

Article

# Crop Boom as a Trigger of Smallholder Livelihood and Land Use Transformations: The Case of Coffee Production in the Northern Mountain Region of Vietnam

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**Abstract:** Coffee is considered a boom crop in Southeast Asia. However, while it bears typical boom crop characteristics in many places where it has been grown, in other places it has contributed to agrarian transformation. This paper examines the context of coffee development in the Northwestern Mountain Region of Vietnam and describes how smallholder coffee growing has triggered an agricultural transition process, and corresponding land use changes, from subsistence-based to commercialized agriculture production. The research was conducted in a commune located in Son La province. Interviews with 46 selected households and three focus group discussions (10–15 people each) were conducted to understand changes in crop systems, corresponding land use, and labor use, due to the adoption of coffee (the boom crop). The research found that coffee has replaced swidden crops and enables a multicrop system, with less land devoted to swidden land use. The income from coffee is used to hire labor and to pay for the inputs needed to mechanize rice farming. The research findings show that the coffee boom has brought about livelihood transformation, changed land use, and transformed local livelihoods from subsistence to production for the market.

**Keywords:** crop boom; coffee boom; small holding coffee; crop system; agricultural transformation; livelihood transformation

## 1. Introduction

Hall [1] defines a crop boom happening when a large amount of land in an area, such as a district, or province, is converted to growing a new crop in order to replace another. Crop booms result from a product that has high value on the world market being adopted and grown for sale and boom crops can be aimed at export markets [2] or domestic markets [3]. Whether export or domestic driven, boom crops have unique characteristics. The quick pace of development across new landscapes is one of their striking features [2]. The rapid spread of shrimp aquaculture in Southeast Asia in the late 1980s [4], cocoa growing in Sulawesi in the 1990s [5], coffee cultivation in the Central Highlands in Vietnam in 1993–1999 [6], rubber expansion into Lao [7], and oil palm in Indonesia [8] are recent examples of this phenomenon.

Crop booms are often described as having detrimental effects on local ecosystems and livelihoods [2]. Because the boom usually takes place in frontier areas where laws and regulations are not well enforced, it is easy for environmental damage to be done, and crop booms have been

associated with deforestation [3]. The change in land use associated with a crop boom also can lead to concerns for local food security. Boom crops are usually highly profitable and the land area suitable for the boom crop is thus devoted to that single crop. The result is that local food crops, and cropping systems, such as swidden, that are used to grow the food crops, are converted to growing the boom crop. This has resulted in cases of local food insecurity [2,8,9].

Boom crop production requires access not only to land, but also to new cultivation techniques and inputs, such as fertilizer and water. When adopting a boom crop, people need access to capital and depend on either credit or sell their land, which is their means of production, in order to pay for the inputs necessary to invest in the boom crop. When the market price drops, as was the case with coffee in 2005, a downward spiral can result for the farmers who adopted the boom crop, ultimately leading to the farmers losing their land. Alternatively, boom crop prices may rise, leading to other producers entering the market for land in order to grow the boom crop and buying up land from poorer smallholders in the area. The poorer smallholders use the money they have gained to relocate and buy land in relatively inaccessible, often frontier areas where they, too, can grow the boom crop. This process results in the expansion of the agricultural frontier and forest loss. Still another pathway to land use change in crop boom areas is that the market may attract investors in the boom crop, leading to the value of land increasing; a formal, or in some cases informal, land market is initiated, which then intensifies and land values rise. This last process leads to land dispossession and land grabs [2,10].

Belton et al. [3] consider boom crops to be a distinct form of agrarian transition as they shift production from subsistence agriculture, e.g., agriculture focused on local or family use, to agricultural production for the market. In addition, as boom crops are adopted, they act to move those who were unable to maintain their agricultural production, often through the land loss process described above, to become participants in the labor market. This process is referred to as “the commercialization of subsistence” [11] and is seen as being a distinct change from Scott’s “moral economy” [12] that subsistence communities have been shown to depend on. In his review of domestically oriented boom crops, Belton et al. [3] point out that boom crops encourage farmers to maximize the profit from their land. Thus, the adoption of a boom crop brings about changes in land tenure, an increase in inward migration, replacement of a multicrop rotational system, often a swidden system, by a monoculture crop and can also cause a decline of the local handicraft industry.

