How Do Farmers Make Decisions in a Land Degradation Context? A Case Study from Northern Vietnam

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Abstract

Stemming from a three-village case study in northern Vietnam, this paper examines how farmers have coped with and adapted to land degradation in the uplands. Following a qualitative approach based on anthropology and institutional analysis, it assesses how policies and research programmes implemented in the area have affected local determinants, namely farmers' perceptions of the environment and local rules, and how in turn the latter impacted individual and community behaviour.

Results suggest that the research projects implemented in the case study area have had little impact on farmers' perceptions of land degradation. The effects of policies have been much more powerful in influencing farmers' beliefs. However, institutional analysis showed that the shift from annual cropping to tree plantations in the area was not the result of farmers' new beliefs regarding forests. The collapse of local rules governing land access and land use, due to a combination of soil fertility decrease and change in land tenure, was the decisive factor in land-use change.

This paper contends that when natural resources are managed by local users, local studies integrating acute models of individual behaviour have marked benefits over meso- or macro-scale studies. Though a powerful tool for analysing the contribution of aggregated or macro-scale factors at the regional or national level, the latter might miss decisive factors that are only observable at the community level. It is argued that, when seeking to explain human behaviour, using a socially constructed view of nature is a necessary approach to assessing the relative impact of external forces on individual decisions. Lastly, the analysis showed that when examining common management, individual decisions should be analysed together with community dynamics. In the present case study, collective determinants were as much responsible for land-use changes as individual strategies.

Keywords: land degradation, soil erosion, reforestation, perception, uplands, northern Vietnam.

1. Introduction

Land degradation has attracted the attention of donors, researchers and policy-makers in Southeast Asia over the past two decades. Deforestation and soil erosion were identified as the key issues to address, and shaped the design of new national policies and research programmes. The means used to address these issues have been similar across different countries. Policies have focused on the eradication of shifting cultivation practices and the development of fixed cultivation, on uplands allocation, and on the implementation of ambitious reforestation programmes nationwide. Considerable public

efforts and funding – e.g. China has allotted US$1.7 billion, to be distributed by 2015, to subsidies for fast-growing plantations (American Forest and Paper Association, 2004) – have been devoted to restoring 'barren land' and improving upland livelihoods. At the same time, research has devoted much attention to developing soil conservation and sustainable land management practices. Despite technically promising results, very few of them have been adopted by farmers. Recognition of this shortcoming was gradual among scholars, and began to translate into new research agendas in the 1990s. The main causes of the poor take up were identified as non-integration of socio-economic determinants within the development of technical solutions, and too much focus on the plot level with no consideration of how to scale up results (Maglinao et al, 2001). A new research paradigm emerged to guide future research and development projects on land degradation in tropical countries (Greenland et al, 1994). It combined the use of a participatory approach with an interdisciplinary, community- and catchment-based framework (Maglinao et al, 2001). Still today however, the implementation of such research techniques is limited. Generally, the results of several decades of political and academic efforts directed towards improving the livelihoods and the environment of uplands communities in this region of the world are deceiving (Dupar and Badenoch, 2002; World Bank, 2005).

In Vietnam, political and research efforts have specifically targeted uplands management since the 1990s. Improvement (or substitution) of ethnic minorities' land management systems and reforestation of barren hills have been the two major goals of these government initiatives. Although some of the policy objectives have been reached, such as a significant reduction in practice of shifting cultivation, all observers challenge the impact of government policies on reducing the social and economic inequities between mountainous and deltaic areas over the last decade (Gomiero et al, 2000, Swinkels and Turck, 2004). Research projects on uplands agriculture and rural development have also achieved mixed results in Vietnam. Promising techniques or practices have been developed and had some success on a small scale but few research results have been translated into farming practice on a significant scale. These deceiving outcomes in uplands areas contrast with impressive improvements in agricultural productivity and livelihoods in the lowlands, achieved largely through policies (land allocation) and national or international research (e.g. improved seed varieties). This paper aims to highlight some factors that have been given little consideration so far, and to examine why policies and research in the Vietnamese mountains have hardly attained the intended objectives. Based on case studies of three villages in northwest Vietnam, it uses an ethnographic approach and an institutional analysis to identify decisive and enhancing factors in farmers' decision-making processes regarding land management. This study examines the extent to which policies and research efforts have contributed to reforestation in these three villages, where both policies and research projects have been implemented since the late 1990s. It underlines the prominence of local factors over national policies, pays particular attention to the role of local rules, and highlights how shared perceptions among different actors are important in defining outcomes.

2. Methodology

Issues covered in the present study have been tackled by two main strands of literature: i) analysis of land-use changes and ii) the adoption of soil conservation practices. Land-use change literature has often relied on spatial modelling and quantitative analysis (McCusker and Carr, 2006). Most analyses have studied the influence of aggregated macro-scale forces on land-use change. Some integrate household level data (Muller and Zeller, 2002; Geoghegan et al, 2001) but all model farmers as rational actors responding to a priori defined explanatory variables according to a utility-maximising process. Despite their contribution to analysis of the impact of driving forces and proximate causes of land-use changes (Geist and Lambin, 2002), they have not really addressed why these factors are the driving forces for land-use changes (McCusker and Carr, 2006).

