

Impact of forestland allocation on agriculture and natural resources management in *Bac Kan* Province, Viet Nam

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Abstract

During the first half of the 20th century, several land tenure systems prevailed in mountainous northern *Viet Nam*, with either common or private property in the lowlands, and temporary rights to use the uplands acquired through the act of clearing the forest. The agrarian reforms that began with independence in 1954 established the land as State property and were followed by the collectivization of lowland agriculture. Use of uplands remained open to all households. In 1981, Decree 100 marked the beginning of a decollectivization process that gradually returned all of the means of agricultural production to individuals. In 1992, the State began distributing forest land-use rights to individual households. The new forestland policy had three related objectives: (i) the introduction of a sedentary livelihood system for those populations who traditionally had relied on shifting cultivation and regular migration; (ii) the development of the village economy through tree plantations; and (iii) the protection of forest resources. In this chapter, we discuss the land use changes that resulted from the new forestland policy, and the effectiveness of the policy in achieving each of its three objectives, within *Na Ri* District of *Bac Kan* Province. Forestland allocation had very different consequences for local populations depending on their initial circumstances. The allocation of forestland secured land-use rights but also prevented populations from migrating, as there was no more free access land available. This enforced settlement has created difficulties for groups that traditionally had relied on shifting cultivation with periodic migrations. The allocation of forestlands has induced or at least accelerated the development of new production systems, even for populations that were not relying primarily on exploitation of the forest. Populations with access to paddylands were easily able to focus their energies on intensifying their paddyland rice production, thereby permitting substantial recovery of the forest ecosystem. In contrast, populations who traditionally had relied on shifting cultivation found themselves with a production system that was not suited to the new

institutional environment. The real challenge of development will be in assisting these populations of traditionally shifting cultivators to create sustainable social and production systems.

Keywords: land tenure policy, forestland allocation, natural resource management, livelihood systems, mountain agriculture, *Bac Kan, Viet Nam*

1. Introduction

Agriculture in *Viet Nam* has changed dramatically over the last fifteen years, with changes in production systems, ecosystems, and land policy. In launching the *Doi moi* (renovation) series of reforms beginning in 1986, the State dismantled the failed agricultural cooperatives and began to restore ownership of the means of production to individuals.

In the mountainous areas of northern *Viet Nam*, the restoration of individual rights to use paddyland in the early 1990's was intended to stimulate paddy field intensification while reducing pressure on the surrounding hillsides. The policy was successful in that it gave farmers an incentive to invest more in their own rice fields, and resulted in substantial productivity gains in the inter-montane valleys.

Despite the paddyland allocations, many farmers were left without paddy fields, often those farmers who had migrated to the montane valleys either from the uplands or the delta regions. In the early 1990's, the *Tây* families had reclaimed the paddyland of their ancestors. In contrast, those who had moved to the lowlands after the establishment of the cooperatives had no historical claim to lowlands (Castella et al., 2002). Without paddy fields, these farmers turned to extensive slash-and-burn systems in the uplands, which had not yet been allocated. The upland ecosystem could not support the increased pressure of agriculture combined with mass deforestation.

The State hoped to regulate the runaway exploitation of the uplands by applying the same solution that had worked in the lowland areas. By allocating forest land to individuals, the State hoped to (i) convert the populations of shifting cultivators to a sedentary livelihood system, (ii) increase agricultural production in the uplands by giving farmers incentives to grow perennial plantations, and (iii) preserve the deteriorating forest resource base.

At first glance, the new policy seems to have been effective in transforming mountainous populations to a sedentary livelihood system. The new context of stable land rights for individuals also made it feasible to grow perennial plantations. Further, the period since the forestland allocation has shown a slight increase in overall forest cover (Sikor, 2001; Tachibana et al., 2001). However, the superficial successes of the land policy hide the deeply destabilizing effect it had on shifting cultivators. Accustomed to livelihood systems based on regular migration, these farmers now find themselves in a crisis situation, with an

unsustainable sedentary agricultural system producing rapidly decreasing yields (Husson et al., 2001), and few alternatives (Pandey and Dang Van Minh, 1998).

In this chapter, we examine the goals of the State in the many land allocations that have taken place over the last fifteen years. We then analyze to what extent these land allocations achieved their stated goals and what impacts they have had on the livelihood systems of farmers. In concluding, we will attempt to identify the possible future trajectories of production systems, and their implications for development interventions.

2. Methods: the case study

The study draws on diverse sources of data including:

- Review of published literature and official statistics,
- Legal and policy documents,
- Commune monographs,
- Land cover maps derived from aerial photographs, and
- Qualitative data collected in interviews and farmer-participatory observation.

In four remote mountain villages within *Na Ri* District of *Bac Kan* Province, we investigated the process and effects at the grassroots level of forestland allocation. We selected these villages to cover a large range of diversity in ethnic composition, natural resource base, and livelihood systems. The objective of the case study was to analyze the way that the same land policies resulted in notably different impacts on villages, even in a limited geographic area, due to the initial diversity of village situations.

None of the four villages is accessible by road or motorized transportation, and unlike many other ethnic minority villages in *Bac Kan* Province, they have not been the targets of the major government development projects (i.e., infrastructure, child education, adult training in technical innovations) associated with the policy of transformation to sedentary production (Dang Dinh Quang et al., 2001). The few development projects that have reached these villages have been limited to one-time donations of material supplies (such as blankets, mosquito nets, kettles, and rice) to the poorest families; and the donation of several tree species by the World Food Program (WFP).

Figure 1 shows the location of the four villages within *Lang San* and *Luong Thuong* communes of *Na Ri* District, along the *Khuoi Sung* and *Ngan Son* rivers. Our field work was performed over the course of several stays in the villages in 1999 and 2000. We combined informal interviews with direct observation to collect our data. In addition, we conducted an exhaustive survey of all village households ($n = 106$), allowing us systematically to complete the qualitative data collection.

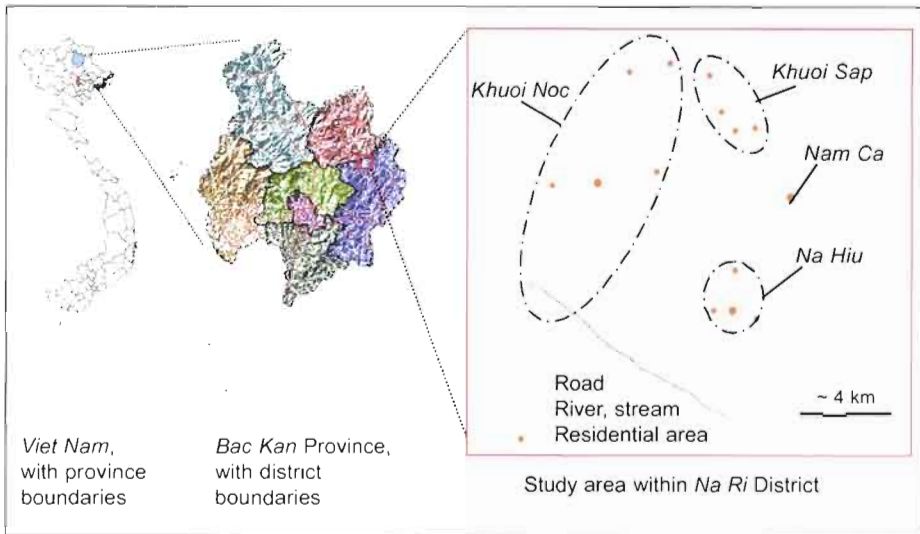


Figure 1: Location of villages and hamlets along the river network

3. Land dynamics in the mountains of northern Viet Nam

The mountainous areas of northern Viet Nam are populated by a large variety of ethnic groups with diverse agricultural practices (Castella et al., 1999; Sadoulet et al., 2002), but two major production systems can be distinguished:

- In the lower elevations, a composite system consisting of paddy rice production on the flat floors of montane valleys and intensive cultivation of maize and cassava on sloping land bordering the paddy fields;
- In the higher elevations, a system of shifting cultivation with various sequences of crops including upland rice.

