appear in italics in Figure 2). We added three exogenous variables. Firstly, we needed to take into account external elements impacting on the action arena including macro-scale socio-economic variables (selling prices of agricultural products, off-farm work availability, etc). Moreover, we considered that not only rules but also narratives spread by national and local authorities through discourses could significantly affect the action arena. The focus in this paper on how narratives might affect farmers' strategies justifies the inclusion of this variable. Finally, we further emphasised the importance of social framings in this analysis by considering that, more than the material conditions themselves, how they are perceived was a key determinant in actors' decisions. These additions intend to capture driving forces that might have remained hidden otherwise. Also of importance is the use of a historical approach to comprehend the succession and linkage of events and of decisions taken by different social groups which resulted in overall land use changes.

In this study, the action arena focuses on the upland areas and on farmers' decisions regarding upland management in the three villages. This does not infer that other action arenas (lowland activities, husbandry, etc) on which farmers rely are ignored. Many action arenas overlap and it is difficult to draw clear boundaries between them.

Located in the action arena, actors are the central variable in the analysis. It is thus essential to select a relevant model of actor behaviour, as this will determine whether actors respond weakly or strongly to different external factors. The neoclassical economic model of rational behaviour has been commonly used by a wide strand of the new institutional economic analysis (Dequech, 2006). Yet, there are a number of limits inherent to the maximization behaviour (a review of these criticisms is proposed in van den Bergh *et al.*, 2000). Although this model is satisfactory in stable and competitive environments where individuals hold full information, there are many situations where individuals do not act as

Homo Economicus (Frohlich *et al.*, 1984; Ostrom, 2005). Vietnamese cultural characteristics (e.g. as underlined by Tran Duc Vien and Rambo, 2001) led us to consider norms as an important component of the valuation process. In Vietnam, norms are particularly strong as the whole society is thought of as a family. As expressed in Vietnamese language, Vietnamese people do not perceive themselves as single, isolated individuals in a wider society but always refer to their own position *vis-à-vis* their family, their friends, their work colleagues, the community in which they live and the whole society with which they interact. An individual's needs and aspirations are framed by the individual's role in society and society's overarching rules. For these reasons, we chose a model of actor behaviour that is rational but the payoffs they will calculate for each option will be heavily influenced by norms. For instance, the payoff attributed to a choice considered normatively correct will get an added positive value. In this context, it is particularly important to take into consideration norms and perceptions shared by actors.

3. A story of land use change

In Vietnam, uplands represent 75% of the country's total area and most of the population living there still heavily relies on upland agriculture for its livelihood. Land degradation in uplands has been an issue of major concern for policy makers for decades. Several policies, which have brought important changes in upland institutions, have been designed since the 1980s to enhance forest protection and forestry activities. These state initiatives include upland classification and land use restriction, upland allocation to households, individuals and organisations, and national reforestation programmes including incentives for smallholders to plant. These policies have been officially justified by a two-fold concern for environmental protection and economic development – though some scholars (Sowerwine, 2004) claim that the true reasons also encompass political concerns.

Here, we analyse the story of land use changes in an upland area where farmers recently stopped annual cropping and started planting trees. From a land use change point of view, this area is not representative of northern Vietnam. In other northern provinces, cash crops are still prevailing, like in Son La (maize cultivation) or Thai Nguyen (tea plantations) provinces, and local government agencies still find it difficult to convince farmers to plant trees on their land as promoted by government policies. It is all the more interesting to understand why tree plantations had some success in this specific area. Indeed, the present case study is a valid and meaningful example of reforestation by households in the northern mountainous region.

The area of study encompasses three neighbouring villages, named Dong Cao, Dong Dau and Que Vai, in Tien Xuan commune, located in Luong Son district, Hoa Binh province, 40 km west from Hanoi (Figure 3). It lies at the edge of the Red River delta and at the bottom of hills and mountains. Transect walks, participatory exercises (participatory mapping, wealth ranking, historical and classification matrixes) with focus groups, 32 key informant interviews at the village, commune and district levels⁵, and 82 household interviews were carried out over a six week period in the three villages. Complementary information on local institutions governing upland management was gathered via semi-structured interviews with a sample of ten households from two villages during a second phase of fieldwork.

⁵ Administrative units in Vietnam from the higher to the lower level, respectively are: province, district, and commune.

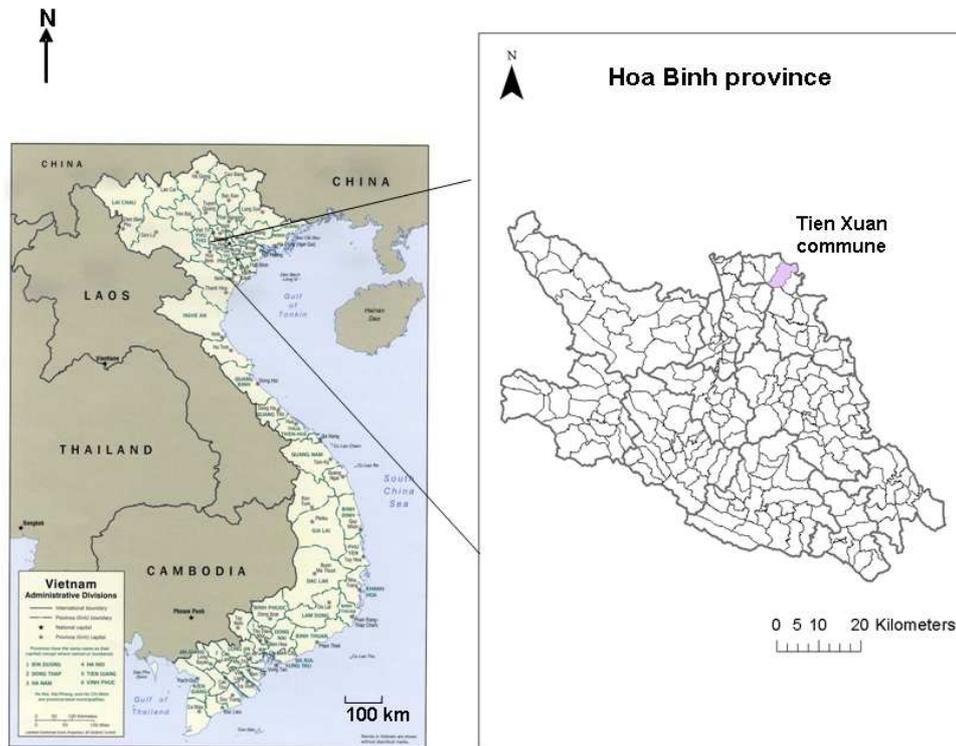


Figure 3. Location of the case study area

In the case study area, uplands represent large areas compared to the local population (Table 1). Rainfall is unevenly distributed, with about 85% of the rainfall occurring between May and October. The dominant upland soil types in this area are Ferralsols and Acrisols (Tran Duc Toan *et al.*, 2001). Both are acid soils, inherently infertile with low resilience, which means it is hard to restore their capability, and moderate sensitivity, which implies that they are quite easily subject to change (Stocking and Murnaghan, 2001).

