

# IMPACTS OF FOREST MANAGEMENT DECENTRALIZATION ON LIVELIHOODS OF ETHNIC MINORITY GROUPS IN VIETNAM'S UPLANDS

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## ABSTRACT

Three communities were selected to see if there had been differences in the impact of implementation of the Vietnamese decentralization policies concerning forest management, between two communities of the same ethnic group living in different areas, and between two communities of two different ethnic groups residing in the same area. One hamlet was in Son La province (Huoi Toi hamlet of the Thai ethnic group in Chieng Hac commune, Yen Chau district) and two other hamlets in Nghe An province (Xieng Huong hamlet of the Thai people and Na Be hamlet of the Khomu ethnic minority, in Xa Luong commune, Tuong Duong district).

## 1. INTRODUCTION

The uplands of Vietnam occupy some 24 million hectares (ha) or three-fourths of the country's total land area. The uplands are where most of Vietnam's forests are located. They are home to 25 million people--nearly one-third of the national population, and contain 50 of the Vietnam's 54 officially categorized ethnic groups (Vien, 1996 in Quang, 2003). For people in the uplands, forests have been an important resource--contributing greatly to both their livelihoods and to their well-being by helping them generate income, provide subsistence goods, supplement inputs for farming, and reduce vulnerability during times of crop failure, unemployment, and other hardships (Phuc, 2002).

Even before Vietnam gained independence as a whole nation in 1975, the Vietnamese government had already initiated policies and programs on natural forest resources and land use management. Regrettably, however, the Vietnamese forests have been quickly disappearing. In over half a century, Vietnam has lost about 5 million ha of natural forests. Moreover, the area of Vietnam's remaining forest cover showed a decrease from 33 percent from 1954-1975, down to 29 percent in 1976-1985, and 28 percent in 1986-1999. While the implementation of several re-forestation programs beginning in the early 1990s has increased the forest cover to 33.2 percent nationwide in 2002, the problem of forest degradation remains serious as valued resources and biodiversity in many forest areas have dramatically declined (Ministry of Agriculture and Rural Development [MARD], 2000 in Quang, 2003).

Several phenomena have been widely cited as the causes for forest loss in Vietnam. Among these factors are wars, inappropriate development policies, population growth, and shifting cultivation. After the war, policies to clear the forests and convert them into agricultural land (about one million ha) as well as policies to exploit timber for reconstructing the country aggravated forest deterioration. Moreover, the establishment of New Economic Zones in the 1980s to settle poor lowland people in the uplands also accelerated forest loss (Nam, Dang, and Hainsworth, 1999). Clearly, state development policies did not help restrain deforestation.

Demographic forces have also contributed to forest loss: high rates of population growth, for example, especially among ethnic minorities in the uplands, swelled population densities in mountain communities and increased demographic pressure on the country's natural resources. According to 1979-1989 census data, the annual average growth rate of the country

as a whole was 2.3 percent. However, the growth rate for the ethnic Ede group was higher at 3.4 percent; the Dao at 3.3 percent; the Thai and H'mong, at 3.2 percent each; the Muong and Dan Lai, at 3.0 percent; and other groups, within the range of 2.4 percent to 2.9 percent (Nam, Dang, and Hainsworth, 1999).

Shifting or swidden cultivation has also been mentioned as a major reason for the depletion of Vietnam's forests (Ty cited in Rambo, et. al, 1995; Vien and Giang in Vien and Thanh, 1996)<sup>1</sup>. According to a 1989 survey, approximately 3 million Vietnamese people, or an estimated 500,000 households, practice shifting cultivation (Vien and Giang cited in Vien and Thanh, 1996). In a more recent study, Sikor, et. al (cited in Poffenbeger, 1999) found that 46 of the 54 ethnic groups are still engaged in shifting cultivation. This means that thousands of hectares of forests have recently been cleared for swidden farming in the uplands of Vietnam. This strategy has worsened the depletion of forest resources, and has hastened environmental degradation, erosion, and the reduction of biodiversity in the country.

Despite all these factors, and interacting with them, the root cause of forest loss is increasingly seen to be the concentration of power over the forest. In some countries, forests have long been under the control of the states, but this management system failed owing to lack of personnel in forest protection/management units and too large an area of forests. Past experiences in such countries as China, Indonesia, Nepal, Tanzania, and Uganda have proven that the condition of forests would be improved by decentralizing the state management regime (Quang, 2003). Vietnam is not an exception in this regard.