The adoption of soil conservation practices has attracted much attention from scholars, with a wide range of local level studies examining the conditions under which farmers adopt soil conservation practices. Factors such as education level, household size, income level and cultivated area have been identified as critical in farmers' adoption of soil conservation practices. Farming conditions (fallow systems versus continuous cropping) have also been proven as important factors affecting whether farmers consider soil erosion as a problem (Cramb et al, 1999). More recent studies have integrated local perception of farmers (Amsalu and de Graaff, 2006; Okoba and de Graaff, 2005; Mbaga-Semgalawe and Folmer, 2000) reached interesting conclusions: results have shown that farmers are usually aware of soil erosion but have not adopted proposed soil conservation practices because they have already developed their own land-use practices, or because they think the practices proposed have little impact compared to natural conditions (also read Fujisaka, 1994). However, these studies have rarely attempted to understand how these perceptions have formed and evolved, how farmers' perceptions differ from researchers' perceptions, and how these differences might affect adoption of research practices.

Generally, these two strands of the literature have not given much consideration to the role of local rules in farmers' decisions, and have limited the institutions they analyse to land tenure bodies. This study aims to address these gaps by an ethnographic approach and an institutional analysis, coupled with a historical perspective that thoroughly explores farmers' perceptions of their environment and farmers' decision-making processes. This approach expects to provide new lights on understanding and predicting land-use change, and more generally on farmers' decision-making processes.

The term 'institution' is used in this context as the usually accepted academic definition, which distinguishes institutions from organisations – although, in the common language, institutions are often assimilated within organisations such as the National Assembly, government agencies, etc. Here, institutions should be understood as the "rules of the games" (North, 1990) and can be

distinguished from organisations, which are compared to the "players" of the game who use the rules in a way to win the game (ibid). Institutions will presently encompass rules governing access and use of natural resources in the uplands.

The Institutional Analysis and Development (IAD) framework developed by Elinor Ostrom and her colleagues (e.g. Kiser and Ostrom, 1982, Ostrom, 1990, Ostrom et al, 1994) was found to be particularly efficient in untangling complex human decisions that both refer to the household and to the community level. The IAD framework has been used for a wide range of institutional settings, notably as a basis for developing a theory of common-pool resources management. It was selected for the current study on the basis of its long-term use and refinement, which allow rigorous and reliable assessments to be made. Institutional analysis emphasises the roles of institutions in human decisions and interactions but factors other than rules are also considered to affect the action arena (figure 1): the material conditions that are the physical state of the environment where actors evolve; the attributes of the community that can be broadly assimilated as cultural determinants; and lastly, the rules that are the "shared understandings that refer to enforced prescriptions about what actions (or states of the world) are required, prohibited or permitted" (Ostrom, 1999). This framework does not presume the prominence of one factor over another and all factors are given an equal role.

Furthermore, this paper proposes a refined version of the framework proposed by Ostrom (1999) and three additional factors (shaded boxes in figure 1): at first, it was needed to take into account external elements impacting on the action arena including macro-scale socio-economic factors (e.g. selling prices of agricultural products, off-farm work availability, etc). Moreover, the importance of social framing was emphasised by considering that, more than the material conditions themselves, their perception was a key determinant in actors' decisions. It takes into consideration that farmers' perceptions of material conditions are influenced by the state of the material conditions themselves, by the information, knowledge and narratives spread by national[1] and local authorities and by research projects.

Located in the action arena, actors are the central variable in the analysis. It is thus essential to select a relevant model for actors' behaviour, as this will determine whether actors respond weakly or strongly to different external factors. Some Vietnamese cultural characteristics (as underlined by Tran Duc Vien and Rambo, 2001) mean that actors are assumed to be following rational behaviour when this behaviour conforms to prevailing norms. Whether these norms and perceptions are shared by the actors or not thus becomes particularly important.

[1]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 actions (Roe, 1994).