In the first half of the 20th century, these production systems were accompanied by a variety of land use rights. Through interviews and written documents, we identified three major categories:

- Individually-owned lowland areas, generally used for paddy ricefields. These ricefields were claimed by whoever had constructed them, and then inherited and shared by their descendants;
- Collectively-owned lowland areas. The lands were owned by the village, which distributed temporary land use rights to individual households;
- Temporary rights to use upland swidden fields, gained by the act of clearing the forest. Such lands were cultivated for several years and then left fallow for a longer period. Ownership could last up to several years after the end of cultivation.

Few villages had absolute control over all of their territory. For example, few villages could prevent the cultivation of a plot of land by an individual from another village. More common was the “clearer’s right”, where land use rights were informally granted to the individual who cleared or developed a given plot, lowland or upland, regardless of its location with respect to village boundaries. The farmer who cleared a given upland field secured for himself or herself the right to use that field until it was fallowed for regeneration¹. Traditional land access was free, with the absence of rules made feasible by the low population pressure on mountainous areas during this time period.

3.1. Land collectivization and the cooperatives

After the creation of an independent Vietnamese state in 1954, the communist government initiated massive rural land reallocations: 810,000 ha were confiscated from large property owners and redistributed to the poor. This land reform primarily affected the Red River Delta region, where population pressure was already relatively high. In the mountainous areas of what was then North *Viet Nam*, the abundance of forestland had prevented the emergence of landless farmers. Households could open as much upland area for cultivation as they desired, limited only by the available family labor force.

The collectivization of labor followed the collectivization of land. One by one, all of the means of production were similarly collectivized within the agricultural cooperatives, the first of which appeared in 1958. Before long, the agricultural cooperatives grew to cover most of the country. By 1959, 45% of households in North *Viet Nam* had joined the cooperative system, which encompassed 41% of cultivated land. By 1960, participation was at 85% of households and 68% of arable land (Nguyen Sinh Cuc, 1995).

Cooperatives soon began to experience management problems (e.g. with the labor point system, burdensome administration, increasing taxes), leading to the dismantling of several cooperatives, particularly in the northern mountains (Nguyen Sinh Cuc, 1995). Cooperative problems continued during the war with the United States. In the decade following the war (1976-1986), despite several State-mandated reorganizations and expansions, continued low productivity of the cooperatives drove the economy into a protracted recession, with per capita food crop production stagnating and even declining. By 1986, the economy had almost collapsed, and a poor rice harvest threatened famine.

Faced with declining lowland productivity and food shortages, more and more households turned to slash-and-burn cultivation. A dual system of production developed, with collectively-managed work in paddy fields complemented by

¹In the context of collective lowland fields, the newly developed land might return to the village.

individually-managed work in the sloping lands. Although the “people” officially owned all land (Article 19 of the 1980 constitution), sloping lands had not been integrated into the cooperatives. For this reason, sloping lands continued to be cultivated according to the free-access rules described earlier, providing a supplementary income for many households. In times of shortage, farmers focused on the private economy, increasing the area cultivated on the slopes. The 1980’s cooperative crises thus led to major deforestation in northern regions.

3.2. *Progressive decollectivization*

Several attempts at partial decollectivization in the 1980’s led to differentiation among households without solving the problem of decreasing lowland productivity. In 1982, the first round of paddyland allocations under Decree 100 resulted in a “rush to the slopes” and serious deforestation (Sadoulet et al., 2002).

On the 5th of April 1988, the Vietnamese Communist Party politburo adopted Resolution 10 to address the agricultural crisis in the country (Jesus and Dao The Anh, 1998). Resolution 10 would guide agricultural policy in the years to come, and revealed an acute awareness of various problems that had developed during the cooperative period, in particular substantial deforestation and the absence of policy coordination between agriculture and forestry.

Resolution 10 emphasized the importance of private property rights, as well as the need for each region to design a development model suited to its unique natural, economic, and social environments. The new policy, in recognition of the importance of the household economy and the private sector, dismantled the failing cooperatives. The means of production would be returned to individual households: cattle, buffaloes, and equipment would be sold to farmers, and paddylands redistributed to households in proportion to their labor force. Forestland later would be distributed similarly, on the theory that private land ownership would both preserve forests and encourage the population to adopt sedentary livelihood systems.

Although the State remained the sole official owner of paddyland, individual farmers gained effective control. Thus, the new land tenure system was comparable in practice to that which had existed before the agricultural cooperatives. Farmers now had the necessary incentives to invest in paddy field intensification and terrace construction. By stimulating these two activities, the new land policy was successful in raising agricultural production (Kerkvliet and Porter, 1995).

Implementation of the national land allocation policy varied from region to region. In *Cao Bang* Province, the *Tày* ethnic group began a movement in 1990 to reclaim the lands of their ancestors, a movement that soon spread to neighboring provinces. As *Tày* farmers repossessed the paddyland that their forefathers had contributed to the agricultural cooperatives, other groups were left without paddy

fields, particularly households who had not owned paddy fields before the creation of the cooperatives but nonetheless had been contributing to the cooperatives in recent years. These groups (mostly *Kinh* from the delta region and *Dao* and *H'mong* who had emigrated from the uplands) were forced to turn to hillsides and forestlands to meet their food needs.

4. Forest land allocation

4.1. The objectives of the allocation

Forestland allocation began in 1992, using modalities that are described in Section 4.2. The State wanted to achieve three major objectives via forestland allocation: (i) fixed settlement of the mountain populations to end shifting cultivation, (ii) protection of forest resources, and (iii) development of plantations and silvicultural production to improve living standards of mountain populations.

Fixed settlement of the shifting cultivators

The predominant upland production system was swidden, or slash-and-burn, cultivation. Swidden cultivation involves burning away a section of forest and then growing crops (usually upland rice) in the rich soil that is left behind. The quality of the soil degenerates quickly, so after several years of cultivation the land is left fallow for a much longer period so that the forest can regenerate (Husson et al., 2001; Roder 2001). The particulars of shifting cultivation differ from one group and region to another, but share the common principle of allowing the land to regenerate. This usually necessitates the constant migration of the swidden cultivators to search for mature forests to clear.