Decentralization can be defined as the transfer of responsibility for planning, management, and the raising and allocation of resources from the central government and its agencies to field units of central government, semi autonomous public authorities or corporations, area regional or functional authorities, or nongovernmental, private or voluntary organizations (Rondinelli and Nellis, 1986 cited in Gibson et al., 2000).

During the Doi Moi or renovation period (late 1980s to now), the Vietnamese government has issued two new laws: Law on Forest Protection and Development (in 1991) and Land Law (in 1993). Under these laws, it has issued and enforced decrees to allocate forests and forestlands to individual households for management and development as an alternative to state management (Sikor in Sikor, 1998). This is the first step in decentralizing natural resources management, or the first sign of transferring development and management responsibilities of natural resources from the central state to lower levels.

## **2. STATEMENT OF THE PROBLEM**

The allocation of forestland to households for management and development has been considered the "centerpiece" of preventive forestry in Vietnam<sup>2</sup>. To support this plan of decentralization in resource management, the government issued additional decrees along similar lines of the 1991 Law on Forest Protection and Development and the 1993 Land Law. Decree 02/CP, issued in January 1994, allocated forestland to households. Lands with

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<sup>1</sup> Although shifting cultivation per se does not pose threats to forest loss, it causes problems when a shortage of land causes people to extend the period of cultivation and reduce the fallow period. Population pressure on the land abets this disregard for proper swidden procedures and eventually makes a farming system unsustainable (Cai, 1997).

<sup>2</sup> Household forest management is not a substitute for direct state management, but these two forms simultaneously exist in the Vietnamese uplands (Quang, 2003).

standing forests were allotted to households for a period of 50 years, while barren lands (those without standing forests) were allotted for longer periods of time. In January 2000, Decree 02/CP was replaced by Decree 163/ND-CP, issued by the government in November 1999. The Decree enabled households to exchange, transfer, mortgage, lease, and pass on the received forestland as inheritance to others.

Different ethnic groups in Vietnam, influenced by their own cultures, perceive and react to the decentralization policy in various ways. People living in different ecological or geographic locations also react differently. However, no studies have been conducted to understand how different ethnic groups residing in the same ecological condition react to this decentralization policy; nor have there been studies conducted to understand how the same ethnic group residing in different ecological conditions responds to the policy. This study, therefore, tries to answer these questions by conducting interviews in three different communities, belonging to two different ethnic minority groups and residing in two different regions.

### **3. OBJECTIVES OF THE STUDY**

The objectives of this study is to determine the influences of the decentralization policy on local people's livelihoods.

### **4. RESEARCH DESIGN AND METHODOLOGY**

This study adapts an exploratory and descriptive design. Specifically, it employs the case study method in describing the responses of local people in study sites to the decentralization process.

#### **4.1 Site Selection**

Three different hamlets of two different ethnic minority groups in two different areas, were chosen for this study, in order to compare differences and similarities in changes of forest resources and the influences of decentralization policy upon local people's livelihoods. This site selection allowed us to compare the impact of decentralization on the same ethnic communities living in different geographic conditions, and its impact on different ethnic communities living in the same geographic condition. The study sites are summarized in Table 1 below.

#### **4.2. Informant Selection**

Key informants (KIs) in the communities and various government agencies in the two provinces, Nghe An and Son La, were selected for this study. These 33 KIs came from the hamlet, commune, district, and provincial offices. They were purposely chosen with consideration that, at the government agency level, informants are the staff working in positions directly related to the work of forest resources protection, development, and management. Among them are Provincial Forest Protection Units (PFPU), Provincial Departments of Agriculture and Rural Development (PDARD), Provincial Departments of Natural Resources and Environment (PDONRE), DFPU, District People's Committees (DPC), DOLA, District Statistical Offices (DSO), and Commune People's Committees (CPC). At the community level, the selected community officials included hamlet heads, vice hamlet heads, and security cadre.

In addition to those key informants, a number of households in each selected hamlet were randomly chosen and interviewed (Na Be – 55, Xieng Huong – 44, Huoi Toi – 40).