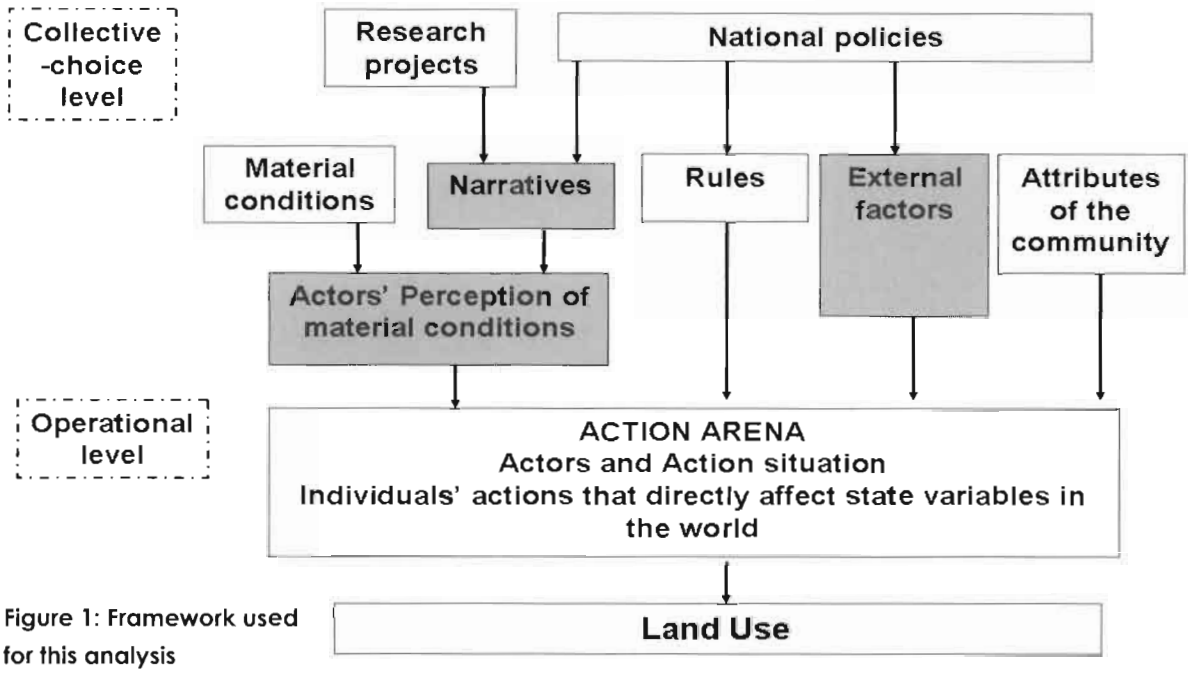

Figure 1: Framework used for this analysis

Adapted from the IAD framework (Ostrom, 1999).

Fieldwork was carried out in three villages, Dong Cao, Dong Dau and Que Vai, located in Tien Xuan commune, Luong Son district, Hoa Binh province, 40 km west from Hanoi (figure 2). The commune lies at the edge of the Red River Delta and at the bottom of hills and mountains, and is constituted by seventeen villages.

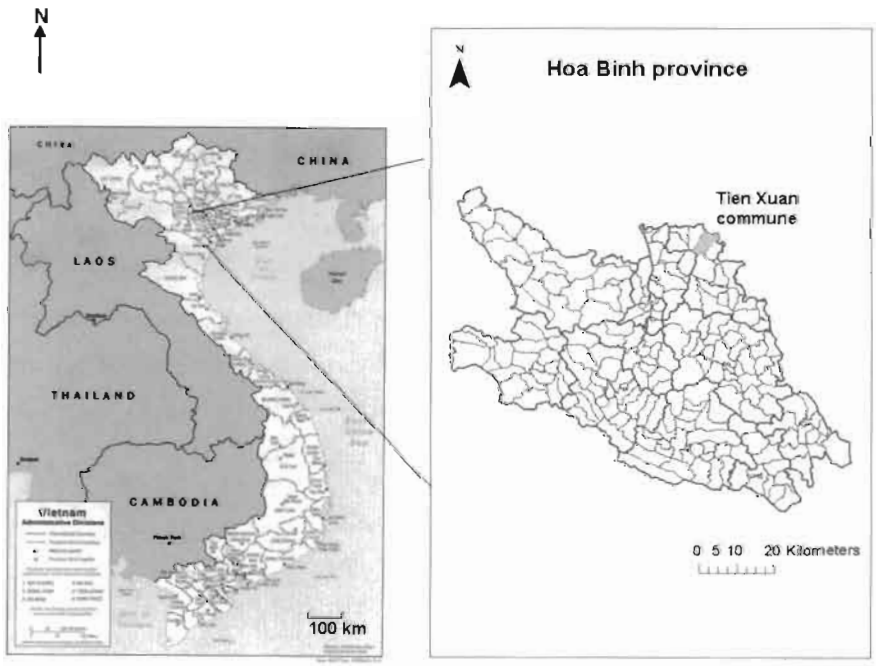

Figure 2: Location of the case study area

Management of Soil Erosion Consortium (MSEC) research activities were carried out in Dong Cao village. This study is an integratedpart of the MSEC project. The two other villages, Dong Dau and Que Vai, neighbour each other. The aim of this fieldwork stage was to construct a general picture of farmers' activities and use of natural resources, to understand how and why they had evolved over the past 50 years, and to assess which incentives farmers had responded to when making decisions affecting their local environment. Work was carried out over a six-week period in the three villages and included transect walks, participatory exercises (participatory mapping, wealth ranking, historical and classification matrices) with focus groups, 32 key informant interviews at village, commune and district levels[2], and 82 household interviews.

3. Different knowledge and perceptions of land degradation

The term 'soil erosion' usually carries a negative environmental connotation within scientific, public and political debates. However, soil erosion is not always a problem for local communities (Forsyth, 2003). Its impact greatly depends on local contexts and farmers' coping practices. This section explains why it is necessary to explore indigenous knowledge, and more particularly, indigenous perceptions of land degradation. The perceptions of two groups of actors, i) policy-makers and ii) researchers are then compared.

Perception is the acquiring of knowledge by means of our senses (Armstrong, 1961). It is a form of knowledge that usually carries a strong weight in our decisions, as human beings tend to give more importance to information directly acquired from the subject we observe than to information indirectly provided by a third person or device. Apprehension of biophysical reality depends on socially constructed representations that are formed at several stages. First, the perception of biophysical changes differ according to how they are actually experienced (Blaikie, 1995).

A now famous example provided by Fairhead and Leach (1996) in Guinea illustrates this very vividly: Forest islands surrounding the villages of the studied area were seen both as a symptom of land degradation by the authorities – who identified them as remnants of an extensive forest – and as evidence of their good land management practices by villagers – who claimed they had been created by themselves or by their ancestors. These two groups had a diametrically opposite perceptions of one environmental process. Considering one perception rather than the other has significant implications for designing policies or research projects. Citation of the inability of local communities to manage land has been a recurrent argument behind policies to restrict and/or control land access and land management

[2] The administrative units in Vietnam are, from highest to lowest level, province, district and commune.

