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## **Reforestation policies and upland allocation in northern Vietnam: An institutional approach for understanding farmer strategies and land use change**

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### **Abstract**

Through the lens of the Institutional Analysis and Development (IAD) framework, the paper analyses how the combination of reforestation programs and households uplands allocation has significantly altered land management in a commune of Northern Vietnam.

Based on a three villages' case study, we argue that the government policies implemented in the end of the 1990s have not only impacted on individual farmer land-use, but has also induced the collapse of existing informal institutional arrangements governing uplands management. In turn this has had repercussions on farmers' strategies and households' resilience. For instance, important changes in land access and land-use rights broke up the subtle collective rules that enabled grazing and cropping systems co-existence.

Further to the analysis of policies' impacts on land use and farmers livelihoods, this study examines how, and under what conditions for a three decade period, farmers have been able to adopt new strategies, new land management systems and new institutional arrangements.

Furthermore, we make recommendations for policy-making: on the one hand, directions for new policies development and on the other, advice to champion policies which match impacts to pursued objectives.

We adopt a political ecology perspective by focusing on institutions and policies as driving forces for environmental change, and propose a comprehensive approach for analyzing land-use change in mountainous areas. Methodology for data analysis combines the use of the IAD, a rigorous institutional framework that has been widely used in the field of the commons studies, with an historical perspective. The approach integrates environmental, social, and economic factors – from the micro to the macro level – to explain how uniform national policies have lead to different farmers' strategies and distinct upland management systems.

## 1 Introduction

Uplands management is an issue of critical importance in Vietnam, as mountainous regions represent 75 % of the total country area. These uplands also hold a number of challenges distinct from more low-lying topographies; while Vietnam has accomplished impressive progress in improving agricultural productivity and reducing poverty for the two last decades, the economic gap between delta and northern mountains regions has widened, and a large part of the upland population still suffers from food shortages (Castella and Dang Dinh Quang, 2002). Most northern rural communities still heavily rely on agriculture on steep slopes for their livelihood and are very dependent on forest land (Swinkels and Turck, 2004). Food self-sufficiency thus is all the more under threat, when one considers that uplands are fragile environments, with inherent low soil fertility and which can be easily subject to land degradation.

Policy-makers have recently paid more attention to enhancing uplands communities' livelihoods. Improving (or substituting) ethnic minorities' land management systems and reforesting barren hills have been two major aims for policies, and have been often supported by donors, research projects, and Non Governmental Organizations (NGOs). Most of these government initiatives have been officially justified by a two-fold concern in economic development and environmental protection – though some scholars (Sowerwine, 2004) suspect the true reasons also encompass political concerns. The stated success of these government initiatives both in alleviating poverty and protecting the environment has already been challenged (Gomiero *et al.*, 2000; Dang Thanh Ha and Espaldon, 2001). What is more, many scientists have for a long time questioned some widely-stated environmental benefits of forests plantations (Hamilton and Pearce, 1988; Calder, 1998; Jackson *et al.*, 2005); myths that have been taken as granted by policy-makers and donors. As forestland allocation process still goes on in many northern provinces and an ambitious reforestation program (the Five Million Hectares Reforestation Program) is still under implementation, it is important to understand how these national policies impacted on farmers' strategies, land-use change, and livelihoods.

Stemming from the study of land-use history in three villages of northern Vietnam, this paper examines the gap between (1) the government objectives of upland allocation and reforestation policies and (2) documented land-use change. More particularly, using the Institutional and Development (IAD) framework, it relates institutional change to courses of action taken and decisions that took place between policies implementation and shift in farmers' strategies. It argues that policies have greatly affected local institutions in a way that was probably not predicted by the Vietnamese government. These institutional changes combined with a shift in farmers' perception of uplands have had in turn had significant impacts on land-use. Finally, we both supply advice towards designing policies for which actual impacts are coherent with pursued objectives and propose new directions for policies development.

## 2 Methodology

This study is part of a Ph.D. work, integrated within an international research program called Management for Soil Erosion Consortium (MSEC). MSEC aims to propose sustainable land management systems, evaluate the biophysical, environmental, and socioeconomic effects of soil erosion; and generate reliable information for improvement of catchment management policies (Maglinao *et al.*, 2001). Coordinated by the International Water Management Institute (IWMI), it currently operates in three Southeast Asian countries, including Vietnam. MSEC collaborating research institutes in Vietnam – the Institut de Recherche pour le Developpement (IRD) and the National Institute for Soils and Fertilisers (NISF) – have been collecting soil, hydrological, and land use data in a 50 ha watershed in the northern uplands for six years.

This Ph.D. work voluntarily takes a step back from MSEC framework by having a critical look at the umbrella term 'land degradation' and examining the causative factors that might lie beyond soil erosion and reforestation narratives. Its scientific line of enquiry adopts a critical political ecology (Forsyth, 2003) approach.