#### **4.3. Data-gathering Techniques, Data Sources, Data Analysis and Interpretation**

Three major sets of data were gathered for this study, namely: (1) Community profiles of the study hamlets; (2) Factors that brought about changes in forest resources and different responses of local people toward the decentralization policy; and (3) Changes in people's livelihoods as impacts of forest protection policy implementation. Data were sought from interviews (structured, semi-structured, and in-depth) with the KIs, direct observation and from the analysis of secondary data. An interview guide was formulated for use in semi-structured and in-depth interviews. Data drawn from the different hamlet residents and state agents was analyzed qualitatively and reported.

### **5. DECENTRALIZATION POLICIES IN STUDY SITES AND FOREST RESOURCES**

Decree 02/CP (1994) and the subsequent Decree 163/ND-CP (1999)--the forestland allocation policies to households for management and development, or decentralization policies in forest resources management--were issued by the Vietnamese government in 1994 and 1999, respectively.

Nghe An implemented Decree 02/CP in the whole province right after it took effect in 1994. While in Son La, it was implemented in 1995 in only seven communes of Yen Chau district. As for Decree 163/ND-CP, Son La started implementing it in July 2001, while Nghe An started nearly one year later, in June 2002.

The decentralization processes of both Decrees were the same from central level to lower levels: central government – province – district – commune – community/hamlet and/or local recipients. However, when implementing Decree 02/CP, Son La province allocated forestland to communities or hamlets, while Nghe An authorities allocated forestland to individual households. Provincial authorities made their own circulars/decisions to appoint their lower administrative levels to implement the Decrees.

To allocate forestland, both provinces established Forestland Allocation Management Boards at different levels. Members of a Board are officials from several organizations in the same level: land administration, agriculture and rural development, forest protection units, people's committee, police, finance and price departments. Although the Board included a variety of members, those who really worked in the field were very few. Following Decree 02/CP, the District Office of Land Administration (DOLA) directly allocated forestland to local people. While following Decree 163/ND-CP, not only was DOLA appointed to allocate forestland, the District Forest Protection Unit (DFPU) was also assigned.

The decentralization policies have brought about some positive impacts: various programs and projects formed under these policies have provided benefits to local people; and they have also increased local people's awareness of the need to protect natural resources, especially forests. However, policies have still failed to achieve their main objectives: better management, conservation, and development of forest resources.

Local authorities still have no right to decide what to do with their allocated forests. They must follow plans designed by higher levels. Similarly, funds for the work of allocating and managing forestland are still controlled by organizations that are not directly involved in the process of allocating and managing the lands. As a result, delays of policy implementation are common.

Knowledge of who has what rights and what responsibilities in the use of forest resources, under these policies, was often unclear to recipients. This brought about low motivation for forest protection by local people, and the quality of the forest continues to decline.

There was participation by local people in the land allocation process in the studied communities. Meetings were held in which farmers got some ideas of their rights and responsibilities in land use and forest protection. Many farmers freely asked questions and expressed their opinions at these meetings. This helped authorities to avoid making some of the unnecessary mistakes made in previous land allocations, such as serious discrepancies between the actual size and position of plots and what appeared on official maps. And authorities were enabled to make some changes in their approach to win greater acceptance by local farmers. Nevertheless local people were not thoroughly informed about the new policies and many people continued to extract forest products and extended their swidden fields into new areas of forest. Lack of equality in access to and use of forest products by forestland recipients was a problem in all three study sites as well.

## **6. RESULTS: CHANGES IN LIVELIHOOD**

### **6.1. Huoi Toi hamlet, Son La province**

#### ***6.1.1. Crop Production***

All 40 respondents said that there have been a lot of changes in their crop production practices after land allocation in terms of new varieties, fertilizer uses, weeding and land preparation practices. Dry rice was the major crop in their swidden fields in the mid-1990s. After forestland allocation in 1999, however, maize became a major crop that dominated agricultural practices of the Thai people in Huoi Toi. This is because along with forestland allocation policies, there have been supporting projects (subprograms under the Program 327 and/or 661, and the SFDP) which introduced hybrid maize varieties to Huoi Toi Thai people and encouraged them to cultivate these varieties on swidden fields. Moreover, hybrid maize had been proven to bring about good cash incomes compared to upland rice or cassava. This is why more and more farmers planted maize in most of their swidden fields. In addition, because swidden fields were restricted to a fixed and limited area after the 1999 land allocation, people had to intensively focus on how to use their limited fields in the most effective ways, and maize has been the best choice to date (Direct interview, 2004). VN10 and Bioseed have been the new hybrid maize varieties cultivated in Huoi Toi. Of course, not all swidden fields have been converted to cultivate maize. In some plots farmers kept planting upland dry rice since they still needed it for their daily use and for special occasions such as wedding parties, traditional festivities, and funeral ceremonies.