(Committee on the Human Dimensions of Global Change et al, 2002). A second stage is that of social construction and the interpretation and appropriation of environmental issues by political communities based on scientific evidence. Scientists from different disciplines have different foci for analysing environmental changes. These can lead to different interpretations and sometimes very different recommendations. The scientific and political debate on climate change is a clear illustration. Proponents and opponents of the Kyoto protocol ratification use scientific evidence from different scientific communities to defend their respective positions. These two particular stages of social framing are considered in this paper.

The methodology used to analyse actors' perceptions of land degradation draws on semantic realism. This approach examines how "brute facts" and "institutional facts" (Searle, 1995) can be perceived differently. Brute facts have a relatively neutral meaning as they are basic descriptions of a biophysical process. Institutional facts, in contrast, carry a strong social meaning that is not equally shared by all groups in the society. They may, for example, carry a negative connotation for scientists and policy-makers, but not for local people. For instance, 'soil movement' has a neutral meaning. Because "one farmer's soil erosion is another soil's fertility" (Blaikie and Brookfield, 1987), the institutional fact of 'soil erosion' can be interpreted both as 'soil fertility' or 'soil degradation'. Indeed, redeposition of eroded particles from one site might bring nutrients to agricultural land elsewhere and, in some cases, what might be experienced as a problem by uplands communities might be regarded as a benefit by downstream people.

3.1 Policy-makers perception of land degradation

Two major underlying narratives were identified as highly influential regarding land and forest policies in Vietnam . Following a discourse-analysis and a study of historical perspective, their impact on policies in the specific case of Vietnam was examined.

3.1.1 The responsibility of ethnic minorities

Ethnic minorities' culture and agricultural practices have long been perceived as backward by the Kinh, the majority group in Vietnam (Rambo and Jamieson, 2003). Many local cadres and policy-makers believe that ethnic minorities, because of their generally low education, do not know what is good for them (Jørgensen et al, 2001). This deeply rooted and sometimes unconscious perception has had a great impact on the elaboration and implementation of several policies.

For instance, the Kinh view shifting cultivation, a traditional agricultural system practised by many ethnic groups in this region of the world, as economically inefficient and as the primary cause of deforestation and soil erosion. Figures given by the Ministry of Forestry estimated that about 50% of forest area loss was due to shifting cultivation (Do Dinh Sam, 1994). As a result, large settlement and migration programmes were implemented: migration programmes aimed not only to revitalise the

densely populated lowlands by bringing a labour force to manage natural resources, but they were also designed to integrate the Kinh culture in the highlands and change land-use practices. At the same time, the government promoted new farming technologies and rice varieties with the hope of improving agricultural systems and enhancing agricultural productivity.

However, the assumptions of the links between shifting cultivation and forest cover decrease have not relied on any robust scientific evidence. A national study conducted in 1994 in Vietnam examined twenty years of data on slash-and-burn areas and forest cover in the whole northwest region and found that shifting cultivation was responsible for a significantly lower percentage of forest loss than the officially postulated figures – around 20-40% (Do Dinh Sam, 1994). Furthermore, many scholars have provided scientific evidence suggesting that rotational swiddening, the traditional form of shifting cultivation practised by most nomadic groups, allows long-fallow cycles that enable the cleared parcels of forest to regenerate (Rerkasem and Rerkasem, 1995; Forsyth, 1996; DiGregorio et al, 2003). Although certain national authorities have recognised the advantages of shifting cultivation systems (Ministry of Forestry, 1991), shifting cultivation is still banned. Article 29 of the Law on Environmental Protection "strictly prohibits" burning of forests (National Assembly of Vietnam, 1993). Settlement programmes and forestland allocation have greatly affected land use systems and farmers have found themselves with production systems that are not adapted to these new constraints, and with few alternatives for developing new land use practices (Castella et al, 2002). Today, scientific studies suggest that shifting cultivation practices are in many places no longer adapted to the environmental and economic conditions because of higher population pressure and increased access to markets. However, unsuitable policies have played a great role in transforming traditional sustainable practices into non-sustainable land-use systems (Bass and Morrison, 1994).

3.1.2 Forests: from wasteland to omnipotent remedy

The second belief linked to land degradation in Vietnam relates to the importance of forests for watershed health. The current trend is for policy makers to emphasise the importance of upland forests, both in debates surrounding watershed health and for the economic development of delta plains and coastal areas. Loss of forested areas is associated with increasingly severe floods yet reduction of rainfall. It is also blamed for accentuated soil erosion, which is assumed to have negative impacts on irrigation water for paddy fields and the productive life of dams. These statements are clearly identifiable in the discourses of the Ministry of Agriculture and Rural Development (MARD) of Vietnam. As an example, a MARD review (MARD, online 2005) on the rural development situation states that:

> *"Regarding forestry resources, the over exploitation of natural resources have caused bad consequences to the climate in recent years, especially draught and storm in the South in 1998, big flood in the Centre in 1999 and flood in Mekong River Delta in 2000".*

International research works (Calder, 1998; Hamilton and Pearce, 1988; Bruijnzeel et al, 2005) and domestic publications based on local evidence (FSIV and IIED, 2002) have challenged the universality of these beliefs, arguing that much of this wisdom, though today taken for granted, has been exaggerated or relies on false assumptions. For instance, the impact of forests on floods has been largely overestimated. While forests can reduce the volume of flood water downstream in a small water catchment, climate has a much larger influence than land use on large-scale floods (Calder, 1999). The impact of forest loss on soil erosion is also highly dependent on site conditions (Walker, 2002). Forests are a precious resource that should be protected and conserved, but care should be taken not to mix goals with objectives. Reforestation should not be considered as an aim *per se,* because forest is not an environmental panacea. Moreover, tree plantations might have also adverse environmental impacts such as reduced stream flows and soil acidification (Jackson et al, 2005). However, little new scientific evidence on this topic has so far entered the policy-making arena. A reliance on the exaggerated beliefs described above has had consequences on Vietnam's policy regarding land classification criteria (which are mostly based on slope) and on the design of uniform reforestation programmes.