Table 1. Some general characteristics of Tien Xuan commune

Location of Tien Xuan centre	Population in 2004	Yearly average temperature and rainfall	Lowland area	Upland area	Main upland soil types	Slope ^a	Elevation ^a
20° 58' N 105° 29' E	6300 inhabitants	25°C; 1800 mm	320 ha	978.12 ha	Ferralsols and Acrisols	15 to 60%	125 to 700 m above the sea level.

^a These figures were measured only in Dong Cao experimental watershed, but are representative of the landscape in the whole study area.

The villages of Dong Cao, Dong Dau and Que Vai were created approximately a century ago by a few Muong families. The Muong form one of the largest ethnic minority groups in Vietnam. They have traditionally cultivated irrigated rice in the lowlands and have relied on husbandry (pig and buffalo breeding) and aquaculture as a means of living. Under the

government's migration programmes of the 1960s, a few Kinh⁶ families migrated into the three villages. Kinh households now constitute up to 36%, 5% and 7% of the population in Dong Cao, Dong Dau and Que Vai, respectively. Regardless of ethnicity, farmers are today all engaged in a wide range of activities from rice cultivation and husbandry to forestry and aquaculture. Non-farm based employment has also increased over the last few years, especially construction work.

Uplands in the region were originally covered with primary forests. As a response to overcome poverty and famine, local people started to cut trees and sell timber from the 1960s. Progressively, uplands were also opened up for agricultural purposes and from the mid 1970s, farmers cultivated annual crops: cassava, arrowroot, taro, and maize. They were practicing rotational shifting cultivation with ten to fifteen year fallow periods. The information and perception farmers had of uplands was essentially based on their own experience. Uplands were seen by villagers as an unlimited resource, but interview results suggested that they were also aware of its fragility. Many farmers mentioned the inherent low soil fertility of the area and upland sensitivity to degradation: "when there are heavy rains, water flows with humus". Selling prices of cassava, arrowroot and taro were low⁷ and work in the uplands was hard. However, upland cultivation was the only source of cash income and equally raised farmers' living standards significantly. According to farmers, no formal rules governed upland land management; work in the uplands was neither managed nor controlled by the co-operative or the district State Forest Enterprise (SFE). Instead, local people had designed their own rules. Everyone was free to clear as much land as he or she wanted; how much land farmers could open up only depended on their will and available labour force. Upland access was not restricted to any individuals or group of people. As land was abundant, there was very little competition to open new parcels. Farmers used to simply make a mark on the area that they wanted to open up to indicate to other people that they should not start clearing at this place.

From the time that farmers first started cultivating the uplands, they were confronted with damage from freely grazing cattle. As cultivated plots were often located far from their dwellings, they either had to build a shelter and stay all day in the field or to create collective rules that could more efficiently cope with this issue. Many farmers decided to create and follow collective arrangements. Cultivated fields were regrouped and fences could be built collectively to protect the whole cultivated area. The cost of building fences to protect the fields was shared by all the farmers. Farmers could also guard the whole cultivated area when working on their own plot in order to prevent cattle damage. Furthermore, if animals entered the fields, the costs resulting from the caused damages were divided between different owners and thus reduced for each farmer. Shifting cultivation during that period was characterized by a land use system collectively managed with a minimum set of local rules and with little need for enforcement.

From the 1990s, decisions taken at the collective-choice action level resulted in dramatic changes in rules-in-use and in narratives. In 1991, the Forest Development and Protection Law (National Assembly of Vietnam, 1991) divided forestry land⁸ into three categories: i) special use forest, ii) protection forest and iii) production forest. Procedures and guidelines for forestland allocation were provided with the new Land Law (1993, amended in 1999), and Decree 02CP (1994, replaced by Decree 163 in 1999). Rights to use forest production land could be allocated to organizations, households, or individuals for 50 years. In the three

6 Kinh form the majority ethnic group in Vietnam and represent 80% of the total population. They prominently hold power positions at the provincial and national levels.

7 Cassava prices for example ranged from 300 – 400 Vietnamese dong/kg, which is equivalent to approximately 2 cents USD

8 Forestry land is not necessarily covered by forest. It is upland that has been designed for forestry purposes according to different criteria (most predominantly slope).

villages Dong Cao, Dong Dau and Que Vai, forestland was zoned, classified and allocated from 1996 to 1998 according to what had been previously cleared and cultivated by every family. Most farmers acknowledged that there were few conflicts during the land allocation process as many farmers refused to claim land. Most villagers feared that they would be liable to pay more taxes if they were given land use rights. The advantages of getting official land use rights for land were not very clear, as uplands had previously been freely used and accessed. In 1998, the process of land allocation was completed and land tenure certificates (Red Book) were given to households. Allocated forestry land with slope $> 25^\circ$ was restricted by the law to forestry activities. But villagers were not very willing to stop their major source of monetary income, and the commune authorities' task of enforcement and control was enormous. A team of twenty people had to control a 978 hectare (ha) territory in addition to their usual administrative tasks. Even though many villagers were fined, a large majority of farmers kept on cultivating arrowroot, taro, maize, peanuts, and cassava several years after annual crop cultivation was banned.