The desire to settle mountainous populations in fixed areas is not new in *Viet Nam*. Such policies first arose in the colonial era, when settled populations were necessary for political control and taxation. Later, one of the objectives for instituting the cooperatives in the mountainous areas was “bringing nomadic populations down from the mountains,” and pushing them to participate in lowland ricefield cultivation (Dang Nghiem Van, 1991). Before the cooperative period, certain ethnic groups were the predominant cultivators of lowland rice, while others engaged in shifting cultivation. Today, such a distinction is no longer possible - the shifting cultivators are rather those who have been left out of the land allocations, regardless of ethnicity (Castella and Erout, 2002).

The State views shifting cultivators as leading a precarious existence with harmful effects on forest resources. By settling these farmers onto allocated pieces of land, the State hoped to end their slash-and-burn practices and motivate them to develop stable and fixed production systems (e.g., perennial plantations) that would allow them to produce and earn more.

Protection of forest resources and the battle against deforestation

Forest cover in *Viet Nam* has decreased dramatically in recent decades, from 45% of the country's area in 1943 to only 28% in 1991 (of which only 10% was primary forest; Vo Quy, 1998). These percentages correspond to a reduction in natural forest area by 350,000 ha per year over the last twenty-five years. Deforestation has been accompanied by the appearance of severely eroded cleared lands, which according to some estimates covered up to 40% of the country's surface area in 1990 (Vo Quy and Le Thac Can, 1994).

The causes of deforestation include war, timber exploitation (Poffenberger et al., 1997), relative land scarcity due to increasing population, and regulations on access to resources. Nonetheless, the State placed the blame for deforestation squarely on the backs of the shifting cultivators. The State has long perceived swidden cultivation as an "irrational" technique, a backward system that must eventually evolve into sedentary cultivation (Dang Nghiem Van, 1991; Morrison and Dubois, 1998). It is worth noting that if a burned field is left fallow for enough time after cropping, then the soil and forest can regenerate sufficiently to provide for the next cycle of cultivation. Thus under the right conditions, particularly a combination of low population pressure and regular migration, swidden cultivation is sustainable (De Rouw and Van Oers, 1988; Mazoyer and Roudart, 1997). However, in the period following the cooperatives, low population pressure was no longer a characteristic of northern *Viet Nam*. Allocating the forestland and obliging nomadic peoples to practice sedentary production would, the State hoped, result in an end to the deforestation process begun decades earlier.

Increasing production via regional specialization

Resolution 10 aimed to transform the economy from a focus on self-sufficiency to a focus on the national market. For the agriculture sector, the State envisioned a system of regional specialization, with intensive rice production in the delta regions complemented by large-scale silviculture plantations and animal husbandry in the mountainous regions. These sedentary production systems would require sedentary populations to manage them.

The granting of individual property rights to sloping land puts an end to the free access system. Free access has often been identified as a major cause of over-exploitation of forest resources, because it allows farmers to draw individual profits from the land while the costs of their exploitation would be shared by the entire community (Hardin, 1968). By granting renewable usage rights in fifty-year cycles, the State hoped to transfer responsibility to the individual, allowing him or her to reap the benefits but also to pay the costs associated with the exploitation of forestland.

Figure 2 summarizes the rationale behind the forestland allocation. Individual responsibility would give farmers the needed incentive to make "rational" use of

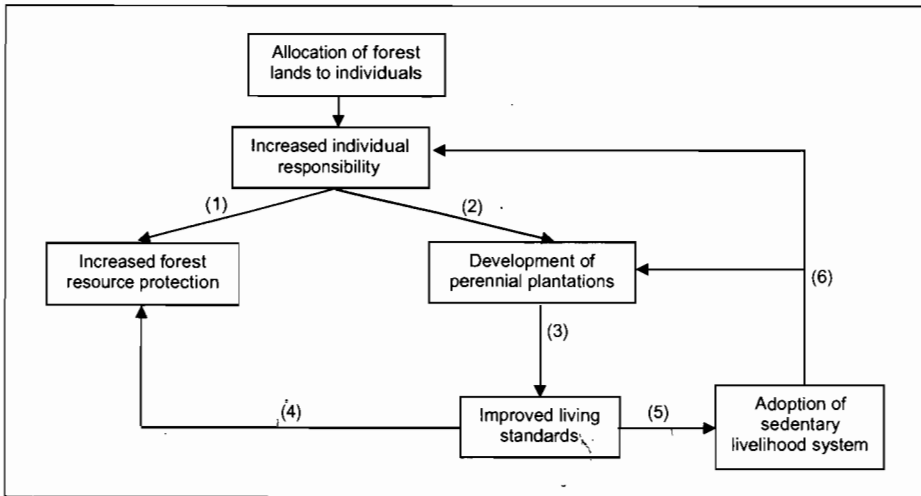


Figure 2: Rationale for forestland allocation

their land, leading to the protection of forestland (arrow 1 in Figure 2). Private ownership also would encourage individuals to make investments in their forestland and develop perennial plantations (2). Developing commercial perennial crops would lead to both an increase in tree cover and additional income for households, thus improving living conditions (3). Assuming that poverty is what motivates farmers to adopt short-term unsustainable survival strategies, the economic gains from perennial plantations would allow better protection of the forest (4). Further, the migration associated with shifting cultivation would no longer be necessary, tying improved living standards to decisions on sedentary livelihood systems (5). Sedentary livelihood systems reinforce individual responsibility for resources and provide an incentive for the improvement of perennial plantations (6).

4.2. The allocation process

Forestland allocation began in 1992, and was still ongoing in 2002. Resolution 10 (April 1988) defined the main modalities of the land allocation, with the 1993 land law and Decree 02-CP (January 15, 1994) supplying additional details. The allocation policy is also closely associated with the forest protection and development code developed in 1991.

The 1993 land law (article 43) defines forestland as, “*all land identified as being destined for silviculture, natural forest regeneration, reforestation, timber, nurseries, forestry research and experimentation*”. Because forestland was defined according to planned future use rather than present use, the policy resulted in classification as “forests” of some lands that were currently being cultivated with annual crops and had been for dozens of years.

Forests were classified into three distinct types:

- Protected forest, for the preservation of water resources; prevention of erosion, natural disasters, and climatic risks; and overall protection of the environment.
- Special-use forest, intended for the conservation of nature and plant and animal species; scientific research; and protection of historic, cultural and tourist sites.
- Production forest, used primarily for timber and other forest products, and complementing the other types of forest to protect the environment.

The land-allocation process consists of a series of meetings, beginning at the district people's committee and progressing down the administrative hierarchy to each individual village. The district develops an allocation plan that delineates the areas to be classified as each type of forest (protection forest, production forest, special-use forest). The plan is then disseminated through the communes to the village level, where each household that wants to receive a plot of forest land must fill in a request form, sent on to the district forest service.

The district forest service then measures and classifies each individual plot. Once all conflicts have been cooperatively resolved at the village level, the forest service integrates the information into a land map and gives certificates of land use rights to households. Following the granting of land-use certificates, a meeting is held in each village to address the issue of forest protection. At this meeting, the forest service elucidates the regulations of forest protection and development, and each household possessing forest land must sign an agreement to treat their land accordingly. Each village can then develop its own system of forest management, protection, and development based on its particular circumstances. However, the rules of all villages are based on model regulations supplied by the forest service.