3.2 Researchers' perceptions of land degradation

Research on land degradation has progressively evolved from studies focusing on the biophysical process to more integrated farming system approaches of land degradation and then to livelihood approaches. Research studies have also increasingly adopted participatory approaches in order to involve farmers in projects and integrate their knowledge. On-site and off-site impacts of soil erosion are greatly dependent on local contexts. Therefore, the impact of soil erosion should be carefully considered before addressing soil erosion *per se*, as there is a real risk of overlooking the actual problem. For instance, a study conducted in northern Vietnam showed that soil degradation on cultivated sloping fields was due to enhanced mineralisation and crop export rather than the result of soil erosion (Wezel et al, 2002). A few research studies have critically analysed soil erosion following a pragmatic approach. Work in Nepal showed that soil loss might have positive on-site impacts under specific circumstances (Kienholz et al, 1984): in the study area, farmers deliberately triggered landslides to improve soil fertility and facilitate the construction of terraces. From a broader perspective on land degradation research, Blaikie (1985) questioned the universal use of the Universal Loss Soil Equation and Morse and Stocking (1995) further warned of applying general assumptions on soil erosion in different environmental contexts and farming conditions. Recent works have underlined the importance of filters and redeposition (Van Noordwijk et al, 2004; Walker, 2002) in ecological processes and how not considering these might lead to policy fallacies.

Research interest on soil erosion and land degradation started in Vietnam towards the end of the 1950s (Thai Phien, 2006). In 1981, the 'Rational Utilisation of Natural Resources and Environmental

Protection' project, which gathered national researchers from leading research organisations, identified forest loss as the most critical environmental issue in Vietnam (Le Trong Cuc, 1996). From the start of the 1980s until the end of the 1990s, research on uplands degradation and soil erosion expanded. It focused primarily on the development of new techniques to control erosion or on the testing of how different uses of land affect erosion and runoff, and gradually recognised the need to incorporate socio-economic factors. Many national and international research projects were implemented in this period.

Since the 1990s international efforts have encompassed the Management to sloping lands for sustainable agriculture in Asia Network, the Mountain Agrarian Systems project, MSEC, "The Uplands Program" (funded by Deutsche Forschungsgemeinschaft) and various research projects funded by the Australian Centre for International Agricultural Research, the Swedish International Development Cooperation Agency or Canada's International Development Research Centre (this list is in random order and is not extensive). Participatory and farming systems approaches have been widely used.

This study is linked to MSEC research activities and MSEC was implemented in the same case study area. MSEC was launched in 1998 by the International Board for Soil Research And Management (IBSRAM) as a component of the Asian Development Bank-supported project "Catchment Approach to Managing Soil Erosion in Asia". Recognising the failure of conventional soil conservation techniques to halt erosion and land degradation in the Southeast Asian uplands, the MSEC programme proposed a new research paradigm based on a participatory, interdisciplinary and catchment based framework (Maglinao et al, 2001). Now coordinated by the International Water Management Institute (IWMI), it has been implemented since 1999 in six Southeast Asian countries including Vietnam. MSEC research partner institutes in Vietnam are the French Institut de Recherche pour le Développement (IRD) and the Vietnamese National Institute for Soils and Fertilisers, which have been collecting soil, hydrological, and land-use data in a 50-ha watershed in the northern uplands of Vietnam for six years (Tran Duc Toan et al, 2003).

MSEC objectives are based on the assumptions that (a) farmers' land use practices in Southeast Asian uplands have become environmentally unsustainable (Maglinao et al, 2001); (b) local people are not aware of this degradation; or/and (c) they do not know how to make their practices sustainable. However, a recent IWMI report stemming from MSEC research activities has strongly challenged some of these assumptions (Lestrelin et al, 2004). This study takes a critical look at these statements by considering the social constructions that frame the context of land degradation.

4. Presentation of the case study area

In this study the action arena considered as the unit of analysis included the uplands area of the three villages and farmers' decisions regarding uplands management. This does not, howver, infer that other action arenas (lowland activities, husbandry, etc) on which farmers rely are ignored. Indeed, many action arenas overlap and it is difficult to draw clear boundaries between them. 'Actors' refers here to every person who has access, use or control over these upland areas. The general characteristics of the commune where the fieldwork was carried out are presented in table 1.

Table 1: General characteristics of Tien Xuan commune

Location	Population in 2004	Yearly average temperature and rainfall	Area	Area	Main soil types	Slope*	Elevation*
Tien Xuan administrative centre			Lowland	Upland	Upland		
20 58'N 105 29'E	6,300 inhabitants	25°C; 1,800 mm	320 ha	978 ha	Ferralsols and Acrisols	15-60%	125-700 masl

* Measured in Dong Cao experimental watershed only, but representative of the landscape in the whole study area.