Bernstein and Woodhouse [13] describe a three-level pattern from subsistence to commercialization, namely subsistence, low commercialization, and high commercialization. Subsistence is centered on food production for one’s own consumption while low commercialization is “subsistence plus”, which means producing an excess of a staple food for exchange as a “cash crop”. High commercialization refers to the specialized production of commodities of little or no use to the producers, mainly for commercial purposes. Distinguishing between levels of commercialization is still debated as there is no clear divide between subsistence and commercialization. Discussions about the differences between them tend to refer to the size of farms and types of crops [14], the ratio of market sales and/or agricultural input rates to total inputs that households invest in, and measures taken by the farmer to integrate into the cash economy [15]. Commercialization takes place when the use of inputs such as family labor declines relative to production for the market, hired labor becomes predominant, or when the proportion of farm income in total household income declines but the share from nonagricultural employment increases.

Vietnam has experienced several crop booms throughout the course of its agricultural development. Since 2000, there have been coconut palm, Cypress, cacao, and jackfruit booms in the Mekong Delta; pepper booms in the Central Highlands; and a coffee boom in the Northwest of Vietnam in addition to a coffee boom in the Central highlands [16]. Coconut was once a boom crop for people living in the Mekong Delta; however, in early 2012, coconut prices began to fall 10 times lower than what they were at the beginning of the year [16]. Many Vietnamese entrepreneurs, traders, and manufacturers reduced their coconut-related operations, and many farmers replaced their coconut palms with Cyprus (*Cyperus malaccensis* Lamk).

Coffee is currently one of the most popular boom crops in Vietnam. Coffee trees were introduced to Vietnam at the end of the 19th century by French missionaries who established coffee plantations around churches in the provinces of Ha Nam, Quang Binh, and Kon Tum. It was not until the early 20th century, however, that coffee started to be grown on a large scale. Large-scale plantations were first established in Phu Quy and Nghe An Provinces and then later in the provinces of Dak Lak and Lam Dong, although the total area of land under coffee plantation at that time occupied only a few thousand hectares. After the August Revolution in 1945, state-owned farms began expanding their coffee-growing operations in Northern Vietnam, reaching a peak of over 10,000 ha in 1963–1964. In Southern Vietnam nearly 10,000 hectares of coffee trees had been planted by 1975. During the Second Indochina war, coffee production completely ceased in the north, but at the beginning of economic liberalization (Doi Moi) in 1986, private enterprises were once again allowed to establish businesses, and private coffee enterprises were started. By 2000, coffee growing in Vietnam had entered a “boom” phase as it expanded in Central Vietnam, leading to changes in local livelihoods from subsistence based to market orientation as well as leading to land conflicts between the ethnic majority Kinh peoples and the local ethnic minorities [10]. During this “boom” Vietnam became the world’s second largest exporter of coffee, and coffee plantations as large as 500 to 600 ha exist (Table 1). Although coffee production suffered from falling prices between 1999 and 2002 and the area under coffee tree cultivation shrank, coffee production recovered when prices started to rise again in 2004–2005 and the area under coffee trees expanded from 2010–2016.

**Table 1.** Coffee growing area in 2014–2016 season.

	Province	2014	2015	2016
1	Dak Lak	209,760	209,000	210,000
2	Lam Dong	151,565	154,000	155,000
3	Gia Lai	83,168	80,000	82,000
4	Dak Nong	131,895	126,000	128,000
5	Kon Tum	12,390	14,000	14,000
6	Dong Nai	20,800	21,000	21,000
7	Binh Phuoc	15,646	16,000	16,000
8	Ba Ria – Vung Tau	15,000	15,000	15,000
9	Quang Tri	5050	5050	5000
10	Son La	10,650	12,000	12,000
11	Dien Bien	3385	4500	4500
12	Others	5700	5700	5700
	<b>TOTAL</b>	<b>665,009</b>	<b>662,250</b>	<b>668,200</b>

Source: Buon Ma Thuot Coffee Association, 2017 [17].