At the same time, reforestation programmes were launched in the study area and all across Vietnam. Pertinent schemes included the United Nations World Food Programme (WFP – often identified by the acronym PAM), the government programme 327 (Council of Ministers, 1992) and more recently the Five Million Hectares Reforestation Programme (5MHRP) (Prime Minister of the Government of Vietnam, 1998). Financial incentives were provided through these programmes to promote reforestation. Depending on the programme, the district usually paid for seedlings, fertilisers, and labour costs (which in turn were deducted from the sales benefits). During PAM, even rice was provided for each tree planted. Nationwide, environmental forest benefits were extolled by local authorities and through different kinds of media to justify the implementation of government policies – especially the ban of annual crop cultivation that was quite unpopular – and encourage villagers to follow the reforestation programmes. Forest was presented as the panacea for environmental protection and restoration. In the Vietnamese national imagination, planting trees – regardless of the tree species – has become equivalent to improving soil quality and fertility, increasing water runoff, and enhancing biodiversity. Progressively from the 1990s to 2003, farmers ceased annual cropping in the whole upland area and have chosen to plant trees or leave land fallow. Figure 4 illustrates forest cover area increase since 1999.

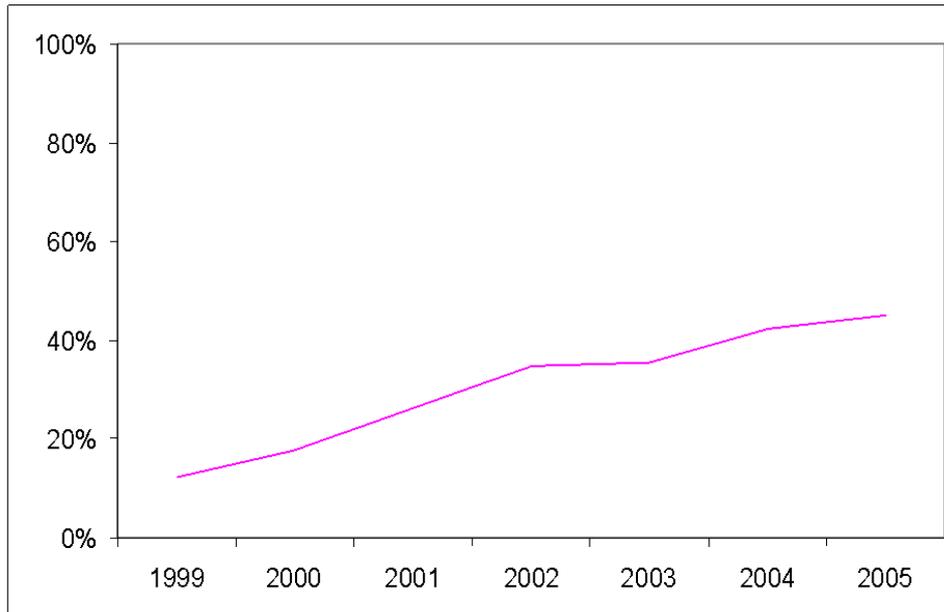


Figure 4. Proportion (%) of planted forest area of the total forestland area in Tien Xuan commune from 1999 to 2005

4. An institutional analysis to understand land use changes

The end of annual cropping

As reforestation coincided with the implementation of national land policies, one could presume that forestland allocation and reforestation programmes attained the pursued official objectives: to encourage reforestation by households. In a first approach to identify the range of factors that had led to reforestation, we asked farmers what were the reasons for stopping annual crop cultivation in the uplands (Table 2).

Table 2. Driving forces leading to the end of annual crop cultivation

Reasons given by farmers ^a	Percentage of respondents
Damage caused by cows and buffaloes to crops	51%
Soil was poor	40%
It was forbidden (government ban)	22%
They sold the land	13%
It is what others did	9%
Not enough labour force	8%
Low cassava selling prices / cultivation not profitable	8%
Work was too hard	2%
They wanted to plant trees	2%

^a Figures from a 45 household interviews sample.

Remarkably, results suggest that very few farmers (2%) stopped cultivating because they preferred to reforest. Poor soil fertility and inability to make grazing and cultivation activities coexist in the area appear to be the main reasons. However, the data needs further assessment before we can draw firm conclusions. When examining collected data from a chronological perspective, we found that farmers did not cease cultivating annual crops in the uplands at the same time. The end of cultivation ranged from the mid 1990s through to 2003, and the latest farmers stopped for different reasons than the first ones. The first group of farmers did so because they observed – through a decrease in yields, soil hardness, loss of the fertile top-layer of the soil and emergence of stones and rocks – that the soil had become very poor. We suspect that forestland allocation, by transforming rotational shifting cultivation systems with long fallow cycles to fixed cultivation systems, is partly responsible for this decrease in soil fertility (population pressure has not increased much in the same period). As a result, a few farmers decided to stop cultivating and let their land revert to a natural fallow. In the mid 1980s, when programme 327 was launched, some farmers decided to plant trees. The primary driver for land use changes was thus a decrease in soil fertility, and the resulting decrease in productivity. But, later on, of more significance was that the informal rules-in-use changed, in turn affecting costs and benefits of annual cropping systems.

The changes caused by these few farmers ceasing cultivation of annual crops impacted upon the informal collective arrangements governing cultivation and grazing cohabitation. The decision of some farmers to stop annual cropping created a domino effect with dramatic consequences on land use practices for all farmers. Farmers who stopped cultivating no longer needed to prevent cows and buffaloes from entering their plot. Neighbouring fields were damaged by marauding livestock with crop losses of up to 60%. Costs to protect one's individual parcel of cultivated land increased as land owners had to build fences individually. The costs of annual crop cultivation in the uplands became too high compared to expected benefits from sales of agricultural produce. Farmers could not move their fields as they could do before because land had been allocated. As a result all farmers progressively ceased cultivating annual crops. Changes in material conditions together with changes in rules

governing land access affected costs and benefits of annual cropping. One can also speculate to what extent farmers were tempted to imitate the first farmers who had stopped and who were considered as the most innovative in the area. It is suspected that a norm-guided behaviour accelerated or amplified rational decisions.

Reforestation stage

As shown in table 2, the end of annual cropping was a first step in land use changes, and should be distinguished from the next step: reforestation. The reasons why farmers chose to plant trees were distinct from the factors that led to the end of annual cropping. During the interviews, farmers in the three villages were also asked why, once they stopped upland cultivation, they decided to plant trees. The most quoted reasons were the following: the soil was poor, so nothing else could grow (24%); it provided fuel wood (19%); it was subsidised through a government programme (19%); and they had no other choice (14%). As underlined by some farmers, no land-management option other than monoculture tree plantation was available, except fallow. Fallow was an important component of the former rotational cultivation system, but in the current private system, where each farmer had been allocated a small parcel of land (1.1 ha on average in Dong Cao), farmers tend to consider it as “wasted land”. Reforestation thus appeared as the “least bad solution”.