According to farmers, the three villages were created approximately a century ago by a few families from the Muong, one of the largest ethnic minority groups in Vietnam. Villagers have traditionally cultivated irrigated rice in the lowlands as their main activity and have also relied on pig and buffalo husbandry and aquaculture. Under the New Economic Zone government programme of the 1960s, a few Kinh families migrated into the three villages (table 2). Today all farmers, regardless of ethnicity, are 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 in construction work.

Table 2: General data on village populations

Village	No. of households	Ethnic groups	Proportion of Kinh households
Dong Cao	42	Muong, Kinh	36%
Dong Dau	64	Muong, Kinh	5%
Que Vai	78	Muong, Kinh	7%

Rainfall is unevenly distributed, without about 85% falling between May and October (figure 3). The dominant upland soil types in this area are Ferralsols and Acrisols (Tran Duc Toan et al, 2001). Both are acidic 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).

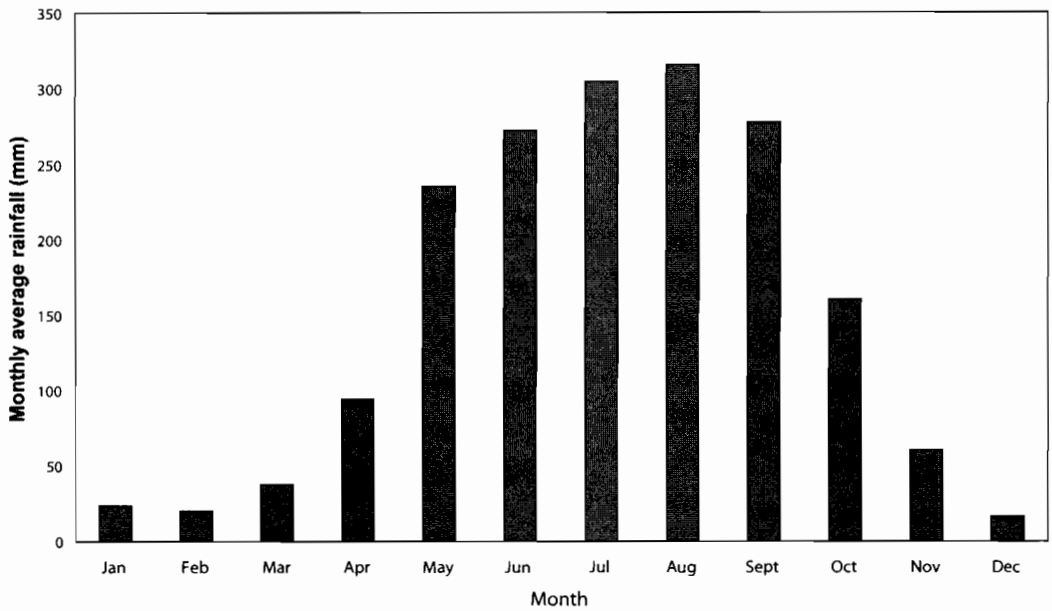

Figure 3: Average rainfall (mm/month) in Hoa Binh province 1969-2005
Source: Statistics department, Hoa Binh.

Research studies indicate that there were serious problems of soil erosion in the uplands area during annual crop cultivation. Scientific results from the MSEC programme indicated a high annual variability in soil loss (from 1-15 t/ha per year) and that this variability depended both on rainfall characteristics (amount and intensity) and land use (Tran Duc Toan et al, 2003). Another research project carried out in the area, the "Sustainable Land Use for the Uplands of Vietnam and Laos – Science and Local knowledge for Food Security", applied notions of scales and filters in soil erosion (Hoang Fagerstrom et al, 2005) and found significant differences between the level of erosion at the catchment scale and at the plot level. Off-site impacts of soil erosion were not assessed by research studies. During interviews, no farmer mentioned sedimentation downstream as a problem.

Most farmers (40%) mentioned a decrease in crop yields and soil fertility in the uplands over the past few years. Natural soil fertility is low, and cultivation techniques like tillage are likely to have had a significant impact on soil fertility. However, research work in the area suggests that cassava cultivation in rotation with long fallows did not lead to aggravated erosion (Hoang Fagerstrom et al, 2005). It is suspected that the change from shifting to fixed cultivation, forced by land allocation policies, led to aggravated soil fertility decrease or dramatically accelerated the soil fertility reduction process. Under shifting cultivation land was farmed for two to three years and then left under fallow for 10-15 years. The fixed cultivation system prevented farmers from using long fallow periods as they could not move elsewhere to cultivate in the meanwhile. As underlined further, decreased soil quality was a triggering factor that led some farmers to completely stop cultivation in the uplands. This decision, taken by a few farmers, then had a domino effect on the whole cultivated area.

5. Analysing land-use change

5.1 The action arena: initial situation and changes

No formal rules governed traditional upland management: work in the uplands was neither managed nor controlled by the commune co-operative. Farmers had designed their own rules. Everybody was free to clear as much land as they wanted to and how much land farmers could open up only depended on their will and the available labour force. Uplands access was not restricted to any individuals or groups of people, and included not only villagers from the three studied villages, but also those from villages further away with no direct access to uplands. As land was abundant, there was very little competition to open up new parcels. Farmers used to simply make a mark on the area that they wanted to open up to signify to other people that they should not start clearing that particular place.

From the time that farmers first started cultivating the uplands, they were confronted with damage from free 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 create collective rules that could cope with this issue more efficiently. Many farmers decided to create and follow collective arrangements. Cultivated fields were regrouped and fences 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.