Swidden fields which were used to cultivate maize were no longer let fallow. Thus, to enrich the soil, farmers had to use fertilizers. Urea was the main kind of chemical fertilizer used in Huoi Toi. Cattle and buffalo manure was also used but in small amounts only since it was hard for farmers to carry it up hills to their fields. Some households also planted legumes with

maize in order to enrich field soil. Pesticides were also utilized sometimes in Huoi Toi (Direct interview, 2004).

### **6.1.2. Livestock Production**

Most households reduced the number of cattle they raised because of a local regulation that set a limit of three cattle/buffalo heads per household, and farmers now had to take care of the cattle since there was no area available for cattle raising as freely as in the past. Of 40 farmers interviewed, 30 said that their heads of cattle and buffalos has been reduced after land allocation, of which 18 said that the change took place because of stricter disease quarantine/management, and no fixed area for cattle/buffalo raising. This has been seen to be a good point (by the state local authorities) since it helped protect farmers' crops and forest resources from destruction by cattle and buffalos. On the other hand, however, it had a negative impact on the state land allocation policies in the sense that in fact cattle and buffalos mean an accumulative asset for farmers against sudden disasters, famines, or other difficult periods. Now they had to shrink this important accumulative asset, which meant that they became more vulnerable. In other words, they had to live in a more risky situation.

### **6.1.3. Living Conditions of Farmers**

Eight out of 40 households interviewed (20 percent) said they were usually short of food for about 4 months per year. What they usually did to overcome this time of shortage was to buy rice from shops on credit. The debt would be paid after their crops (mainly maize) were harvested, with a quite high rate of interest (normally 15-20 percent higher than the real price at the time of purchase). The rest, 32 households, said they had enough rice to eat year round because they used money derived from selling maize to buy rice. 35 households said their living conditions have been better than those in the past 5 or 10 years. Of these, 20 considered new maize varieties and 6 considered new technical skills as main reasons for the improvement. By contrast, 2 households said their living conditions became worse because of a shortage of land for agricultural production.

For future development, 10 households wished to develop/expand livestock raising, 8 wanted to have more land for agriculture, and 6 wished to have technical skills in livestock raising and fruit crop production.

## **6.2 Na Be hamlet, Nghe An province**

### **6.2.1. Crop Production**

Na Be was the poorest and most swidden- and forest resources-dependent hamlet studied. In the period of 1992-2003, or before and after the forestland allocation policies, reduction in area of dry rice and maize were significant, while the area of cassava remained the same (see Table 7).

The cropping yield was reduced in all three major crops--dry rice, maize and cassava—especially for dry rice whose yield was reduced from 1.25 tons per ha in 1992 to 0.98 ton per ha in 2002 (see Table 8). That, as the case of Xieng Huong, induced a large number of households to suffer lack of food, even though about 60 percent of farmers in Na Be did try

new varieties of maize for some time with support from district authorities (farmers had to pay only a fee for transporting seeds from the commune center to their home).

### **6.2.2. *Livestock Production***

There was no change in the kinds of livestock raised by farmers in Na Be over time. Cow and buffalo were usually considered an “accumulative asset” for farmers. However, the average number of these per household in Na Be was, modestly, only one (while that of Xieng Huong was 2.5). The number of pigs slightly increased, although not significantly. As in Xieng Huong hamlet, the number of poultry was much reduced owing to diseases (see Table 2).

However, many households in Na Be were still raising pigs by letting them freely go around (while all households in Xieng Huong raise pigs in sheds). This made pigs in Na Be more vulnerable to diseases.

### **6.2.3. *Living Conditions of Farmers***

Thirty-five households interviewed (almost 73 percent of the total) lacked of food some time in the year. Of these, 14 (or 27 percent of the total), lacked food for more than four months a year.