One can also wonder to which extent the discourses of the commune authorities on upland management and reforestation impacted on actors’ perceptions of uplands and on final decisions. For instance, in Tien Xuan commune, villagers were told that forestland allocation was implemented by the government for ecological reasons (as stated by one Dong Cao villager):

“because villagers have too much destroyed the mountains. Now we have to reforest to keep water in the mountains and to reduce soil erosion”.

Farmers were accused of being responsible for an alleged ecological disaster. They were singled out as the guilty ones and, following this argumentation, it was logical in people’s consciousness that they had to atone for their faults by reforesting the hills. Farmers strongly believe that runoff from the watershed increases with forest cover. This belief is so entrenched in people’s minds that some farmers use it to explain all land management problems. As an example, when asked why cassava yields had decreased in the uplands, a farmer replied that it was because there was not enough water in the soil because the forest had been cut. But scientific studies indicate that forests tend to reduce soil moisture because of higher transpiration (Calder, 1998; Forest Science Institute of Vietnam (FSIV) and International Institute for Environment and Development (IIED), 2002). Soil fertility decline due to soil erosion and/or nutrients plant uptake are more likely the primary and prominent factor for yield decrease in this area (Tran Duc Toan *et al.*, 2003). It is difficult to assess to what extent farmers’ beliefs in the environmental benefits of forests influenced decisions to reforest, but they were powerful enough that today farmers rely more on these explanations than on their own observations.

A synthesis of the factors that led to land use changes is presented in Figure 5 with the IAD framework.

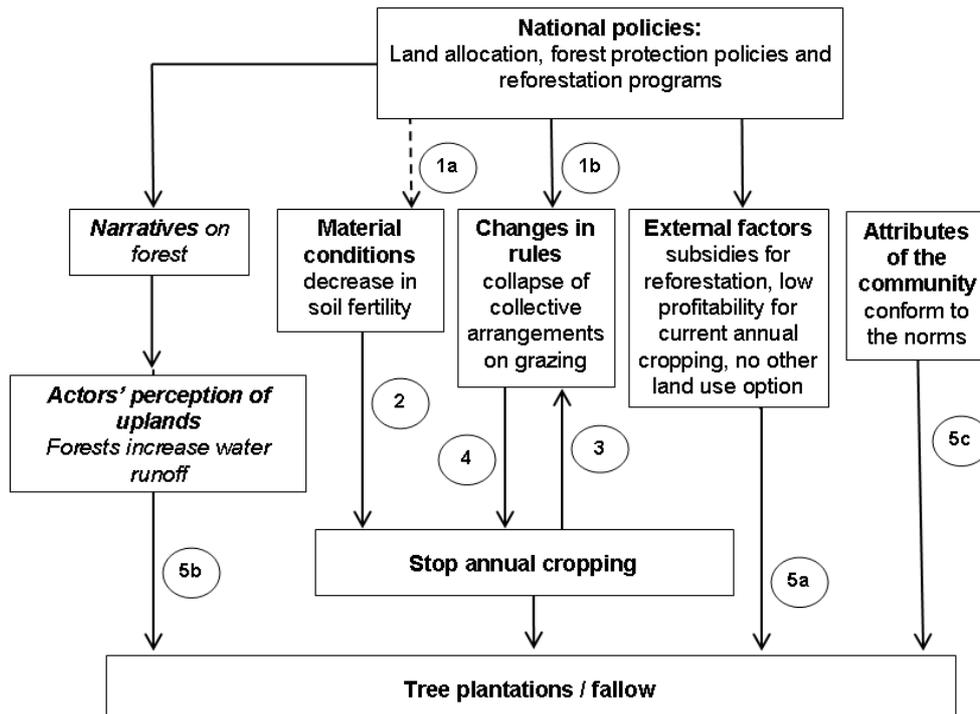


Figure 5. An institutional explanation of land use change using the modified IAD framework

The above framework underlines the range of factors involved in farmer's decision-making and resulting land use. However the chronological and logical linking of factors and impacts on the action arena is not apparent and needs to be specified. Firstly, a decrease in soil fertility which, we suspect, was amplified and accelerated by the shift to fixed cultivation induced by land allocation (arrow 1a in Figure 5) led a few farmers to stop annual cropping (arrow 2). Because of land allocation, rules for land access and use were less flexible (arrow 1b) and farmers could not relocate their parcels next to the farmers who wished to collaborate to protect annual crops from cattle damage. Thus, the decisions of a few farmers in turn led to the collapse of the local collective rule system that governed the cohabitation of cultivation and grazing (arrow 3). This led a large majority of farmers to cease annual cropping (arrow 4). During a second stage, external factors including incentives provided by reforestation programmes (arrow 5a), and to a certain extent new beliefs on forests' benefits (arrow 5b), impacted on the choice of the alternative land use. Choice of the new land use was reinforced by a certain degree of imitation among farmers who tend to choose options already applied by a majority (arrow 5c). Soil fertility decrease and the disruption of local institutions were prominent and decisive factors for land use changes. Other factors such as economic conditions (rising opportunities for wage labour, low selling prices for annual cropping) also participated in the final decisions but we would rather classify them as enhancing factors. They appeared not to be decisive factors, i.e. we believe that these factors alone would not have led to extended land-use change in the area.

This section has shown that the relative success of reforestation in the study area is not directly linked with the state policies designed to promote reforestation but rather results from the disruption of local land use systems by these policies. Tree plantations were not adopted as the preferred option compared to annual cropping but only when there was no other possible option left. One can thus wonder how sustainable this new land-use option is.

Tree plantations: a sustainable option?