The rule-development system appears to be participatory and flexible, but in reality it is a top-down procedure. Instructions are passed down from one hierarchical level to the next with minimal changes. At each level, only limited independent decisions can be made, and all must be approved by the higher levels of authority. Often, the management rules that are intended to reflect local circumstances have in fact been dictated to the smallest detail by the district forest service. In reality, villages are limited to reordering the various articles of the policy in terms of their local importance and removing those that do not apply to their circumstances. It is not uncommon to find that the management rules of one village are nothing more than a photocopy of those of the neighboring village, with the names of the village and its leaders changed. The top-down implementation of the system favors neither local participation nor ownership, though these goals are admittedly difficult to fulfill given the high illiteracy rates and often poor understanding of the spoken *Kinh* language² in these areas.

²*Kinh* (the name of the predominant ethnic group) is the official language of the country, often called Vietnamese. The various ethnic groups each have their own languages.

5. The effects of the forestland allocation

We examined the effects of the forestland allocation through a case study of four villages in *Bac Kan* Province. Village locations are shown in Figure 1. Boxes 1 to 4 describe the main characteristics of each village. In *Na Ri* District as a whole, the allocation process began in 1992 and finished in 2000. Specifically, the allocation of land-use rights in *Lang San* and *Luong Thuong* communes took place from 1997 to 2000.

The studied villages were all founded relatively recently, the oldest being *Nam Ca*, settled just one hundred years ago. All of the villages with the exception of *Na Hiu* were settled for their abundant forest resources³, and even *Na Hiu* now relies on the forest more than ever, as two-thirds of its ricefields were repossessed during the *Tây* land reclamation movement.

Although paddy rice has gained popularity as a means of subsistence, there is almost no remaining land in the region suitable for terracing for new paddyfields. The majority of households cannot produce enough paddyland rice to feed themselves, and have production strategies based on shifting sloping-land cultivation. In our analysis, we have found it informative to distinguish between two types of households: those who can produce enough rice on paddyland to meet their food needs, and those who cannot and must rely on shifting cultivation on sloping lands (Castella and Erout, 2002). The effects of forestland allocation were substantially different for these two types of households.

To reiterate, forestland allocation was intended to achieve three goals: encouraging shifting cultivators to adopt sedentary livelihood systems, forest regeneration, and economic growth. We will now examine the effects of the allocation within the case-study area on those three goals.

5.1. Effects on sedentary livelihood systems

Clarification of individual and village land boundaries

The forestland allocation process necessitated the clear demarcation of each individual's property rights. In doing this, the forest service implicitly defined all village and commune boundaries. The "village territory" now comprised the set of land plots allocated to the households of a village, together with those plots placed under direct village ownership. Within each village territory, clear boundaries for agricultural and forestry activities were specified. By definition, the existence of individual land-use rights effectively excluded individuals from

³Although settlers chose the locations for these villages for their abundance of "primary" forest, the settlers did not realize that the forest was not more than twenty years old. Aerial photographs from 1954, 1977, and 1998 show that although the areas were densely forested in 1954, they had been cleared almost entirely at least once by 1977.

Box 1: Na Hiu village.

In 2000, *Na Hiu* village was composed of nine households spread across a large area. The village comprised sixty-two inhabitants of a diverse mix of ethnicities, including *Dao Cooc Mun*, *Red Dao*, and *Nung*. The villagers shared a history of coming to *Na Hiu* in search of cultivable land. The first arrivals came in 1985, redeveloping a group of paddy fields that had been abandoned over twenty years before. Most of those paddy fields have since been repossessed by the original owners. The remaining inhabitants (the later arrivals) were not able to acquire paddy fields and relied on the forested slopes.

Although *Na Hiu* village was founded for its abandoned ricefields, its inhabitants have increasingly turned to swidden cultivation and hunting and gathering as means of survival. Even the inhabitants who arrived in hopes of developing new paddy fields now depend on the forest for survival, as terracing requires large labor investments. Many paddy-field terraces have been under construction for years and remain unfinished.

Box 2: Nam Ca village.

Nam Ca village was founded over one hundred years ago by a *Tây*, whose descendants now make up the eleven households and fifty-seven inhabitants of the village. He chose a location favorable for the development of irrigated paddyfields, the basis of *Tây* production systems in northern *Viet Nam* (Bal et al., 1997; Castella and Erout, 2002).

However, the lowlands now are fully occupied, and no more paddy fields can be built. This has led the village to develop new inheritance rules forcing all but the eldest son in each family to emigrate. Households rely primarily on paddy rice cultivation, with upland glutinous rice as a supplement. The forest is also used for free-grazing buffaloes in the winter season.

In the spring of 2000, most households attempted a spring-season cycle of rice. The trials were not a complete failure, but produced mediocre yields due to cold weather.

Box 3: Khuoi Sap village.

Khuoi Sap is the village farthest from the road, the administrative centre, and the marketplace (about an hour and a half away by foot). In 2000, *Khuoi Sap* was made up of seventeen households and ninety-five people, all *Red Dao* with the exception of one *Tây* family. The village encompasses four hamlets settled by two different family groups.

The continuous spread of the village was motivated by the abundance of old-growth forestland that could be cleared and used for the production of upland rice. Village inhabitants initially opened swidden fields very close to their houses, but with time villagers cleared areas farther and farther from the settlements, now reaching distances of up to one or two hours by foot. The village production system is based on swidden cultivation, beginning with several years of upland rice followed by cassava and maize. This is complemented by hunting and gathering. Only two families own paddy fields, and this is only a small area (1000 m² each).

Box 4: Khuoi Noc village.

Khuoi Noc village occupies the entire northern area of *Luong Thuong* Commune. The village is composed of 394 *H'mong* inhabitants forming 70 households spread across six hamlets. When the first households (about 22) arrived from *Cao Bang* in 1983, the land was unoccupied.

Founded for the area's abundance of primary forest, the village has an economy based on the swidden cultivation of upland rice and cassava, narrow fields of maize on the flat lands along the river, and hunting and gathering. Only five of the 70 families own irrigated ricefields, which they built themselves; the combined surface area is only 8100 m². Some families engage in gold mining to supplement their incomes.

using land to which they did not have formal usage rights. Thus the new land policy abruptly ended the traditional free access rules that had existed before. Each village and household now possessed land that was protected from outsiders, but that same protection now constrained their actions.

The end of free access was of critical importance to those groups with production systems based on shifting cultivation, particularly the *H'mong* and *Dao*. Under the new land policy, these groups could no longer migrate in search of mature forests to clear, as other individuals now owned the right to use all forests.

At first glance, one of the goals seemed to have been accomplished: previously shifting populations were settled permanently. However, it is necessary to distinguish between sedentary housing and sedentary production systems.

Sedentary housing versus sedentary production systems

Effective transformation from a migratory to a sedentary society has at least two different levels of indicators:

1. Sedentary housing, indicated by kinds of homes and the materials used to construct them; and
2. Sedentary production systems, indicated by an agricultural system that is ecologically and economically sustainable within a fixed territory (without requiring regular migration).