Like households in Xieng Huong, to have cash for buying food during this time, the households extracted non-timber and timber forest products, or engaged in hired labor. Only 11 households said their living conditions were better than before, 17 said their situation was unchanged and 27 replied it was worse than before. For the first 11 households, increasing income from non-timber forest products (NTFPs) was a major reason for their improved living conditions. While for the last 27, 11 said reduction of land available for agriculture was the major reason for their worse living conditions, and 8 considered lack of labor as the main reason.

## **6.3. Xieng Huong hamlet, Nghe An province**

### **6.3.1. *Crop Production***

Over time, a significant reduction of the area planted in dry rice and cassava took place in Xieng Huong hamlet, while the area of maize mostly remained the same. The reduction of the area of dry rice and cassava fields led to a reduction of the swidden area of the hamlet as the whole (see Table 7). The yield of dry rice was significantly reduced, from 1.3 tons per ha in 1990 to 1.1 tons per ha in 2002. However, in this hamlet, while the yield of maize slightly increased and the yield of cassava was reduced, these were not statistically significant (see Table 8). Since dry rice and cassava accounted for most of the production area, the reduction of these areas and yields did cause a lot of problems in terms of food security for local farmers. A large number of households in the hamlet were facing a lack of food in a certain period of the year. Some farmers started using chemical fertilizers, such as urea, for their dry rice in 2000. However, by the year 2003, only eight households still did that.

### **6.3.2. *Livestock Production***

In terms of livestock raising, the number of cows was significantly increased in Xieng Huong, from 67 heads in 1990 to 102 heads in 2003 (for the 43 interviewed households). However,

the number of buffalos and pigs also slightly increased. The number of poultry was much reduced owing to diseases (see Table 2). Several farmers said they used industrial food and periodically adopted quarantine for their pigs, which were now raised in sheds. Besides, several farmers had invested in raising cage-fish since the presence of the Nam Non river in the hamlet territory helped farmers in Xieng Huong raising cage fish. Cage fish raising generated an average net income of about VND three million per cage per year. However, doing this required a big investment of at least VND five million per cage, an amount that many households could not possibly raise. Fish raising was highly profitable and posed less risk than cattle. Thus, households with available capital tended to invest in fish raising rather than cattle or buffalo.

As in crop production, ethnic characteristics did play a remarkable role in livestock production. It was clear that more farmers in Xieng Huong started raising new breeds of pigs, using industrial food for pigs, and taking better care of them than that in Na Be.

### ***6.3.3. Living Conditions of Farmers***

Thirty-one households interviewed (70 percent of the total) lacked food during part of the year, of which 22 households, or 50 percent of the total, lacked food for more than four months per year. These households normally entered the forests for NTFPs, or timber, or engaged in hired labor for cash, in order to buy rice for this time period. Of 42 households interviewed, 27 households said their living conditions were better than before, seven said they were unchanged, and nine that they were worse. Among households with improved living conditions, 14 said income from increased livestock and/or fishery production was the main reason for improvements, while six of the nine households with worse living condition blamed the reduction of land available for agriculture.

In all three of the hamlets studied, the swidden area decreased after the forestland allocation. In 1990, the average swidden area of a household in Huoi Toi was nearly 2 ha. In Xieng Huong it was 1.6 ha. And in Na Be it was about 1.9 ha. In 2003, however, these numbers became 1.4, 1.1, and 1.4 in the three hamlets respectively (see Table 3 below).

Table 4 shows that although living together in the same place, Khomu people have a larger swidden area than the Thai people both before and after the forestland allocation. This indicates that the Khomu people are more likely to live on the forest (do swidden on forestland), than the Thai.

For the two Thai communities living in two different places (Nghe An and Son La), the study showed that the Thai in Son La had a larger area of swidden, compared to that of the Thai in Nghe An. Even after the land allocation, though the area of swidden field in each households decreased in general, the average size of swidden field of the Thai in Son La was still larger than that of the Thai in Nghe An (Table 5).

## **7. CONCLUSIONS**

We found no signs of any direct impact that forest allocation or decentralization policies had upon people's living conditions. The two communities of Thai living in different places showed no clear differences in their reaction to decentralization policies. The study found economic condition differences between the two different ethnic groups (Thai and Khomu) living in two different hamlets in the same commune.