Many studies (e.g. 2001; Gomiero *et al.*, 2000; Ngo Thi Minh Hang, 1995; Rerkasem, 2003; World Bank *et al.*, 2004) have seriously challenged the financial attractiveness of smallholders' forest plantations in Vietnam. The main arguments are that farmers lack information on market conditions and connections with merchants. Some authors also recommend a minimum size for allocation to ensure economic viability of tree plantations (Neef and Schwarzmeier, 2001). We examine from a farmer's perspective the sustainability of exotic tree plantations in the case study area under current economic conditions. We discuss the economic efficiency and equity of tree plantations which are managed as private land use systems. In two of the three investigated villages, tree plantations have already been abandoned for other land use options by many farmers. In Dong Cao, a large majority of villagers sold their land to Hanoian and to the commune extension worker. In Que Vai, thirteen families started planting sweet bamboo shoots mixed with chicken breeding and peanut and cassava cultivation under a district subsidised project. The following variables tend to demonstrate that this trend will be reinforced in the following years. First, information regarding land use rights is quite poor: most farmers who engaged in a reforestation programme with the State Forest Enterprise do not know when they will be allowed to cut trees and to whom they will sell the wood. Second, when farmers receive support from the government in the establishment of new plantations they cannot choose which species to plant. Government only provided acacia or eucalyptus saplings. In addition to poor yield, farmers observed that eucalyptus degraded the soil, which has been supported by scientific studies (e.g. Jackson *et al.*, 2005). Finally, very few farmers are satisfied with the financial benefits provided by forestry. Although, compared to other northern provinces of Vietnam, the economic environment is quite favourable in Luong Son district (due to the proximity with Bai Bang paper mill) farmers complain about income irregularity – with harvesting only occurring every five to seven years. The economic efficiency of new land use systems is not perceived as satisfactory.

Equity was assessed by exploring perceptions of different groups of actors: women, young people, rich, average, and poor farmers. Table 3 presents an extract from the table that was made by the women's group during a focus group exercise. Participants were asked to list all natural resources used by village inhabitants (Table 3). In the first column, they weighted each natural resource according to its importance for villagers' livelihoods. In the second, third and fourth column, they were asked to weight their relative importance for the following group of villagers: poor villagers, average villagers, and rich villagers. Importance was ranked on a scale of 0 to 10, with 0 given to the lowest importance. Table 3 further supports the above assumption that exotic tree plantations are considered relatively unimportant for people's livelihoods. It also suggests that these are only profitable for the richest farmers.

Table 3. Use of natural resources in Que Vai, women's focus group

Importance ranking	All villagers	Poor villagers	Average-income villagers	Rich villagers
Forest wood	0	10	4	3
Wild bamboo shoots	8	9	5	3
Banana tree leaves	3	10	0	0
Water springs	0	0	0	0
Cultivated bamboo shoots	3	5	5	5
Eucalyptus, acacias, styrax	4	0	0	5
Grazing land	9	5	5	10
Garden (fruits and vegetables)	7	3	3	10
Rice	10	9	9	10
Maize and sweet potatoes	8	0	0	5
Medicinal plants	3	7	4	4

These assumptions were reinforced by the discussions and results of exercises organised with the other focus groups. The other groups were asked to list sources of incomes for villagers and to rank them according to their importance. The group of young people did not mention tree plantations in the list of activities but “merchant of wood” was considered as an averagely important source of income (ranked the 6th most important out of ten activities). The group of poor farmers did not mention tree plantations in the list of sources of incomes in the village. The group of average farmers ranked it as one of the least important activities in the village. For rich farmers, tree plantations were ranked as a relatively attractive option (sixth out of ten). The commune extension worker decided to plant various tree species with high market values on his land and has expected these will bring substantial benefits – though ironically, when interviewed, he justified his choice not on the basis of economic reasons but via ecological arguments. Yet, it appeared that only a few rich farmers had fully benefited from forest plantations. This group of society had access to information, financial capital, was able to make long term investment, and was socially well connected. These results confirm much of what a liberal economist would anticipate.

5. Contextualizing results

As clearly emphasised in Gray (1999), different scales of analysis can lead to different interpretations. A regional study might have suggested that forest cover expansion in Hoa Binh province is correlated with the implementation of policies. In a sense, this would be true, as forestland allocation was partly responsible of the disruption of traditional local land use systems, which in turn led to the end of annual cropping. But a macro level study would not have explained why policies resulted in reforestation. Standing at the land user decision-making level, we argue that local factors have been prominent over government policies in land use change. Policies had an impact but not in the way that had been planned by policy-makers. Our understanding of land use changes seriously questions the sustainability of forestland policies in attaining their objectives. Several local level studies reach similar conclusions. Sikor (2001) also previously challenged the link between upland allocation and the observed forest expansion in Northwest Vietnam. He argued that reforestation was mainly

the result of changing markets and technology, which had led to agricultural intensification in the lowlands and had relieved pressure on the uplands. Recently, Tran Ngoc Thanh and Sikor (2006) reported the central role of the existing local distribution of power in transforming formal land use rights devolved through forest land allocation into actual rights and practices. Sowerwine (2004) has also emphasised the importance of micro level factors over national policies in forest property relations. She argues that forest imagined and policed by the State does not match forest reality as experienced and represented by local people.

Indeed, in a first approach⁹ to linking the operational level with the constitutional level, we also observe that forestland policies in Vietnam rely to a large extent on false or exaggerated narratives. The inability of upland communities to manage land and forest has been a recurrent argument worldwide to justify land use interventions (Blaikie and Brookfield, 1987; Forsyth, 2003; Ives *et al.*, 2002) and has provided the rationale for settlement policies and forest land allocation in Vietnam. Shifting cultivation practised by ethnic minority groups has been pointed out as the major cause of deforestation and land degradation, and consequently banned. Similarly, in the Himalayas region (Blaikie and Muldavin, 2004), despite new scientific evidence on the causes of deforestation (De Koninck, 1997; Do Dinh Sam, 1994; Lang, 2001), beliefs remain and national policies have not changed. Another sustaining narrative on which Vietnamese and other countries' reforestation policies are based is the universal character of ecological and environmental benefits of forests. Internationally, many scientists (e.g. Calder, 1998, 2005; Hamilton and Pearce, 1988; Jackson *et al.*, 2005; Walker, 2002) have for a long time questioned some of the commonly accepted links between forests, hydrology and soil erosion. In spite of international evidence confirmed by Vietnamese studies (e.g. Forest Science Institute of Vietnam (FSIV) and International Institute for Environment and Development (IIED), 2002), falsely universal assumptions such as "forests always reduce erosion" and "forests increase water runoff" are solidly ingrained in the Vietnamese policy-making and academic arenas.