The *Tây* village of *Nam Ca* offers an example of sedentary housing. The people of the village have lived in the same location for over one hundred years and have built houses on wooden stilts with tile roofs. Such houses require substantial investments in both materials and labor and a considerable sum - 20,000,000 VND⁴ - corresponding to several years of work. Migrating populations tend not to build such houses, usually living instead in houses made from bamboo, built on the ground or on simple stilts. This type of house is mostly found in *Dao* and *H'mong* villages. For a family to build a wooden-stilt house with a tile roof is both a sign of relative wealth and an indicator that they intend to stay in one place for several years at least.

The second, more fundamental change in society is the transition from a shifting production system to a sedentary production system. The most emblematic example would be a shift from a system based on swidden cultivation to a system based on irrigated ricefields, whether in flatlands or in terraces on sloping land.

Almost all farmers in the studied area have had this transition as one of their goals, even before the new land policy. Even though the construction of paddy fields or terraces is extremely labor-intensive, farmers consider paddy rice cultivation to be easier than sloping-land cultivation. This is particularly the case when the swidden fields must be cleared from degraded forests, requiring increased time investment

⁴As a frame of reference, the price of 1kg of paddy in 2000 was 2500 VND.

in weeding for lower and highly uncertain yields. Although the majority of households have investment in paddy fields as a major objective, few have achieved this objective. Reasons include inadequate access to flatlands, inadequate water sources for irrigating terraces on sloping lands, and insufficient labor force for construction of paddyfields or terraces.

The villages with economies based on irrigated rice (*Nam Ca* and part of *Na Hiu*) had both sedentary housing and sedentary production systems even before the forestland allocation. Therefore, transformation to a sedentary society was not an issue for them. The remaining villages (*Khuoi Sap*, *Khuoi Noc* and the rest of *Na Hiu*) have been converted to a sedentary existence only in terms of their housing. Even after the implementation of the new land policy, the majority of production systems in the studied *Dao* and *H'mong* villages continue to be based on swidden cultivation, a system that is sustainable only when accompanied by regular migration. These populations now find themselves in a very delicate situation, with a production system that is poorly adapted to their institutional environment. At the same time, their sedentary housing reveals a *de facto* transformation to a sedentary lifestyle. This is not a true transformation of society, based on a new livelihood system that no longer requires migration. Rather, it is a transitional stage compelled by the lost possibility of migration but not yet truly sustainable.

5.2. Effects on forest protection

At the time of writing, it is too early to say whether the new forest protection policy will affect the extent of land cover. The most recent aerial picture available of the studied area is from 1998, whereas the first forestlands were allocated in 1997. Therefore, in the next section we focus on people's reactions to this policy.

Individual responsibility toward forests

Farmers in the studied area are particularly conscious of the need for forest protection, as their livelihoods depend on the survival of this resource base. They frequently mention the rapid decrease in old-growth forest that has taken place in recent years, and state that the over-exploitation of the forest could have severe effects on their families. Farmers already are experiencing declining yields from swidden fields and increasing labor requirements for weeding. Forest wildlife, another important component of people's livelihoods, is also rapidly disappearing. Given their reliance on the forest, farmers are eager to learn about initiatives to protect it. Under the old system, individuals could claim lands in the territory of the neighboring villages, and the villages were powerless to stop them. This often led farmers to blame neighboring villages for resource deterioration. Under the new land allocation system, farmers are fully responsible for their own land, and can be satisfied that no household other than their own is harming this resource. Most farmers received the land that they requested (that which would have been theirs by traditional rights), making the allocation doubly satisfying.

Although the populations of the studied villages were mostly satisfied with the land they received (either for its proximity to their house or high quality), many were less enthusiastic about the accompanying forest protection policy. Certainly not ignorant of the consequences of forest deterioration, farmers nonetheless rely heavily on forest resources for survival; after all, the forest is the basis of swidden cultivation. An outright ban on forest exploitation jeopardizes their food security. The announcement of the forest protection policy, particularly the ban on the clearing and burning of forestland, was met with fear by a large number of farmers who had no short-term alternatives to feed their families.

New circumstances will inevitably force farmers to develop new production systems that are better adapted to the ban on swidden production. Indeed, since the allocations, farmers have been searching desperately for helpful innovations as their swidden cultivation evolves into something new and hopefully sustainable.

The end of swidden cultivation

Since 2000, in response to the land allocations and protection regulations, the inhabitants of *Nam Ca* have entirely stopped swidden cultivation. In the other three studied villages, every single household continues to engage in swidden cultivation, but the figures reveal a system that must change or die.

Figure 3 shows that the number of newly-opened swidden fields has been decreasing over the last two years. Our field survey indicates that a large number of households have continued to cultivate swidden fields opened in previous years. This change is likely a direct consequence of the forestland allocation and forest protection policy: opening new fields is no longer possible. The cultivation of old swidden fields is particularly striking in *Khuoi Noc*, where some swidden fields have been cultivated continuously since 1990. In contrast, in *Na Hiu* and *Khuoi Sap* the oldest fields date from 1994 and 1995, respectively. An additional problem is that the yields of newly-cleared swidden fields (defined by the rice harvest in proportion to the quantity of rice seed sown) have been declining in *Khuoi Noc*. The low and still diminishing yields in this village are the result of a forest that is becoming thinner and less mature while the population of swidden cultivators, swollen by immigration, continues to rise. The surprising (and alarming) result is that fields in their first year of cultivation are producing yields even lower than fields that have been cultivated continuously for seven years (Figure 4).

The average surface area of swidden fields⁵ opened three years earlier has not changed substantially (Figure 5). Taken with declining yields, this is a clear sign that, confined to fixed territories under the new land policy, production systems based on swidden agriculture are slowly failing.

⁵Because it is difficult to measure actual plot sizes in sloping lands, we estimated surface area of fields by the amount of seed sown, using a conversion factor of 100 kg seed/ha.

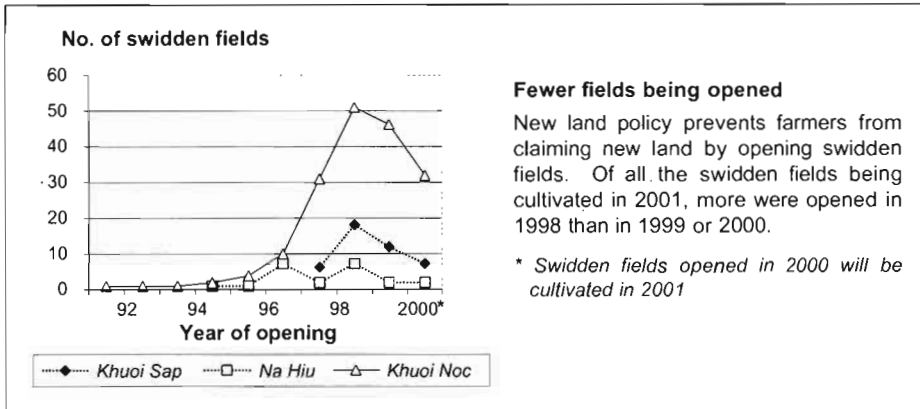


Figure 3: Number of upland fields being cultivated in 2000, plotted against year of opening.