In both of the Thai villages we studied, the allocation of forestland for agricultural production helped stabilize their income and as a result cooperation in forest protection increased. Specifically, the Thai people increased their income by growing crops for sale. They were helped in this by fluency in the Kinh language, by proximity to markets, and by better knowledge about the market economy. The Khomu, on the other hand, found it difficult to communicate with outsiders. Also, they lived next to a village of ethnic H'mong, created by a state resettlement program. These two hamlets shared no common interests in land use and benefit sharing. Thus this area suffered from behavior that had a negative impact on forest resources.

Current decentralization policies have not really helped conserve the remaining forest resources, improve forest quality, and/or increase people's livelihoods in the studied areas. Changes are needed in order to have better management and conservation of forests, and to bring about better livelihoods for people living close to the forests.

TABLE 1 - STUDY SITES

Hamlet	Ethnicity	Commune, District, Province	Region
1. Huoi Toi	Thai	Chieng Hac commune, Yen Chau district, Son La province	Northwestern Vietnam
2. Xieng Huong	Thai	Xa Luong commune, Tuong Duong district, Nghe An province	North Central Vietnam
3. Na Be	Khomu	Xa Luong commune, Tuong Duong district, Nghe An province	North Central Vietnam

TABLE 2 - CHANGES IN LIVESTOCK PRODUCTION OF HOUSEHOLDS IN XIENG HUONG AND NA BE

Livestock	Hamlet	Year	Mean	N	Sum	Std. Deviation
Cow	Xieng Huong	1990	1.55	43	67	2.02
		2003	2.37	43	102	2.22
		Sig. = 0.05; df = 42				
	Na Be	1992	0.84	52	44	1.22
		2003	0.84	52	44	1.71
		Sig. = 1.00; df = 51				
Buffalo	Xieng Huong	1990	0.16	43	7	0.57
		2003	0.20	43	9	0.46
		Sig. = 0.599; df = 42				
	Na Be	1992	0.19	51	10	0.49
		2003	0.21	51	11	0.75
		Sig. = 0,87; df = 50				
Pig	Xieng Huong	1990	1.53	43	66	1.76
		2003	3.13	43	135	6.15
		Sig. = 0.10; df = 42				
	Na Be	1992	1.66	53	88	1.91
		2003	1.83	53	99	2.54
		Sig. = 0,63; df = 52				
Poultry (mainly chicken)	Xieng Huong	1990	71.38	42	2,998	212.64
		2003	14.59	42	613	17.94
		Sig. = 0.09; df = 41				
	Na Be	1992	54.67	51	2,788	5.74
		2003	4.05	51	207	197.70
		Sig. = 0.07; df = 50				

TABLE 3 - SWIDDEN LAND OF HOUSEHOLDS IN THE THREE HAMLETS BEFORE AND AFTER FOREST ALLOCATION

Hamlet	Year	N	Mean (m <sup>2</sup> /hh)	Min	Max	Sum	Std. Deviation
Huoi Tuoi	1990	37	19,871.19	9,000	40,000	735,234	6,901.05
	2003	37	14,155.35	3,000	27,000	534,148	5,044.08
	Paired t-test	Sig. = 0.000; df = 36					
Xieng Huong	1990	30	15,766.66	5,900	30,500	473,000	6,647.15
	2003	30	11,065.45	300	25,000	365,160	5,378.79
	Paired t-test	Sig. = 0.002; df = 29					
Na Be	1992	41	18,738.00	5,000	34,000	768,258	8,396.83
	2003	41	14,380.97	3,600	34,500	683,720	7,521.00
	Paired t-test	Sig. = 0.000; df = 40					

TABLE 4 - COMPARISON OF SWIDDEN LAND OF THE TWO ETHNIC GROUPS IN NGHE AN PROVINCE BEFORE AND AFTER THE FORESTLAND ALLOCATION

	Ethnicity	N	Mean (m <sup>2</sup> /hh)	Std. Deviation
Before the land allocation	Thai (in Xieng Huong)	30	15,766.66	6,647.15
	Khomu (in Na Be)	41	18,738.00	8,396.83
	paired t-test	Sig. = 0.113; df = 69		
After the land allocation	Thai (in Xieng Huong)	30	11,065.45	5,378.79
	Khomu (in Na Be)	41	14,380.97	7,521.00
	paired t-test	Sig. = 0.016; df = 69		