This reliance on false or simplistic premises has led to two outcomes. Firstly, by ignoring the value of indigenous practices, policies have considerably disrupted existing local management systems. State-led forestland allocation has instituted a land use system where all land is either state-owned or private with no consideration of traditional common land use practices. Many countries worldwide have undertaken similar interventions, under the justification of Hardin's "tragedy of the commons" (Hardin, 1968). The argument is that common natural resources require the intervention of external forces in their management otherwise they will be overexploited. However, in many cases new external regulations designed to control access and use of the forest were not sufficient to ensure that they were respected and so led to the creation of open-access resources instead of common property resources (Ostrom, 1990). Generally, the new land management systems imposed by the State have had a high degree of disruptive influence over local institutions and have led to complex causality chains and unpredictable outcomes, as is illustrated by our case study. Indeed, thus far, no scientific study has been able to establish the link between forestland allocation and reforestation in Vietnam. Allocation of forestland to communities (rather than households or individuals) has been introduced in the revised Law on Forest Protection and Development (National Assembly of Vietnam, 2004), but implementation is slow because of entrenched beliefs on the backwardness of ethnic minority groups.

Secondly, reforestation, supported by simplistic narratives on the environmental benefits of forest, has become a goal *per se* (Tomich *et al.*, 2004). The assessment of the 5MHRP success at the provincial and national level is exclusively based on the area of forest cover and little attention has been given to forest quality and to the actual environmental benefits of the

⁹ This will be tackled more comprehensively in a future analysis relying on a political ecology approach.

newly established forest. Recently, the state-owned source of information, Viet Nam News Agency, announced that four provinces had increased their forest cover over 60%¹⁰ (Viet Nam News Agency, 2006). Attaining this target is presented as a victory, but there is no mention of the benefits of reaching 60% forest cover. The environmental benefits of the newly established plantations are disputable. The tree species that have been planted under the state reforestation programmes since the 1990s are dominated by few fast-growing species: eucalyptus, acacias and pines (Nguyen Van San and Gilmour, 1999). These monoculture tree plantations have little value from a biodiversity point of view. Plantations might even have adverse environmental effects including reduced stream flows and soil acidification (Jackson *et al.*, 2005). Ironically, although the government currently supports the establishment of exotic tree plantations throughout the country, former president Tran Duc Luong called on scientific support to overcome water shortages that regularly occur during the dry season in the northern mountainous region (Viet Nam News Source, 2006).

6. Conclusion

Our study differs from previous studies on land use change in Vietnam by focusing on the role of local and informal institutions. We showed that reforestation in the study area was not a direct response to the government policies designed to promote reforestation. Forestland allocation policy played a major role in land use changes but not because it provided the right incentives for farmers to reforest. Rather, it was because forestland allocation disrupted local institutions and collective land use systems. Material incentives provided by the government to reforest played a role in the establishment of trees plantations by farmers in the area but only after annual cropping was no longer viable. Reforestation was chosen as a last resort. Not surprisingly, our analysis of farmers' perception of tree plantations suggest that under current conditions, tree plantations are unlikely to last as a viable option, except for the richest farmers. By highlighting determinants that have been given little consideration in land use change literature, we have provided a number of lessons that can be applied in designing further research on land management.

Firstly, we demonstrated that an institutional approach coupled with an historical perspective was particularly efficient in disentangling a complex story of land use changes. This is particularly pertinent to environments controlled by a high level of human interaction. We defend the suitability of using the IAD framework in similar contexts. The historical perspective proposed here was necessary to realize how a feedback effect took place between some factors and the action arena. Although it was not explored in much detail in the present paper, the consideration of the narratives that are conveyed within policies also emerged as a promising avenue for further research. We observed that these narratives have strongly impacted the collective imagination. Using the IAD framework also highlighted the importance of considering community dynamics. The demise of annual crop cultivation was not only the result of isolated individual behaviour but also the consequence of the collapse of the collective framework that linked farmers and land-management systems. It was thus crucial to use a framework that could combine household patterns with community trends.

Secondly, we support the need for local studies. Policy implementation in areas where local factors are very diverse (in northern Vietnam they considerably differ from a biophysical, cultural and social point of view) may follow multiple paths of interpretation. Considering driving forces at only the macro-scale level might blanket complex decision-making processes and lead to erroneous conclusions. From a higher scale of analysis, it was tempting to conclude that reforestation programmes and forestland allocation policies had led

¹⁰ As mentioned in the introduction, these figures are put under question by many observers.

to the expected and pursued objectives of increasing reforested areas in the studied territory. Only a detailed examination of factors at the local level could provide an accurate understanding of land use changes. This report ascertains that whilst national policies had an indirect impact on land use changes through the disruption of land institutions, local factors (in our case study: soil fertility, local rules governing upland management) were prominent in explaining land use history. In addition, the examination of how local factors interfere with state interventions is all the more essential when the latter rely on false assumptions that do not fit with the local reality. In such a context, interference is likely to be particularly diverse and complex.