## **2.1 Data collection methodology**

Reconnaissance fieldwork was carried out in three villages of northern uplands, and followed a broad line of enquiry, with a particular interest in uplands natural resources management and rural development issues. The aim was to get a general picture of farmers' activities and use of natural resources, to understand how and why the latter had evolved over the past 50 years and to assess which incentives farmers had responded to when making decisions affecting their local environment. Participatory exercises (participatory map, wealth ranking, historical and classification matrixes with five focus groups), key informants interviews at the village, commune and district level, and household interviews (82 households were interviewed in the three villages) were carried out over a six week period. Though farmers' decisions were found to be dependent on a wide variety of factors – labor force, available capital, environmental conditions, etc., institutional change brought about by national policies appeared to be prominent in explanation of land use change. Thus an institutional framework was chosen to describe and analyze farmers' decisions and land-use change. Complementary information was then gathered via semi-structured interviews with key informants during a second stage of fieldwork.

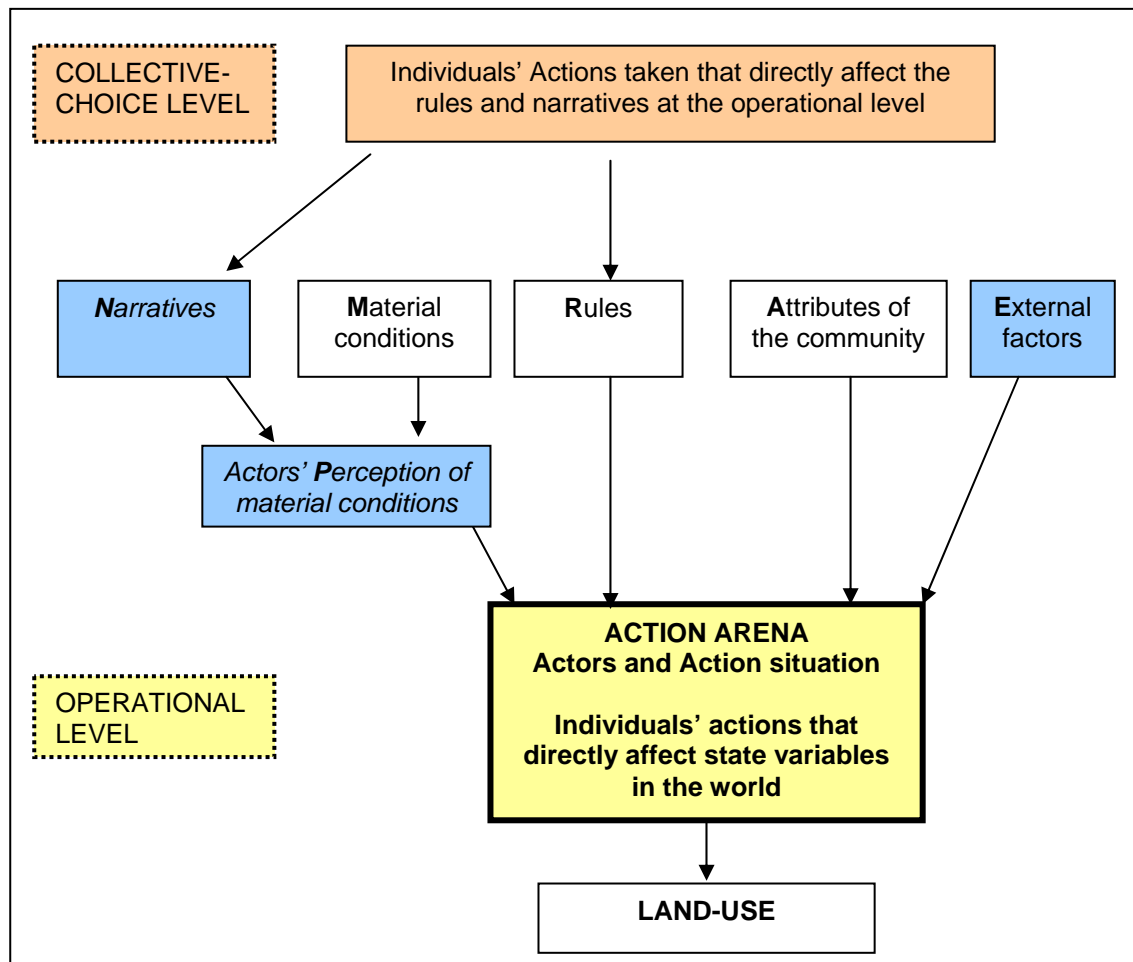
## **2.2 Data analysis: The Institution and Development (IAD) Framework (Ostrom, 1999)**