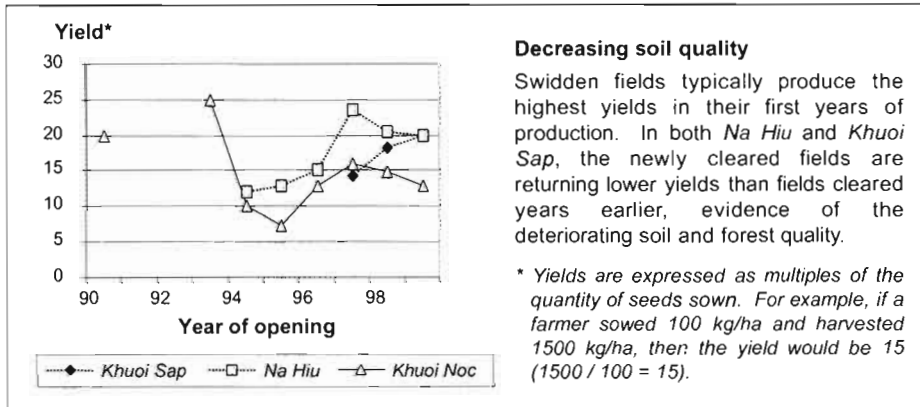


Figure 4: Yield of upland rice crops cultivated in 2000, plotted against year of opening.

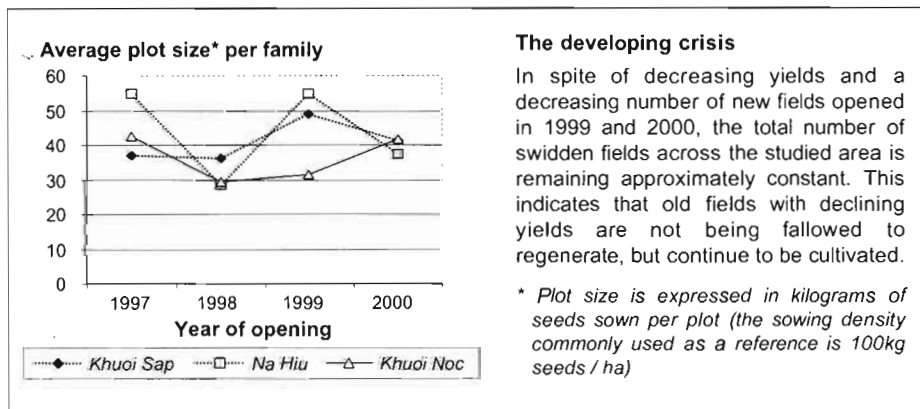


Figure 5: Size of upland rice fields being cultivated in 2000, plotted against year of opening

5.3. Effects on agricultural production and economic development

The new land policy was intended to result in both intensification of paddyland production and the use of the uplands for perennial plantations. Both outcomes were intended to increase the income and thus the quality of life of farmers. In reality, the new system exacerbated the problems of swidden cultivation without providing farmers with a sufficient alternative source of income.

Shifting cultivators in crisis

The reduction in the upland rice yields implies a reduction in the living standards of the populations that rely on swidden cultivation. In two out of the three villages practicing shifting cultivation, the average rice yield is under the 250kg / person self-sufficiency threshold (Table 1). Indeed, a substantial number of households faced rice deficits in 1999 (Table 2). This does not necessarily mean that they went hungry; these households purchased rice, or they ate non-rice staples. However, the high percentage of households facing rice deficits is indicative of a production system in crisis, a system no longer adapted to its environment. We will now discuss how farmers have adapted their production systems in response to the crisis, and more generally how they have adapted their systems to the new land policy.

Intensification of lowland production

The ban on opening new upland fields was intended to encourage households to focus their energies on the lowlands. Lowland rice production can be increased

Table 1: Indices of upland rice production in 1999, by village

Index of upland rice production	Village		
	<i>Khuoi Sap</i>	<i>Na Hiu</i>	<i>Khuoi Noc</i>
“A” = Quantity seed sown / person (kg)	16	12	13
“B” = Average yield	18	18	14
“A x B” = Average production/person (kg)	288	216	182

N.B. Yields are expressed as multiples of the quantity of seeds sown

Table 2: Indices of rice deficit in 1999, by village

Index of rice deficit	Village			
	<i>Khuoi Sap</i>	<i>Nam Ca</i>	<i>Na Hiu</i>	<i>Khuoi Noc</i>
Percentage of households experiencing deficit (food requirements exceeded rice production)	59%	20%	87%	67%
Average length of the deficit (months)	2	2	5	3

either by developing new paddy fields; or intensifying production in existing paddy fields (e.g., by introducing a spring-season rice crop); or both.

New paddy fields have recently been constructed in *Na Hiu* (eight households) and *Khuoi Noc* (six households), and two households in *Khuoi Sap* purchased paddy fields. However, most of this increase happened before the new forest land policy was implemented. Our interviews indicated that the decreasing availability of old-growth forest was already pushing individuals to the lowlands; land allocations were only an added incentive.

As we mentioned earlier, the paddyland within the studied area already is largely saturated; little flatland remains that could still be developed. Indeed, in *Nam Ca*, no new paddy fields have been developed since 1971. Instead, in the spring of 2000 *Nam Ca* farmers began to experiment with increasing production by adding a second, spring-season rice crop. They were aided by the district agricultural service, who sold them a new variety of seeds at a low price. However, yields were only mediocre, due to cold weather.

Farmers' initiatives to increase the area of, and intensity of production on, paddyland in response to forestland policy confirm the interdependence of paddylands and sloping lands, as demonstrated by Castella and Erout (2002).

Perennial plantations

State policy suggests a future of uplands brimming with fruit tree plantations, bringing wealth or at least self-sufficiency even to farmers who lack paddy fields. With swidden cultivation no longer feasible, upland rice production will decline or cease, and perennial plantations are expected to fill the gap.

Plantations are indeed being developed in the study area, but they are far from an all-purpose solution to the difficulties faced by farmers. Cinnamon and anise plantations account for 70% and 15%, respectively, of the trees planted in the study area, whereas fruit trees (e.g. plum, apricots) make up the remaining 15%.

For most farmers, tree-crop production is still experimental, as revealed by the fact that the majority of plantations are very small – the trees are located in the vegetable garden or very

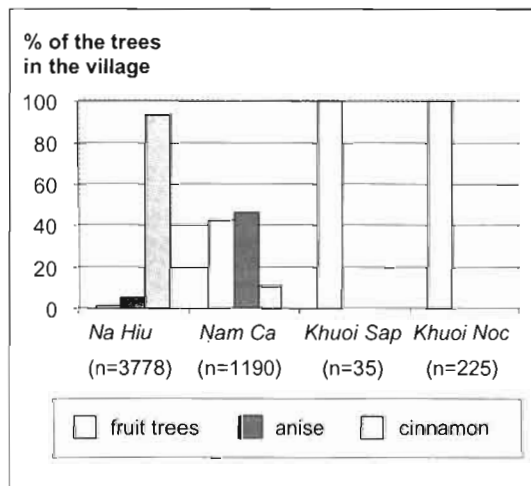


Figure 6: Plantation composition by village.

near to swidden fields, and the harvest is mostly consumed by the household. Although over 3,000 cinnamon trees have been planted in the studied area (nearly all in *Na Hiu* village), the vast majority of these belong to only two households (Figure 6). Out of all four villages, only six households (four of these in *Na Hiu*) own more than 100 trees. This concentration of plantations in a few hands can be explained by the limited number of rice-sufficient families who could afford to invest in plantations.