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References

2001. Five Million hectare Reforestation Program Partnership. Synthesis report. Ministry of Agriculture and Rural Development. International Cooperation Department. 5MHRP Partnership Secretariat, Hanoi.
- Agarwal, C., Green, G.M., Grove, J.M., Evans, T.P., Schweik, C.M., 2002. A Review and Assessment of Land-Use Change Models: Dynamics of Space, Time and Human Choice. Gen. Tech. Report NE-297. U.S. Department of Agriculture, Forest Service, Northeastern Research Station Newton Square, PA
- American Forest & Paper Association, 2004. China's Subsidization of its Forest Products Industry. American Forest & Paper Association, Washington DC.
- Bacha, C. J. C., 2003. The Determinants of Reforestation in Brazil. *Applied Economics* 35 (2), 631-639.
- Barney, K., 2005. Central Plans and Global Exports: Tracking Vietnam's forestry commodity chains and export links to China. *China and Forest Trends in the Asia Pacific Region: Implications for forests and livelihoods*. Washington D.C: Forest Trends.
- Blaikie, P.M., Brookfield, H.C., (Eds), 1987. *Land Degradation and Society*. Methuen, London.
- Blaikie, P.M., Muldavin, J.S.S., 2004. Upstream, Downstream, China, India: The politics of environment in the Himalayan region. *Annals of the Association of American Geographers* 94 (3), 520-548.
- Bray, D.B., Ellis, E.A., Armijo-Canto, N., Beck, C.T., 2004. The Institutional Drivers of Sustainable Landscapes: A case study of the 'Mayan Zone' in Quintana Roo, Mexico. *Land Use Policy* 21 (4), 333-346.
- Calder, I.R., 1998. Water-resource and Land-use Issues. SWIM Paper 3, International Water Management Institute (IWMI), Colombo, Sri Lanka
- Calder, I.R., 2005. *Blue Revolution*. Earthscan Publications Ltd, London.
- Council of Ministers, 1992. On Policies for the Use of Bare Land, Denuded Hills, Forests, Alluvial Flats, and Water Bodies. Decision 327-CT. Official Gazette. , Hanoi.
- De Koninck, R., 1997. *Le Recul de la Forêt au Viet Nam*. IDRC, Ottawa.
- Dequech, D., 2006. The New Institutional Economics and the Theory of Behaviour Under Uncertainty. *Journal of Economic Behavior & Organization* 59 (1), 109-131.
- Dinh Duc Tuan, 2005. *Forestry, Poverty Reduction and Rural Livelihoods in Vietnam*. Labour and Social Affair Publishing House, Hanoi.
- Do Dinh Sam, 1994. Shifting Cultivation in Vietnam: Its social, economic and environmental values relative to alternative land use. IIED Forestry and Land Use Series No. 3, International Institute of Environment and Development, London.
- Forest Science Institute of Vietnam (FSIV), International Institute for Environment and Development (IIED), 2002. *Do Forests Protect Watersheds? A short summary of current thinking on the links between land use, hydrological functions of watersheds and local livelihoods in Vietnam*. IIED, London.
- Forsyth, T., 2003. *Critical Political Ecology. The politics of environmental science*. Routledge, New York.

- Frohlich, N., Oppenheimer, J., Bond, P., Boschman, I., 1984. Beyond Economic Man: Altruism, Egalitarianism, and Difference Maximizing. *The Journal of Conflict Resolution* 28 (1), 3-24.
- General Statistics Office of Vietnam, 2006. Statistical data. Agriculture, Forestry and Fishery. General Statistics Office of Vietnam, Hanoi.
- Geoghegan, J., Villar, S.C., Klepeis, P., Mendoza, P.M., Ogneva-Himmelberger, Y., Chowdhury, R.R., Turner II, B.L., Vance, C., 2001. Modeling Tropical Deforestation in the Southern Yucatan Peninsular Region: Comparing survey and satellite data. *Agriculture, Ecosystems & Environment* 85 (1-3), 25-46.
- Gibson, C.C., McKean, M.A., Ostrom, E., (Eds), 2000. *People and Forests: Communities, institutions, and governance*. MIT Press, Cambridge, Mass.
- Gomiero, T., Pettenella, D., Trieu, G.P., Paoletti, M.G., 2000. Vietnamese Uplands: Environmental and socio-economic perspective of forest land allocation and deforestation process. *Environment, Development and Sustainability* 2 (2), 119-142.
- Gray, L.C., 1999. Is Land Being Degraded? A multi-scale investigation of landscape change in southwestern Burkina Faso. *Land Degradation and Development* 10 (4), 329-343.
- Hamilton, L.S., Pearce, A.J., 1988. Soil and Water Impacts of Deforestation. In: Ives, J.D., Pitt, D.C., (Eds), *Deforestation. Social dynamics in watersheds and mountain ecosystems*. Routledge, New York, pp. 75-98.
- Hardin, G., 1968. The Tragedy of the Commons. *Science* 162 (3859), 1243-1248.
- Ives, J.D., Messerli, B., Janski, L., 2002. Mountain Research in South Central Asia: An overview of 25 years of UNU's Mountain Project. *Global Environmental Research* 6 (1), 59-71.
- Jackson, R.B., Jobbagy, E. G., Avissar, R., Roy, S.B., Barrett, D.J., Cook, C.W., Farley, K.A., le Maitre, D.C., McCarl, B.A., Murray, B.C., 2005. Trading Water for Carbon with Biological Carbon Sequestration. *Science* 310 (5756), 1944-1947.
- Janssen, M.A., (Ed), 2002. *Complexity and Ecosystem Management: The theory and practice of multi-agent systems*. Edward Elgar Publishers, Cheltenham, UK.
- Jianchu, X., Xihui, A., Xiqing, D., 2005. Exploring the spatial and temporal dynamics of land use in Xizhuang watershed of Yunnan, southwest China. *International Journal of Applied Earth Observation and Geoinformation* 7 (4), 299-309.
- Kiser, L., Ostrom, E., 1982. The Three Words of Action: A metatheoretical synthesis of institutional approaches. In: Ostrom, E., (Ed), *Strategies of Political Inquiry*. Sage, Beverly Hills (CA), pp. 179-222.
- Lang, C., 2001. Deforestation in Vietnam, Laos, and Cambodia. In: Vajpeyi, D.K., (Ed), *Deforestation, Environment, and Sustainable Development: A comparative analysis*. Praeger, London, pp. 111-137.
- Leach, M., Mearns, R., Scoones, I., 1999. Environmental Entitlements: Dynamics and institutions in community-based natural resources management. *World Development* 27 (2), 225-247.
- Lovell, C., Mandondo, A., Moriarty, P., 2002. The Question of Scale in Integrated Natural Resources Management. *Conservation Ecology* 5 (2), 25.