The IAD framework (an adapted version for this study is presented in Figure 1) has been used for a wide range of institutional settings, notably as a basis to develop a theory of common-pool resources management. It was selected for the current study because of the following comparative advantages with other institutional frameworks such as the environmental entitlements (Leach *et al.*, 1999) and the sustainable livelihoods framework – which has also been recently used as a basis for institutional analysis (Messer and Townsley, 2003). Firstly, the IAD framework is particularly efficient in linking local with higher decision levels i.e. those, where central (governmental) policies and rules governing policy-making are decided. It is structured from the operational level, where decisions directly affect natural resources management to the collective-choice level, where decisions impact the rules that affect the operational level. The collective-choice level is finally linked to the constitutional level, where decisions impact the rules that govern how decisions are taken at the collective-choice level. Though the lead author's Ph.D. research work will take into account all three levels, this article focuses on the operational level as a first step of analysis (Figure 1).

Secondly, the IAD framework explicitly considers local conditions as potential determinants of individuals' behavior. The factors that affect the action arena where decisions are taken by individuals are divided into material conditions, i.e. the physical state of the environment where actors evolve, rules, and attributes of the community, which can be broadly assimilated as cultural determinants (Figure 1). This classification was found to be particularly illuminating when explaining decision-making at the community level.

For the purposes of this research, a number of modifications were made to the framework proposed by Ostrom (Figure 1). Three additional factors were added: at first, it was needed to take into account external elements impacting on the action arena and including macro-scale socio-economic factors (selling prices of agricultural products, off-farm work availability, etc).

Secondly, it was considered that not only rules but also narratives<sup>1</sup> spread by national and local authorities through discourses could significantly affect the action arena. This focus on discourse and on the importance of narratives over farmers' strategies justifies the inclusion of this factor. Lastly, the importance of social framings was further emphasized in this analysis by considering that, more than the material conditions themselves, their perception was a key determinant in actors' decisions.



**Figure 1: Framework used for this analysis, adapted from the IAD framework (Ostrom, 1999)**

Actors are the central variable in the analysis; they are connected with every step of the IAD framework as outlined above. It is thus essential to select a relevant model for actors' behavior, as this will determine whether actors respond weakly or strongly to different factors. Neoclassical economics theories have been commonly used for institutional analysis. Yet, limits inherent to these theories, such as the existence of information costs, have been recently highlighted by institutional experts (North, 1990; Vatn, 2005). Some Vietnamese cultural characteristics (e.g. as underlined by Tran Duc Vien and Rambo, 2001) led us to prefer considering actors as following a normative behavior rather than a rational one. For instance, in Vietnam, the whole society is thought as a family. As expressed in Vietnamese language, Vietnamese people do never 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.

<sup>1</sup> 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. Denning S., 2005. *The Leader's Guide to Storytelling. Mastering the art and discipline of business narrative.* Jossey-Bass/A Wiley Imprint, San Francisco, 360 pp.

Secondly, spontaneous emotions and feelings have always been taught to be subordinated to obedience, morality, duty to one's family and to society (Jamieson, 1993). Individuals' needs and aspirations are framed by individual's role in society and society's overarching rules. For these reasons, it is suspected that farmers will prefer to act according to what is considered normatively correct rather than comparing costs and benefits for different choices. Whether norms and perceptions are shared or not by actors thus becomes particularly important.

### **3 A case study investigation of land-use in northern Vietnam**

Tien Xuan commune is located in Luong Son district, Hoa Binh province, 50 km west from Hanoi. It lies at the edge of the Red River delta and at the bottom of hills and mountains. Uplands represent large areas compared to the local population. In Tien Xuan commune, uplands comprise 978.12 ha compared to a figure of 320 ha for lowlands, and support a population of 6,300 inhabitants (2004 figures, tenure service office of Tien Xuan Commune). Upland soils 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). The commune is constituted of seventeen villages, the principal of which are Dong Cao, Dong Dau and Que Vai, where fieldwork was carried out. These three villages 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 (pigs and buffalos breeding) and aquaculture as a means of living. Under the New Economic Zone government program of the 1960s, a few Kinh<sup>2</sup> families migrated into the three villages. They now represent respectively 36 %, 5 % and 7 % of the total 42, 64 and 78 households in Dong Cao, Dong Dau and Que Vai. 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 building works.

In this study, the action arena focuses on the uplands area and on farmers' strategies regarding upland management in the three villages. It doesn't mean that other action arenas (lowland activities, husbandry, etc) on which farmers rely are ignored. Many action arenas overlap and it is difficult to draw sensible boundaries between them. For example, grazing land availability in the uplands considerably affects husbandry development: in Que Vai, where large grazing areas are available, households own on average three buffalos. In Dong Cao, where most upland has been sold to Hanoian and access to grazing land is limited, households own on average one buffalo.