Plantations represent a highly uncertain source of income to farmers. Villages far from the roadway do not have the market access to sell the produce of industrial trees⁶. Even for those villages close to marketplaces, the future demand for industrial tree production cannot be confirmed, and the trees will not produce for several years. Large plantations bring the added risk of theft, and constant monitoring to prevent theft is difficult.

Despite these disadvantages, plantations represent a low-risk experiment for many farmers because various organizations subsidize the initial establishment of plantations. In *Na Hiu*, farmers have received cinnamon and anise seedlings from the WFP and continue to do so. *Khvoi Sap* also received seedlings, but because of poor management (related to the limited interest by farmers who have not achieved rice sufficiency) they have all since died or been destroyed by buffaloes. In the other two villages, plantations (mostly fruit) are mostly established on the initiative of individuals, with seedlings purchased either from a market or a state farm, or self-produced. The economic role of a tree plantation depends on the current household production system. Those households with sufficient paddy fields to meet their food needs tend to develop plantations in search of additional profit. They plant a set of trees without knowing whether or not they will turn a profit on the activity. Such “speculative” plantations are predominantly industrial trees (anise and cinnamon). They can potentially bring in high returns but carry with them high uncertainty because of poor plantation management and uncertain market; but for rice-sufficient households, the consequences of failure are not severe. Because these households have production systems stable enough to provide for their needs, they can afford to make such low-risk experiments.

Households that are still trying to meet their food needs usually develop plantations at a very small scale, in the hopes of complementing their annual-crop harvests several years down the road. Further, they tend to plant fruit trees rather than industrial trees, so that the future production could be readily sold within the village or in the commune marketplace. Proceeds would be used to buy the rice needed to feed the household or pay for other family expenses.

⁶The term “industrial trees” as used here (and in the Vietnamese literature) refers to trees producing products that require post-harvest processing - for example, cinnamon, tea, or anise.

The new land policy successfully destabilized shifting cultivation, but perennial plantations and lowland intensification have not been sufficient to meet the needs of swidden farmers. Struggling to feed their families, they are rapidly experimenting with new possibilities, from aquaculture and animal husbandry (mainly poultry, pig, and cattle) to the testing of any cropping innovation that shows promise. Another option is to move to new places in search of better environmental conditions for agriculture or opportunities for non-agricultural income.

New kinds of migration

Migrating to new communes or districts within the province is no longer a possibility because all land is now allocated to locals. However, households without opportunities in their current locations can move their houses closer to forestland they own within a village. Living close to forestland facilitates guarding and tending the plot, and thus makes feasible a wider range of production options (Fatoux et al., 2002). In *Khuoi Sap* and *Khuoi Noc*, some households have created new hamlets, and others have moved their houses to their more remote upland plots to develop irrigated paddy fields or fishponds. A few other families have moved closer to the road to engage in non-farm activities such as small-scale commerce (e.g., selling consumption goods or agricultural inputs) or motorcycle taxi services.

The more dramatic option is migration to southern *Viet Nam*, where the New Economic Zones are being developed. Supported by State subsidies, families can relocate to work in the new industrial tree plantations (mostly coffee and rubber) in these zones, located in the Central Highlands region or in the south of the country. The New Economic Zones hold a particular appeal for highland peoples; the prospect of having sufficient land to grow commercial crops that can be readily sold leads many to dream of a better future. Ten households from *Khuoi Sap* have made the long journey. Between 1991 and 1996 nearly 1.5 million persons have migrated to the Central Highlands (Vo Tong Xuan et al., 1999). The journey south nonetheless represents a substantial risk with unknown benefit. Concrete knowledge about the New Economic Zones is scanty, and those individuals who have made the trip and then chosen to return bring reports that are lukewarm at best. Further, the journey is costly; farmers interviewed estimated that such an undertaking would cost at least ten million Dong. The migration is thus only a possibility for households that have accumulated capital, who nonetheless find themselves in sufficiently difficult circumstances to justify leaving everything behind for the great unknown.

The departure of some households for the South occasionally gives other households the valuable opportunity to buy paddy fields from the departing families. In 2000, four households in *Khuoi Sap* purchased ricefields in neighboring *Vu Loan* Commune from *Tây* families who had departed for a New Economic Zone.

6. Conclusions

Our study of four remote mountain villages in northern *Viet Nam* revealed a distinction between two kinds of farmers: those who have their food needs met by paddyland rice, and those who do not. For the first group, the new land policy had little effect - the focus of their production continues to be the paddylands, and they can now use the sloping lands to develop perennial plantations as a supplement to their income.

For the second group, those who had long been shifting cultivators, frequent migration and free access to forestland were an inherent part of their production systems. These households do not oppose the notion of a settled existence; after all, farmers of all ethnicities share the strategy of purchasing paddy fields wherever possible. Farmers associate paddyland rice with a sense of food security, in contrast with swidden cultivation and its extremely unstable yields. Unfortunately, however, there is not enough paddyland to provide for all the shifting cultivators.

By eliminating free access to sloping lands, the State has eliminated the possibility of migration, and thereby put an end to shifting cultivation. The problem is, the State has not yet enabled farmers to successfully implement a feasible alternative. New paddy-field development is not possible in the study area, and perennial plantations have been implemented on a very small scale, if at all, by most farmers. Meanwhile, swidden cultivation continues, in a spiral of declining yields and soil quality.

Farmers have sought to meet this crisis by trial and error, testing a profusion of innovations to find a sustainable way to meet the basic needs of their families. The solution-finding process can be long and difficult, and often takes place at the expense of upland resources.

Thus, the new land policy has created an intervention point for development. Shifting cultivators have long been the poorest of the rural people in northern *Viet Nam*. However, their frequent migration has made them a difficult target for development projects. Settled in a fixed place, these people are now in more dire straits than ever before, but also are now a clear and willing target for new innovations.

Development activities need to focus on facilitating these populations in their solution-finding process, not only by introducing technical innovations but also by identifying the necessary institutional environments to make those innovations economically feasible. For example, to stimulate the development of silviculture, our case studies have shown that it is not sufficient to provide seedlings to farmers and do nothing more. Instead, a means of access to the market also needs to be developed. Further, the institutional context of the village also needs to be

addressed in order to create intra- and inter-village rules for livestock management, to prevent cattle and buffalo from damaging the new plantations.

In the future, improved transportation and communication networks will broaden the range of options available to the now-remote households. They have to prepare themselves for these coming changes to be better able to seize upon new agricultural or non-agricultural opportunities for income generation. This will require specific training efforts in how to access and use market information, accessing marketing channels, rural non-farm employment, etc.