Common resources could be managed effectively with a minimum set of rules without need for enforcement. Because farmers were aware of the inherent low soil fertility, they adopted shifting cultivation practices that enabled the fertility to regenerate. As long as large upland areas were available, shifting cultivation practices were probably the best option in terms of economic and environmental costs and benefits in this highly sensitive environment. Farmers' living standards rose significantly thanks to uplands cultivation.

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: i) special use forest, ii) protection forest and iii) production forest (National Assembly of Vietnam, 1991). Procedures and guidelines for forest land allocation were provided with Decision 327-CT (1992), the new Land Law (1993, amended in 1999) and Decree 02/CP (1994, replaced by Decree 163 in 1999). Rights to use land with or without forest cover could be allocated to organisations, households, or individuals for 50 years. In 1995, the government ban on crop cultivation in the highest parts of the mountains was implemented in Tien Xuan commune. 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-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 by every family, and the opening up of more land was forbidden. There were few conflicts during the land allocation process as many farmers refused to claim land. Firstly, they feared paying more taxes if they were given land-use rights. Secondly, as the uplands had previously been freely used and accessed, the advantages of getting official land-use rights for land were not very clear.

In addition, during the 1990s reforestation programmes were launched in the study area and all over Vietnam. Pertinent schemes included the United Nations World Food Program (WFP)[3], programme 327, and more recently the Five-Million-ha reforestation programme. Financial incentives were provided by the government to promote reforestation. Depending on the programme, the district usually paid for seedlings, fertilisers, and labour costs (which in turn were deduced from the sales benefits). WFP even provided rice for each tree planted. The district forestry organisation, which managed programme implementation with the support of the local commune authorities, promised to ensure timber purchase for the farmers. The households had to sign a contract with the district forestry organisation, which stipulated specific requirements such as the time of harvesting to cut or planting strategy.

Local authorities vaunted the forests' environmental benefits to justify the implementation of government policies – especially the rather unpopular ban on annual crop cultivation – and encouraged villagers to follow the reforestation programmes. Over-simplified or false 'laws' such as "forests reduce erosion" and "forests increase runoff" were assimilated as new narratives in the villagers' imagination. From the 1990s to 2003, farmers gradually stopped swidden cultivation. By 2003, most upland area was under fallow or reforested.

5.2 Understanding farmers' decisions

5.2.1 The importance of local factors: biophysical conditions and rules

The time when farmers stopped annual cropping coincided with the implementation of national policies encouraging reforestation. It would be tempting to conclude that these were prominent factors in farmers' decisions. Household interviews, however, shed a contrasting and different light on the reasons why farmers stopped cultivating annual crops (table 3).

[3]This programme encompassed six forestry projects and managed to restore some 450,000 ha of production forest.

Table 3: Causes of the end of annual crop cultivation

Reasons given by farmers for stopping upland* cultivation	Percentage of respondents
Damage caused by cows and buffalo 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 prices/cultivation not profitable	8%
Work was too hard	2%
They wanted to plant trees	2%

* Figures from a 45-household interview sample.

Firstly, results suggest that very few farmers (2%) stopped cultivating because they preferred to reforest. When reviewing the above data, one would thus probably revise the previous conclusion. Instead, table 3 might suggest that farmers stopped cultivating because i) they were not able to cope with cows and buffalo; and ii) their agricultural practices were not sustainable and had led to soil fertility depletion. Further assessment of the data reveals that none of these explanations are correct.

Examination of the data from a chronological perspective shows that farmers did not stop cultivating annual crops in the uplands altogether. The end of cultivation ranged from the mid-1990s through to 2003, and the first farmers stopped 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. Some farmers decided to stop cultivation and let the land revert to a natural fallow. In 1995 and 1998, when Programme 327 was launched, farmers were encouraged to plant trees through government subsidies. Few farmers decided to plant these trees. The primary driver for the land use change was thus a decrease in soil fertility, and the resulting decrease in productivity. Later on, and of more significance, was the way informal rules changed, in turn affecting costs and benefits of annual cropping systems.

The changes caused by these few farmers ceasing cultivation of annual crops affected the informal collective arrangements governing cultivation and grazing cohabitation. From the 1970s farmers had adopted institutional arrangements to conciliate grazing and cultivation activities in the uplands. They grouped their fields together and built fences and managed cattle and damages collectively to protect themselves. The decision of a few farmers to stop annual cropping created a domino effect with dramatic consequences on the land use practices of all farmers. Farmers who stopped cultivating no longer needed to prevent cows and buffalo 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 increased as land owners had to build fences individually, and became too high when compared to the profits from sales of produce. Farmers could not move their fields as land had been allocated. As a result, all farmers progressively stopped cultivating annual crops. Changes in material conditions and reforestation incentives, together with changes in rules governing land access, affected the costs and profits of annual cropping. Behind this rational choice, one can also speculate how much farmers were tempted to imitate others who were considered as the most innovative in the area.

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. During the interviews, farmers in the three villages were also asked why, once they stopped upland 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 subsidised through a government programme; and they had no other choice. 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 has thus appeared as the 'least bad solution'.