Actors refer here to every person who has access, use or control over uplands. It encompasses all the villagers living in the studied geographical area, local authorities in charge of implementing laws and monitoring land-use, and Hanoian investors who recently have purchased some of the surrounding land.

#### **3.1 Period 1: Slash and burn cultivation**

*Initial structure of the action arena: perception of material conditions, external factors and rules*

Uplands in the region were first covered with primary forests, populated with wild animals. From the 1960s local people started to cut trees for timber, which at that time was the only means by which to overcome poverty and famine. Progressively, uplands were opened up for

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<sup>2</sup> 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 level

agricultural purposes. From the mid 1970s, farmers cultivated annual crops: cassava, arrowroot, taro and maize. They were practicing rotational shifting cultivation, choosing a piece of land, burning the vegetation, cultivating for two to three years and then moving to another plot. Following periods were at least ten to fifteen years.

The information farmers had on uplands state was essentially based on their own experience. Uplands were seen as an unlimited resource but villagers were aware of the inherent low soil fertility and of the steep slopes sensitivity to erosion: “when there are heavy rains, water flows with humus”. They also knew that cassava cultivation was an aggravating factor behind soil erosion:

*“when we plant cassava we have to weed. But when we cultivate on steep slopes, soil runs with water and there are only stones left”.*

Selling prices of cassava, arrowroot and taro were low, but at this time access to other crop varieties was limited. Work in the uplands was hard, this being especially pertinent to newly migrated Kinh families who were not used to live in a mountainous environment.

No formal rules governed upland management; work in the uplands was neither managed nor controlled by the co-operative. Farmers had designed their own rules. Everyone was free to clear up as much land as he wanted to, how much land farmers could open only depended on their will and available labor force. Uplands access was not restricted to any individuals or group of people, and included not only villagers from the three studied villages, but also villagers from further located villages with no direct access to uplands. 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 signify other people that they shouldn't start clearing at this place.

From the time that farmers first started cultivating the uplands, they were confronted with damages 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 on 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 not 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.

### *Outcomes*

Common resources could be managed effectively with a minimum set of rules and no need for enforcement. Because farmers were aware of the inherent low soil fertility, they adopted shifting cultivation practices that enabled the soil fertility to regenerate. As long as large uplands areas were available, shifting cultivation practices were probably the best option in term of economic and environmental costs-benefits in this highly sensitive environment (Do Dinh Sam and Forest Science Institute of Vietnam, 1994). Farmers' living standards rose significantly thanks to uplands cultivation.

## **3.2 Period 2. From cessation of annual cropping to reforestation**

### *Changes in rules, external factors and narratives*

From the 1990s, decisions taken at the collective-choice action level resulted in dramatic changes in rules and narratives. In 1991, the Forest Development and Protection Law divided forested land into three categories: special use forest, protection forest and production forest

(National Assembly of Vietnam, 1991). Procedures and guidelines for forestland allocation were provided with Decision 327-CT (1992), the new Land Law (1993, amended in 1999), and Decree 02CP (1994, replaced by Decree 163 in 1999). Rights to use land with or without forest cover could be allocated to organizations, households, or individuals for 50 years. In 1995, the government ban for crop cultivation in the highest part of the mountains was implemented in Tien Xuan commune. Villagers were not very willing to stop their major source of monetary incomes and the commune authorities' task for enforcement and control was enormous. A team of twenty persons had to control a 978 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 the government ban. At the same time, forest land was allocated according to what had been cleared up by every family, and opening up more land was forbidden. There were few conflicts during land allocation process as many farmers refused to claim land. Firstly, they feared to pay more taxes if they were given land-use rights. Secondly, as uplands had previously been freely used and accessed, the advantages of getting official land-use rights for land were not very clear.

Furthermore, during the 1990s, reforestation programs were launched in the study area and all over Vietnam. Pertinent schemes included the United Nations World Food PAM program<sup>3</sup>, Program 327 and more recently the Five Million ha reforestation program. Financial incentives were provided by the government to promote reforestation. Depending on the program, the district usually paid for seedling, fertilizer, and labor costs (which in turn were deduced from the sales benefits). Rice was even provided for each tree planted in the PAM program. The district forestry organization, which managed program implementation with the local support of the commune authorities, promised to ensure timber purchase to the farmers. The household had to sign a contract with the district forestry organization, with specific requirements such as the time of harvesting to cut or planting strategy.

New narratives such as “forests increase runoff” and “forests reduce erosion” were spread by local authorities to justify the implementation of government policies – especially the ban of annual crops cultivation that was quite unpopular – and encourage villagers to follow the reforestation programs.

#### *Outcomes*

Progressively from the 1990s to 2003, farmers stopped annual cropping. In 2003, most upland area was under fallow or reforested.