- Manson, S., 2006. Land use in the southern Yucatan peninsular region of Mexico: Scenarios of population and institutional change. *Computers, Environment and Urban Systems* 30 (3), 230-253.
- McCusker, B., Carr, E.R., 2006. The co-production of livelihoods and land use change: Case studies from South Africa and Ghana. *Geoforum* 37 (5), 790-804.
- Messer, N., Townsley, P., 2003. *Local Institutions and Livelihoods: Guidelines for analysis*. Food and Agriculture Organisation, Rome.
- Muller, D., Epprecht, M. and Sunderlin, W.D., 2006. Where are the poor and where are the trees?: targeting of poverty reduction and forest conservation in Vietnam. Center for International Forestry Research (CIFOR), Bogor, Jakarta, Indonesia.
- Muller, D., Zeller, M., 2002. Land Use Dynamics in the Central Highlands of Vietnam: A spatial model combining village survey data with satellite image interpretation. *Agricultural Economics* 27 (3), 333-354.
- National Assembly of Vietnam, 1991. Law on Forest Protection and Development. In: National Assembly of Vietnam, (Ed). Legal Publishing House, Hanoi.
- National Assembly of Vietnam, 2004. Law on Forest Protection and Development. Official Gazette, Hanoi.
- Neef, A., Schwarzmeier, R., 2001. Land Tenure Systems and Rights in Trees and Forests: Interdependencies, dynamics and the role of development cooperation - case studies from mainland southeast Asia. Sector Project: Importance of land policy and land tenure in developing countries. GTZ.
- Ngo Thi Minh Hang, 1995. A cost-benefit Analysis of Smallholder Investments in Reforestation in Coastal Vietnam. College of Business, Management Department. Boise State University, ID.
- Nguyen Van San, Gilmour, D.A., 1999. Forest Rehabilitation Policy and Practice in Vietnam. National workshop. IUCN, Hoa Binh, Vietnam.
- North, D.C., 1990. *Institutions, Institutional Change and Organisations*. Cambridge University Press, Cambridge.
- Ostrom, E., 1990. *Governing the Commons. The evolution of institutions for collective action*. Cambridge University Press, Cambridge.
- Ostrom, E., 1999. Institutional Rational Choice. An assessment of the institutional analysis and development framework. In: Sabatier, P.A., (Ed), *Theories of the Policy Process*. Westview Press, Boulder, Colorado, pp. 35-71.
- Ostrom, E., 2005. *Understanding Institutional Diversity*. Princeton University Press, Princeton, NJ.
- Ostrom, E., Gardner, R., Walker, J., 1994. *Rules, Games & Common-pool Resources*. The University of Michigan Press, Ann Arbor.
- Prime Minister of the Government of Vietnam, 1998. On Objectives, Tasks, Policy and Organisation for the Implementation of the 5 Million Hectares Afforestation National Programme., Decision 661/QD-TTg Official Gazette, Hanoi.
- Rerkasem, K., 2003. Uplands Land Use. In: Kaosa-ard, M., Dore, J., (Eds), *Social Challenges for the Mekong Region*. White Lotus, Bangkok, pp. 323-346.
- Roe, E., 1994. *Narrative Policy Analysis, Theory and Practice*. Duke University Press, Durham; London.

- Sikor, T., 2001. The Allocation of Forestry Land in Vietnam: Did it cause the expansion of forests in the northwest? *Forest Policy and Economics* 2 (1), 1-11.
- Sowerwine, J., 2004. Territorialisation and the Politics of Highland Landscapes in Vietnam: Negotiating property relations in policy, meaning and practice. *Conservation and Society* 2 (1), 97-136.
- Stocking, M. A., Murnaghan, N., 2001. *Handbook for the Field Assessment of Land Degradation*. Earthscan Publications Ltd, London.
- Sunderlin, W.D., Huynh Thu Ba, 2005. *Poverty Alleviation and Forests in Vietnam*. Center for International Forestry Research (CIFOR), Bogor, Jakarta, Indonesia.
- Tomich, T.P., Thomas, D.E., van Noordwijk, M., 2004. Environmental Services and Land Use Change in Southeast Asia: From recognition to regulation or reward. *Agriculture, Ecosystems and Environment* 104 (1), 229-244.
- Tran Duc Toan, Orange, D., Podwojewski, P., Do Dui Phai, Thai Phien, Maugin, J., Pham Van Rinh, 2003. Soil Erosion and Land Use in the Dong Cao Catchment in Northern Vietnam. In: Maglinao, A.R., Valentin, C., Penning de Vries, F. (Eds.), *From Soil Research to Land and Water Management: Harmonizing people and nature*. Proceedings of IWMI-ADB Project Annual Meeting and 7th MSEC Assembly. IWMI. Southeast Asian Regional Office, Vientiane, Laos.
- Tran Duc Toan, Thai Phien, Do Duy Phai, La Nguyen, 2001. Managing Soil Erosion for Sustainable Agriculture in Dong Cao Catchment. IWMI-ICRISAT-ADB Joint Annual Review and Planning Workshop for ADB-RETA 5803 and 5812, Hanoi.
- Tran Duc Vien, Rambo, A.T., 2001. Social Organization. In: Le Trong Cuc, Rambo, A.T., (Eds), *Bright Peaks, Dark Valleys. A comparative analysis of environmental and social conditions and development trends in five communities in northern Vietnam's northern mountain region*. The national political publishing house, Hanoi, pp. 177-208.
- Tran Ngoc Thanh and Sikor, T., 2006. From Legal Acts to Actual Powers: Devolution and property rights in the Central Highlands of Vietnam, *Forest Policy and Economics*, 8, (4), 397-408.
- van den Bergh, J.C.J.M., Ferrer-i-Carbonell, A., Munda, G., 2000. Alternative Models of Individual Behaviour and Implications for Environmental Policy. *Ecological Economics* 32 (1), 43-61.
- Viet Nam News Agency, 2006. Forest Coverage Reaches Over 60 Percent in Four Provinces, Hanoi.
- Viet Nam News Source, 2005. International Partners Assist Forestry Sector. Viet Nam News, Hanoi.
- Viet Nam News Source, 2006. Water Flows in Northern Provinces. Viet Nam News, Hanoi.
- Walker, A., 2002. *Forests and Water in Northern Thailand*. Technical Report Working paper no.37. Resource Management in Asia-Pacific (RMAP) Program, Australian National University, Canberra, Australia.
- Weyerhaeuser, H., Wilkes, A., Kahrl, F., 2005. Local Impacts and Responses to Regional Forest Conservation and Rehabilitation Programs in China's Northwest Yunnan Province. *Agricultural Systems* 85 (3), 234-253.
- World Bank, Asian Development Bank (ADB), Canadian International Development Agency (CIDA), Danish International Development Agency (DANIDA), UK Department for International Development (DFID), Netherlands Ministry for Development Cooperation

(NMDC), Norwegian Agency for Development Cooperation (NORAD), Swedish International Development Agency (SIDA), Swiss Agency for Development and Cooperation (SDC), United Nations Development Programme (UNDP), 2004. Vietnam Development Report 2005: Governance. Hanoi.

World Bank (WB), 1995. Viet Nam. Environmental Programme and Policy Priorities for a Socialist Economy in Transition. World Bank. Agriculture and Environment Operations Division, Washington, DC.