In the case-study villages, we have looked at a set of social and production systems confronting a new institutional environment. Farmers face various levels of instability, and need to engage in transformations of varying complexities, depending on their livelihood systems at the time of the institutional changes. The challenge for sustainable development is to reduce the human and environmental costs of the necessary transitions, helping farmers in their search for systems that are adapted to their new social, institutional, and environmental contexts.

References

- Bal P., Mellac M. and Duong Duc Vinh (1997) Evolutions récentes des systèmes de production dans une zone de montagne du Nord-Vietnam, district de *Cho Don*, province de *Bac Kan*. *Cahiers Agricultures*, **6** and *Agriculture et Développement*, **15**: 183-189.
- Castella J.C., Husson O., Le Quoc Doanh and Ha Dinh Tuan (1999) Implementing the ecoregional approach in the Red River Basin uplands (*Viet Nam*). Mountain Agricultural Systems (SAM) Project. In: (N.N. Kinh et al. eds.) *Towards an Ecoregional Approach for Natural Resources Management in the Red River Basin of Viet Nam*. The Agricultural Publishing House, *Ha Noi, Viet Nam*. 75-94.
- Castella J.C. and Erout A. (2002) Montane paddy rice: the cornerstone of agricultural production systems in *Bac Kan* province, *Viet Nam*. In: (J.C. Castella and Dang Dinh Quang eds.) *Doi Moi in the Mountains. Land Use Changes and Farmers' Livelihood Strategies in Bac Kan Province, Viet Nam*. The Agricultural Publishing House, *Ha Noi, Viet Nam*. 175 - 195.
- Castella J.C., Tran Quoc Hoa, Husson O., Vu Hai Nam and Dang Dinh Quang (2002) The declining role of ethnicity in farm household differentiation: A case study from *Ngoc Phai* Commune, *Cho Don* District, *Bac Kan* Province, *Viet Nam*. In: (J.C. Castella and Dang Dinh Quang eds.) *Doi Moi in the Mountains. Land Use Changes and Farmers' Livelihood Strategies in Bac Kan Province, Viet Nam*. The Agricultural Publishing House, *Ha Noi, Viet Nam*. 47 - 71.
- Dang Dinh Quang, Luu Van Toan and Castella J.C. (2001) Comparative analysis of the impact of sedentarization programs in two *Dao* villages in *Bac Kan* province, *Viet Nam*. SAM Program, Vietnam Agricultural Science Institute, *Ha Noi, Viet Nam*. 25 p. [in Vietnamese]

- Dang Nghiem Van (1991) La culture sur brûlis et le nomadisme. *Etudes Vietnamiennes*, **1** (99): 16-28.
- De Rouw A. and Van Oers C. (1988) Seeds in a rainforest soil and their relation to shifting cultivation in the Ivory Coast. *Weed Research*, **28**: 373-81.
- Fatoux C., Castella J.C., Zeiss M. and Pham Hung Manh (2002) From rice cultivator to agroforester within a decade: The impact of *Doi moi* on agricultural diversification in a mountainous commune of *Cho Moi* District, *Bac Kan* Province, *Viet Nam*. In: (J.C. Castella and Dang Dinh Quang eds.) *Doi Moi in the Mountains. Land Use Changes and Farmers' Livelihood Strategies in Bac Kan Province, Viet Nam*. The Agricultural Publishing House, *Ha Noi, Viet Nam*. 73 - 97.
- Hardin G. (1968) The tragedy of the commons. *Science*, **162**: 1243-8.
- Husson O., Castella J.C., Ha Dinh Tuan and Naudin K. (2001) Agronomic diagnosis and identification of factors limiting upland rice yield in mountainous areas of northern Vietnam. *SAM Paper Series 2*, Vietnam Agricultural Science Institute, *Ha Noi, Viet Nam*. 16 p.
- Jesus F. and Dao The Anh (1998) Les réformes au Vietnam depuis 1979 et leurs effets sur les ménages agricoles. *Document de travail n°18*, Unité de recherche en prospective et politiques agricoles, CIRAD-VASI, *Ha Noi, Viet Nam*. 81p.
- Kerkvliet B.J. and Porter D.J. eds. (1995) *Vietnam's Rural Transformation*. Westview Press, Boulder, Col. (USA). 236 p.
- Mazoyer M. and Roudart L. (1997) *Histoire des Agricultures du Monde*. Seuil, Paris, France.
- Morrison E. and Dubois O. (1998) *Sustainable livelihoods in upland Vietnam: Land allocation and beyond*. Forestry and Land Use Series **14**, International Institute for Environment and Development (IIED), London, England. 64 p.
- Nguyen Sinh Cuc (1995) *Agriculture of Vietnam (1945-1995)*. Statistical Publishing House, *Ha Noi, Viet Nam*. 386p.
- Pandey S. and Dang Van Minh (1998) A socio-economic analysis of rice production systems in the uplands of northern Vietnam. *Agriculture Ecosystems and Environment*, **70**: 249-258.
- Poffenberger M., Walpole P., D'Silva E., Lawrence K. and Khare A. (1997) Linking government and community resource management: what's working and what's not. *Report of the 5th Asia Forest Network Meeting, Surajkund, India, 2-6 December 1996*. Research Network Report n°9, Asia Forest Network.
- Roder W. (2001) *Slash-and-Burn Rice Systems in the Hills of Northern Lao PDR: Description, Challenges, and Opportunities*. International Rice Research Institute, Los Banos, Philippines. 201 pp.
- Sadoulet D., Castella J.C., Vu Hai Nam and Dang Dinh Quang (2002) A short history of land use changes and farming system differentiation in *Xuat Hoa* Commune, *Bac Kan* province, *Viet Nam*. In: (J.C. Castella and Dang Dinh Quang eds.) *Doi Moi in the*

Mountains. Land Use Changes and Farmers' Livelihood Strategies in Bac Kan Province, Viet Nam. The Agricultural Publishing House, Ha Noi, Viet Nam. 21 - 46.

- Sikor T. (2001) The allocation of forestry land in Vietnam: did it cause the expansion of forests in the northwest. *Forest Policy and Economics*, **2**: 1-11.
- Tachibana T., Trung M. Nguyen and Otsuka K. (2001) Management of State land and privatization in Vietnam. In: (K. Otsuka and F. Place eds.) *Land Tenure and natural Resource Management. A comparative Study of Agrarian Communities in Asia and Africa.* International Food Policy Research Institute. The Johns Hopkins University Press, Baltimore and London. 234-270.
- Vo Tong Xuan, Nguyen Vu Sanh and Nguyen Huu Hong (1999) From farming systems research to a community-based natural resource management research agenda: current activities of the Vietnam Farming Systems Network in northern Vietnam. In: (Kinh N.N. et al. eds.) *Towards an Ecoregional Approach for Natural Resource Management in the Red River Basin of Vietnam.* The Agricultural Publishing House, Ha Noi, Viet Nam. 187-195.
- Vo Quy (1998) Généralités sur les problèmes de l'environnement au Vietnam. *Etudes Vietnamiennes*, **3** (129): 7-34.
- Vo Quy and Le Thac Can (1994) Conservation of forest resources and the greater biodiversity of Vietnam. *Asian Journal of Environmental Management*, **2** (2): 55-59.

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