### **3.3 Period 3. Abandonment of trees plantations?**

#### *Changes in external factors*

Industrialization and urbanization are likely to become major driving forces in the study area over the next decade. The Hanoi National University will be transferred 15 km from Tien Xuan commune in 2007, together with the building of student, academic and administrative staff housing. Furthermore, Tien Xuan is one of the communes that have been elected by the government as a “New City” in 2010; its territory will be the target to host industries and housing for workers. Today the premises of urbanization traces are expressed by the sudden interest of Hanoian residents for this area who have been interested in buying land mostly for speculative reasons.

New market opportunities have also arisen. Recently, the district extension organization launched a new project, based on sweet bamboo shoot cultivation. Shoots were subsidized by the province and the district by up to 50% of the purchasing costs, and the project was implemented

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<sup>3</sup> This program encompassed six forestry projects and managed to restore some 450,000 ha of production forest.



in several villages in different communes of the district, among which was Que Vai. Because there is today a strong demand for this agricultural product, selling prices are quite high<sup>4</sup>.

### *Outcomes*

According to the tenure service officer at the Tien Xuan Commune People's Committee, all villages in the commune have been affected by extensive land sales except Dong Dau and Que Vai, where the phenomenon is still very limited. In Dong Cao, nineteen families sold 80% of the uplands village territory to the extension commune worker or to Hanoian investors. On the other hand very few families sold their land in Dong Dau and Que Vai, due to lower accessibility and fewer social connections with Hanoi. In Que Vai, thirteen families started cultivating sweet bamboo shoots. They created a few months after, the organization of the "Farmers who like cultivating sweet bamboo shoots". This grassroots' association aims to attract financial support and technical help from local authorities and share experiences between farmers. This unique initiative in Tien Xuan commune testifies of the will of farmers to count on this new activity as a major source of income.

## **4 An institutional analysis**

### **4.1 From cessation of annual cropping to reforestation**

When reading the previous story of land-use change, one could conclude that forest land allocation and reforestation programs attained the pursued official objectives: foster reforestation by households. But as this simplistic view is solely based on facts, it should be considered with caution. A further analysis would integrate local knowledge in addition of the facts observed at the meso-scale level. Local knowledge reveals that farmers stopped cultivating annual crops for the following reasons (Table 1 below).

**Table 1: Driving forces leading to the end of annual crops cultivation**

<b>Reasons given by farmers<sup>5</sup></b>	<b>Percentage of respondents</b>
Damages caused by cows and buffaloes	51 %
Soil was poor	40 %
It was forbidden (government ban)	22 %
They sold the land	13 %
It is what others did	9 %
Not enough labor force	8 %
Low cassava selling prices / cultivation not profitable	8 %
Work was too hard	2 %
They wanted to plant trees	2 %

<sup>4</sup> Figures from a 45 household interviews sample (author's survey)

A second interpretation, based on facts and local knowledge, would probably conclude that farmers stopped cultivating because they were not able to cope with cows and buffalos and because their agricultural practices were not sustainable and had lead to soil fertility depletion.

The present paper, thanks to the use of the IAD framework coupled with an historical perspective, reveals that none of these explanations is correct. If policies undoubtedly impacted rules and were driving forces for land-use change, the course of events happened in a distinct way than expected by the Vietnamese government.

<sup>4</sup> In 2005, sales prices for sweet bamboo shoots range between 3000 and 5000 vnd/kg depending on the season. At the time of annual cropping in the 80s-90s, cassava was sold around 200-300 vnd/kg.

### *Step 1. Changes in material conditions*

Firstly, farmers didn't stop cultivating annual crops in the uplands altogether. The end of cultivation ranged from the mid 1990s till 2003, and the first farmers who stopped had different reasons than the following ones. The first did so because they noticed the soil was poor, according to their own observations – decrease in yields, soil hardness, loss of the fertile top-layer of the soil and emergence of stones and rocks. Land allocation prevented farmers to open-up new parcels and move to another plot. Fertilizers use was considered as requiring too much money and labor force (Orange, 2006). At the same time, new off-farm opportunities were arising in construction works, providing similar incomes for a work that was considered to be less demanding. Some farmers decided to stop cultivating and let land under fallow. Later on, in 1995 and 1998, when program 327 was launched, farmers were encouraged to plant trees because of government subsidies. At the start, few farmers – only the richest and risk-taking ones – decided to plant trees. The primary driver for land-use change was thus a decrease in soil fertility. Yet, this change in material conditions wouldn't have had the same impact if rules governing land access hadn't also changed. But, of more significance was the way rules were later impacted, in turn affecting costs and benefits of annual cropping systems.