5.2.2 Farmers' perception of uplands and land degradation

In the study area, local perception of uplands has changed significantly. Firstly, until the 1970s the uplands were covered with primary forest and were populated with wild animals (e.g. tigers and wild pigs) that threatened livestock and crops in the village. The forest was gradually cut to collect and sell wood and then to expand cultivated area. Uplands area for cultivation became a major source of income, and households from the three villages increased their living standards through cash crop cultivation. The uplands were seen as unlimited and land had no economic value. Since then the mountains have gradually gained in ecological value in the villagers' imagination. Some of this value is due to beliefs spread by local authorities to justify the implementation of government policies restricting land use, and to encourage local people to reforest. According to one Dong Cao villager for instance, in Tien Xuan commune villagers were told that the uplands allocation programme was implemented by the government for ecological reasons,

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

The belief in a link between forest and water prevails strongly in the three villages. Scientific studies have demonstrated that a reduction in forest cover increases yearly runoff and has unclear impacts on dry season runoff (Calder, 1998, Bruijnzeel et al, 2005, Jackson et al, 2005). However, farmers strong-

ly believe that runoff from the watershed increases with forest cover. The positive relationship between forests and water 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. Against this, research has demonstrated that tree plantations tend to reduce soil moisture. Poor inherent natural soil fertility and further fertility decline due to soil loss are more likely to be the primary and prominent factors for yield decrease in this area. This shows that today, farmers in the study area rely more on narratives spread by local authorities than on their own observations. One can wonder the extent to which ecological arguments on uplands management and reforestation have influenced farmers' decisions. Farmers were accused of being responsible for an ecological disaster that was supposedly destroying the mountains. Following this accusation, their collective consciousness decreed that they had to atone for their faults by reforesting the hills. Even if it is likely that ecological arguments alone will not be a decisive factor in individual behaviour and reforestation, this situation has obviously had an impact on collective norms, i.e. about what is collectively considered as good and bad.

The local perception of land degradation and soil erosion was also explored. When they started cultivating upland areas, villagers were aware of the inherent low soil fertility and of the steep slopes' sensitivity to top-layered soil loss: "when there are heavy rains, water flows with humus". They also knew that cassava cultivation was an aggravating factor for soil loss:

> *"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".*

Farmers had adopted shifting cultivation practices with long fallow periods that enabled the soil fertility to regenerate because they were aware of the inherent low soil fertility. As long as large upland areas were available, shifting cultivation was probably the best environmental option in this highly sensitive environment. When discussing land management with the farmers, the phrase 'soil erosion' only occurred in six out of 84 household interviews in the three villages, or just 7% of interviewed households:

- ✓ three people mentioned it as a justification for planting trees;
- ✓ three people mentioned it as a cause of soil fertility decrease.

Out of the 84 households interviewed, 57 stopped annual cultivation in the uplands (most of the others were new couples and had never owned upland fields) between the end of the 1990s and 2003. Of these 57, 45 gave the reasons why they had stopped. Among these 45, eighteen households (40%) mentioned soil degradation, which they had observed through visual aspects demonstrating poor soil quality, or through yield decrease. Only three talked about soil erosion.

Fieldwork suggests that soil erosion *per se* is not a familiar concept to farmers. It was probably only recently introduced by organisations external to the village: researchers or commune authorities. The examination of different actors' perceptions of land degradation suggests that there are gaps between the knowledge and perception of different actors on the land degradation issue: between scientists and policy-makers on the one hand (cf. section 3), and between local people and scientists on the other hand.

This section has highlighted the main factors responsible for reforestation in the study area. The collapse of local rules, due to a combination of soil fertility decrease and changes in land tenure, was the decisive factor in land-use change. The establishment of tree plantations by farmers was not a direct response to government reforestation incentives. The analysis of farmers' perception of land degradation suggested that information conveyed through research projects and policy implementation had distinct impacts. Research projects have had little effect on farmers' perceptions of their environment in the study area. It appears there is a dichotomy between soil erosion and soil fertility decrease: the former is the process defined and studied by scientists and used by policy-makers to justify restrictions on land use, while the latter is experienced by farmers. In this area, soil erosion is not a concept that matches farmers' representation of reality. Narratives brought by official policies on forest benefits and water were a much more powerful influence on their beliefs.

6. Conclusion

This analysis advocates the use of local studies when local users have some degree of freedom in making decisions over natural resource management. It demonstrates that when explaining land-use changes, meso- or macro-scale studies might miss decisive factors that are only observable at the community level. Furthermore, institutional analysis can prove to be particularly suited to the study of land managed under common rules. In this situation, the disruption of collective rules had a prominent role in individual decisions. Research work might miss a significant part of explanatory factors if individual or external variables alone (but not collectively created variables) are considered.

Further, it argues that when seeking to explain human behaviour, it is important to consider socially constructed views of nature. The examination of different actors' perceptions led to two conclusions. Firstly, state-led policies considerably disrupted traditional local practices and led to unpredictable outcomes, partly because they relied on unfounded beliefs – on the unsustainability of ethnic minority land management systems for instance. Secondly, it showed that 'soil fertility' or 'yield decrease' were much more familiar concepts to farmers than 'soil erosion', which is the process of interest for researchers. This mismatching might reduce the success of research activities. As a general recommendation, scientists should pay more attention to local perceptions at the start of their

research activities. Taking soil erosion for granted as a problem may lead to non-adapted responses to biophysical processes and to farmers' needs. Even when soil erosion is the actual problem, the use of this concept, which might be not familiar to local people, can significantly hinder the adoption of soil conservation practices. The use of brute facts that are more familiar to farmers, such as 'soil movement' or 'soil loss', should enhance mutual understanding between farmers and researchers or decision-makers, and help in the sharing of different perspectives and knowledge.

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