TABLE 5 - COMPARISON OF SWIDDEN LAND OF THE TWO THAI COMMUNITIES BEFORE AND AFTER THE FORESTLAND ALLOCATION

	Ethnicity	N	Mean (m <sup>2</sup> /hh)	Std. Deviation
Before the land allocation	Thai (in Xieng Huong)	30	15,766.66	6,647.15
	Thai (in Huoi Toi)	37	19,871.19	6,901.05
	paired t-test	Sig. = 0.017; df = 65		
After the land allocation	Thai (in Xieng Huong)	30	11,065.45	5,378.79
	Thai (in Huoi Toi)	37	14,155.35	5,044.08
	paired t-test	Sig. = 0.018; df = 65		

TABLE 6 - FOOD AVAILABILITY IN THE THREE HAMLETS

Food shortage (month)	Hamlet						Whole three hamlets		Chi-square test
	Huoi Toi		Xieng Huong		Na Be		Fre.	%	
	Fre.	%	Fre.	%	Fre.	%			
0	31	79.4	13	29.5	14	26.9	58	43.0	Sig. = 0.00 df = 6
1-3	8	20.5	9	20.5	24	46.2	41	30.4	
4-6	0	0.0	13	29.5	10	19.2	23	17.0	
>6	0	0.0	9	20.5	4	7.7	13	9.6	
<b>Total</b>	<b>39</b>	<b>100.0</b>	<b>44</b>	<b>100.0</b>	<b>52</b>	<b>100.0</b>	<b>135</b>	<b>100.0</b>	

TABLE 7 CROPPING AREA OF HOUSEHOLDS IN XIENG HUONG AND NA BE

Hamlet	Crop	Year	Mean (m <sup>2</sup> /hh)	N	Sum	Std. Deviation
Xieng Huong	Dry rice	1990	16,016.07	28	457,250	6,805.71
		2003	11,262.85	28	352,000	5,600.11
		paired t-test	Sig. = 0.02; df = 27			
	Maize	1990	831.67	30	27,750	1,184.56
		2003	963.33	30	35,600	1,312.66
		paired t-test	Sig. = 0.548; df = 29			
	Cassava	1990	2,283.52	45	40,900	8,917.79
		2003	2,102.62	45	38,760	6,728.51
		paired t-test	Sig. = 0.004; df = 44			
Na Be	Dry rice	1992	15,138.89	48	681,250	10,590.16
		2003	11,408.22	48	575,870	8,665.15
		paired t-test	Sig. = 0.002; df = 47			
	Maize	1992	1,534.09	44	67,500	1,724.62
		2003	1,065.68	44	51,090	1,028.73
		paired t-test	Sig. = 0.028; df = 43			
	Cassava	1992	2,283.52	42	959,08	4,085.45
		2003	2,102.62	42	952,10	3,677.05
		paired t-test	Sig. = 0.788; df = 41			

TABLE 8 - YIELD OF CROPS BEFORE AND AFTER FOREST ALLOCATION IN THE THREE HAMLETS

Hamlet	Crop	Year	Mean (kg/ha)	N	Std. Deviation
Huoi Toi	Maize	1990	2,357.14	35	1,471.551
		2002	5,927.14	35	1,125.594
		paired t-test	Sig. = 0.000; df = 34		
	Cassava	1990	17,315.79	19	4,619.435
		2002	11,789.47	19	1,902.599
		paired t-test	Sig. = 0.000; df = 18		
Xieng Huong	Dry rice	1990	1,381.43	35	627.915
		2002	1,170.57	35	623.194
		paired t-test	Sig. = 0.071; df = 34		
	Maize	1990	689.00	33	906.134
		2002	794.45	33	1,203.237
		paired t-test	Sig. = 0.540; df = 32		
	Cassava	1990	18,187.50	32	16,309.877
		2002	14,437.50	32	13,899.843
		paired t-test	Sig. = 0.211; df = 31		
Na Be	Dry rice	1992	1,253.66	41	597.849
		2002	979.76	41	397.904
		paired t-test	Sig. = 0.002; df = 40		
	Maize	1992	986.43	42	1,121.255
		2002	688.33	42	770.695
		paired t-test	Sig. = 0.084; df = 41		
	Cassava	1992	23,067.57	37	17,433.270
		2002	16,989.19	37	11,016.976
		paired t-test	Sig. = 0.013; df = 36		