### *Step 2. Changes in rules*

The changes caused by more farmers ceasing cultivating impacted upon the informal collective arrangements governing cultivation and grazing cohabitation. When a few farmers stopped cultivating, it created a domino effect with dramatic consequences on land-use practices of all farmers. When the neighboring field was let under fallow or reforested, cattle could come and go freely on this parcel. The adjacent cultivated parcel was thus more under threat. Once again, as land had been allocated, farmers couldn't move their plot to another location. Building new fences to protect individual's fields was too costly compared to the relatively low benefits taro and cassava sales provided. The costs of protecting one's fields were increased until a non acceptable point was reached. Losses from cows and buffalos damages could comprise up to 30% of the total harvest. As a result, all farmers progressively stopped cultivating cassava, taro and arrowroot. Changes in material conditions and reforestation incentives together with changes in rules governing land access and use affected costs and benefits of annual cropping. Costs for uplands cultivation became too high, especially compared to its rather low profitability.

### *Step 3. External factors and narratives*

The end of cassava, taro and arrowroot cultivation was a first step in land-use change, 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. As suggested in Table 1, only very few farmers stopped cultivating in order to reforest. Farmers in the three villages were asked why, once they stopped uplands cultivation, they decided to plant trees. They provided the following reasons:

- the soil was poor, so nothing else could grow;
- it provided fuel wood;
- it was subsidized through a government program; and
- they had no other choice.

No other land-management option than mono-trees plantation was available, except fallow. As fallow is commonly considered as “wasted land” by the farmers in the studied area, reforestation appeared as the “least bad solution”.

New narratives spread abroad by local authorities emerged and were quickly integrated by the collective imagination. Villagers were told the uplands allocation program was implemented by the government for ecological reasons (as stated by one Dong Cao villager):

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

Farmers were thus accused of being as responsible for this supposed ecological disaster. They were the guilty ones and had to atone for their faults by reforesting the hills.

Farmers still strongly believe that runoff from the watershed increases with forest cover. This belief is so anchored in people’s minds that some farmers use them to explain all uplands problems. As an example, when asked why cassava yields had decreased in the uplands, a farmer replied that it was because there wasn’t enough water in the soil because forest had been cut. Poor inherent soil natural fertility and further soil fertility reduction due to soil erosion are more likely the primary and prominent factor for yield decrease in this area. Thus all spread narratives were taken as granted, though scientifically subject to controversy (read Ives and Messerli, 1989; Calder, 1998; Calder, 1999) and not empirically verified on the field by farmers. There is no evidence that the recent hills reforestation with eucalyptus and acacia has increased water availability for downstream paddy fields. On the contrary, farmers claim a decrease in water runoff for the last years – the period which coincides with forest plantations. Farmers previously relied on their own experience to apprehend uplands. Since the time reforestation narratives were spread, they have relied on government information – even if contradictory with their observations.

#### **4.2 The abandonment of tree plantations?**

The previous section has shown that reforestation had been relatively successful in the study area only because of the simultaneous occurrence of a range of diverse factors. It had been adopted more as the least bad option than deliberately chosen by the farmers. One can thus wonder if trees plantation will be sustainable into the future and under which conditions. For the last three years, many farmers either sold their land or started new agroforestry systems. The following action arena variables tend to demonstrate that farmers abandonment of trees plantations will go on in the following years.

Firstly, information regarding land-use rights is quite poor: many farmers don’t know if they are allowed to cultivate the allocated land; farmers who engaged in a reforestation program with the district forestry organization don’t know when they are allowed to cut trees. Secondly, farmers cannot choose which species to plant. Government promoted monoculture and provided saplings through subsidized programs were either acacias or eucalyptus. In addition to poor yield, eucalyptus degraded the soil. Thirdly, very few farmers are satisfied with financial benefits provided by silviculture. Though farmers acknowledge silviculture is more profitable than cassava cultivation, they complain about the incomes irregularity – with harvesting only occurring every five to seven years.

For these reasons, farmers were very tempted to move out of silviculture altogether. However, this analysis doesn’t argue that trees plantations can’t be a satisfying economic option for farmers. For instance, the commune extension worker has decided to plant various tree species with high marketing values and surely expects these will bring substantial benefits. Ironically, he justifies his choice not by economic reasons but via ecological arguments, using once again the narratives on forest benefits. Some households, who all have family ties with the extension worker, planted cinnamon trees in their gardens. But it would appear that only rich farmers fully benefit from forest plantations; this group of society is able to invest in expensive saplings and wait for many years before getting back the benefits. They are also socially better-connected, know which tree species are profitable, and are well informed on land use rights.

## 5 Discussion

At the macro-scale level, one could claim that reforestation programs and forest land allocation policies led to the expected and pursued objectives of reforested areas increase in the studied territory. Yet, a more detailed examination of factors at the household and community level, using an historical perspective and an institutional framework, has demonstrated that the observed outcomes did not occur in such a straightforward way. Actually, it would be naïve to presume that there is a direct link between policies implementation, expected change in individual behavior and pursued outcomes.

Firstly, because local realities are far more complex than they are usually imagined, represented, or modeled in laws. For instance, land policies in Vietnam were designed to be applied uniformly across the entire national territory. As a result, they failed to take into account local disparities induced by a high ethnic, environmental and economic diversity (Sadoulet *et al.*, 2002). This paper suggests that not only the diversity but the unique combination of these factors at a given location and time will lead to the observed outcomes. It supports the arguments defending the need for local studies. Meso- or macro-scale studies are essential to upscale results and observe global trends, but often they alone can't provide the true explanations for environmental change (see also Gray, 1999).

Secondly, human behavior is in some situations highly unpredictable. How human beings respond to incentives depend on a wide range of factors including cultural or normative determinants. Yet, policy-makers still often assume individuals will follow a rational behavior pattern. In this case study, a consideration of not only individual behavior but also community dynamics was essential. This was another important toolkit provided by the IAD framework. Investigations show the collapse of the collective framework that linked farmers and land-management systems was at least as much responsible for the stop of annual crops cultivation as was individual behavior. It was thus crucial to use a framework that could combine household patterns with community trends. It would have been relevant to analyze in a more explicit manner the attributes of the community (which are linked to a normative behavior pattern). Their impact was the most difficult to assess and would have required a more detailed survey on this aspect, but it was observed that farmers often preferred to conform to general behavior and practices. Yet, rational behavior is not to be excluded. For instance, the success of the sweet bamboo shoots initiative clearly shows the importance of costs and benefits. Though rules for land-use and access haven't changed, farmers have adopted land management systems that are similar to annual cropping systems. What actually makes the difference with former cropping systems is that farmers estimate that crops sales benefits will be higher than the costs of protecting one's field. But a rational approach will drive farmers' strategies only if it is in accordance with norms (i.e. the attributes of the community). An in-depth study on the importance of normative behavior in rural areas of Vietnam would be fruitful to understand farmers' strategies and model farmers' behavior. For instance, how much one's position (village leader, party cell secretary, leader of the farmers' organization, etc) further affects one's behavior would be an interesting research area to explore.

Lastly, policies are not just decisions to be transferred into actions. They also carry with them narratives and beliefs, which might act as powerful driving forces. In the present case, the Vietnamese government deliberately spread narratives on forests through a wide range of media. Panels that vaunt forests environmental benefits border numerous roads in the northern and central highlands in Vietnam. Narratives can quickly and dramatically transform people's perception of their environment, hence multiplying, distorting, or even hindering expected policies impact. It is difficult to assess for how much farmers' beliefs in forests' environmental benefits weighted in reforestation, but they were powerful enough so that today farmers rely more on them than on their own observations.

## **6 Recommendations for policy-makers**

This paper concludes on three different topics that were debated in the present analysis: the impact of policies on land-use change and the success of reforestation programs and forest land-allocation to households.

### **6.1 Impact of national policies at the local level**

As underlined in the discussion section, policies are often confronted by unexpected linkages of action-outcomes leading to unplanned, biased, and sometimes contrary outcomes. In the present case study, it was demonstrated that there was no direct link between policies and reforestation. Farmers didn't stop cultivating steep slopes because of the government ban but because of a myriad of local and macro-scale factors. Sikor (2001) also previously challenged the link between forest land allocation and the observed forest expansion in Northwest Vietnam. According to Sikor, macro-economic forces rather than policies themselves prevailed. Furthermore, a number of researchers have demonstrated that local realities greatly affected land policies implementations and outcomes in northern Vietnam (Scott, 2000; Sowerwine, 2004). This study highlighted more precisely the importance of interactions between rules – mostly affected by national policies – and other factors that are locally dependent. When acting at the collective-choice level and changing the rules that govern the institutions impacting on the action arena, policy-makers should think not only of how these new rules will affect farmers strategies but also how they will interact with the material conditions, attributes of the community and external factors at the local level.

### **6.2 Monoculture plantations**

The Five Million Hectares program is currently under implementation nationwide. Yet, many of the attributed environmental benefits to mono-tree plantations have been challenged. Research works questioned a wide range of usually taken as granted narratives such as “forests reduce erosion”, “forests increase dry flows”, or “forests reduce floods” (see references pp. 2 and 10). In a recent article published in *Science*, Jackson *et al.* (2005) examined water flow and nutrient budgets under 504 reforested catchments. Results suggested that monoculture plantations usually acidified soil and it was found that silviculture, especially evergreen plantations such as eucalyptus, dramatically reduced stream flow after a few years of planting. Ironically, though the government currently supports a program aiming to plant five million hectares of forest nationwide, President Tran Duc Luong recently praised efforts to find scientific solutions to overcome water shortages that regularly occur during the dry season in many villages in the northern mountains (Viet Nam News Source, 2005).

This study also questions economic benefits of monoculture plantations. Though no cost-benefit analysis has been carried out in this specific study, previous studies challenged the benefits of forest plantations for farmers (e.g. Gomiero *et al.*, 2000; Rerkasem, 2003). This paper demonstrated that trees plantations were not perceived as an acceptable economic option for a majority of farmers in the studied area. On the other hand, though it is still early to draw any conclusion, the sweet bamboo shoots initiative seems quite promising. This complex agricultural system mixing bamboo plantation, peanuts, cassava, maize cultivation, and poultry breeding will provide regular incomes, with likely environmental benefits higher than eucalyptus plantations. A previous comparison of agroforestry (AF) systems with eucalyptus showed that the former were financially more profitable than the latter (Bui Dung The, 2003). This article thus encourages policy-makers to examine costs and benefits of different AF systems and to further support local initiatives such as the one implemented by the district extension organization in Luong Son.

### **6.3 Forest land allocation: what did it change?**

Forest land allocation aimed to encourage farmers to reforest and provide them new sources of incomes. Until today, no study has demonstrated that these two goals were reached. Actually, forest land allocation has a wide range of other impacts: this study has focused on only three major effects.

Firstly, it led to a reduction in land access flexibility. As a result, shifting land-management systems and collective arrangements allowing the co-existence of husbandry and annual crops cultivation collapsed, with the consequences described in this paper.

Secondly, it considerably changed the set of actors accessing and using uplands. At the time of shifting cultivation, actors formed a homogeneous group who shared a common perception of their environment. Participants all hold a similar position; there was no leader as there was no need for control and enforcement. But as soon as it was possible to buy and sell land, the variety of actors' positions increased. More importantly, actors now pursue different aims. These distinct goals are likely to lead up to conflicts. For instance, problems arose in Dong Cao between the commune extension worker, who purchased large tracts of the uplands, and the villagers, to whom he has forbidden fuel wood collection and cattle grazing on his land. This example is not an isolated fact. Not only local elite bought land in the area. Hanoian residents also bought significant amounts of land in almost every village in Tien Xuan commune. They restricted access to the plots they bought – though most of them don't use them yet – with a resultant dramatic decrease in grazing land availability. Apart from the direct consequences on grazing areas, a total control of uplands land-use can create further conflicts as land-use can have major impacts on water availability for paddy fields irrigation downstream and lowland productivity as a whole (sedimentation due to eroded materials coming from uplands can reduce lowland crop yields). Many scholars (e.g. Nguyen Nghia Bien, 2001; Bergeret, 2002; Sowerwine, 2004) ascertain that upland allocation has been at the root of social differentiation. This paper supports this view, and argues that this social differentiation is further accentuated with urbanization.

Finally, the lack of communal land also creates tensions between villagers. For instance, villagers who don't own uplands need to steal fuel wood and non timber forests products (NFTP) such as bamboo shoots on private plantations. In the situation when communal land provides assets that can be shared by the whole community, there are distinct advantages of community as opposed to private management (Gomiero et al., 2000; Le Thi Van Hue, 2001). The provision of communal land at the village level could help reducing conflicts between villagers.

## **7 Conclusion**

This paper demonstrated that one should be extremely careful when analyzing macro-scale factors to explain human-induced environmental change when final decisions on natural resources management are taken at the individual and community level. Even if macro-scale factors can have significant impacts on actor's strategies at the micro-level, they also interact with a complex interplay of local agents. However, local analyses are also limited as they are restricted to a limited geographical area with specific local determinants. It is also necessary to examine how different local factors can result or not in different outcomes. Further research is needed to verify on a larger scale the hypotheses proposed in this study. In a future work, analysis will be upscaled to the district<sup>6</sup> level using environmental and socio-economic data from each commune. Quantitative analysis coupled with a Geographic Information System (GIS) will help testing different hypotheses. Remote sensing techniques will be used to identify land use change at the meso-scale.

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<sup>6</sup> Administrative units in Vietnam are respectively from the higher to the lower level: province, district, and commune.

Furthermore, explaining how decisions are taken at the operational level is necessary but not sufficient to guide policy-making. Understanding how rules are taken at the collective-choice level is essential to provide scientific evidence with a high impact capacity. A policy-process analysis will enable mapping groups with different policy interests, actors' networks and influential narratives (read Keeley and Scoones, 2003). Interviews with donors, NGOs, researchers and policy-makers will be carried out to examine how shifts in national policies occurred, how beliefs on forests benefits emerged and prevailed, and how science and policy are linked in the specific context of uplands management in Vietnam.

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