Since Doi Moi, the livelihoods of the Northern Mountain Region (NMR) of Vietnam have gradually shifted from agricultural subsistence to market orientation on a large and comprehensive scale [10] while commercialization is applied to plantation crops, such as coffee. Coffee boomed in the NMR during the 2000s and was widely accepted by smallholder households. This led to provincial governments adopting coffee as an official crop. Coffee growing provides substantial income to smallholders and functions as a trigger for them to transform their livelihood from subsistence-based to market orientation. Previous studies on the NMR focus on political, economic, and social changes [18] or on changes in institutions and land [19] as the trigger for agricultural and livelihood transformation. Some look at the development of markets for upland agricultural crops as the indication of transformation brought

by changes in trade relations between growers and collectors [20]. A few other studies address environmental issues as both a driving force and a feedback, or consequence, of the development of the northern mountains [21,22]. This paper's goal is to investigate the process of the expansion of coffee production in the NMR and its role in the transformation of smallholder households' livelihoods as well as the underlying conditions necessary to support this pathway.

## 2. Study Site and Field Survey

Fieldwork for this study was done in Son La province. The province is located in the western part of the NMR 320 km from Hanoi. The province is the third largest of the 63 provinces in the country with more than two thirds of its land used for agriculture. The province shares a border with the Lao People's Democratic Republic. It has 12 ethnic groups of whom the Thai ethnic minority is the largest, accounting for 55%, followed by the Kinh, Hmong, Muong, Kho Mu, and Dao minorities.

Son La province has the largest coffee growing area in the NMR and the largest area of Arabica coffee cultivation in the country. It has a suitable climate for Arabica coffee with cool weather, heavy monsoon rainfall, and a cloudy dry season. The feralit soil with texture similar to the fertile volcanic soil of Sao Paulo (Brazil) is suitable for Arabica coffee (personal interview, Department of Agriculture and Rural Development (DARD), February 15, 2017). Grown at high altitudes in the North, the coffee trees need little water but have vigorous growth and production. Coffee was first cultivated in Son La province 100 years ago, but during the post-colonial period, it was abandoned due to the national food security policy. Coffee cultivation returned to the NMR in the 1990s, and the boom started in 2008–2010 when a massive expansion took place and thousands of hectares of Arabica coffee were planted. Currently, 12,000 ha of coffee grows in Son La province. The province has prepared a budget of more than 2000 billion VND to invest in the local coffee industry and to expand new plantations in Son La city as well as Mai Son and Thuan Chau district [23].

We selected Ban Dau village of Chieng Co commune in Son La province for the current study because of its history of coffee production. Arabica coffee was originally grown in the village during colonial times. Its cultivation stopped after independence. In 1995, coffee was planted in the area with support from the provincial government through a coffee company, but it was not extensively adopted as a crop by the village population.

The village is located on the periphery of Son La city, roughly 12 km from the city (Figure 1). The 2010 census reported that it had 93 households with 450 people living in them. Its population consists of 100% ethnic Thai. The average household size is five people, but households range in size from three to nine people. Household demography shows a dominant trend (more than 60%) toward "nuclear" households of only two generations (parents and children) and away from a more traditional family structure, which included three or more generations in one household. The household's livelihood system is mixed and often includes irrigated rice (paddy) cultivation, swidden fields where cassava and maize are grown, livestock, coffee cultivation, and plum and mandarin trees. The road connecting the village with Son La city was built in 2010.

Land allocation in the village started in 1995 with the support of the German aid agency, GTZ. Since the mid-1990s, Vietnam allocated forestland with the support of international donors and NGOs. The largest program was the Social Forestry Development Project (SFDP) in Son La and Lai Chau funded by GTZ. In Son La, the SFDP facilitated land allocation to households, individuals, organizations, groups of households, communities, and social organizations at village and commune levels [24]. Land allocation includes agricultural and forest land. Agricultural land is allocated for 30 years with land certificates, known locally as "red books". Forestland is allocated for 50 years. The types of allocated forestland include production forests, protection forests, and planted forests (land with trees that are planted with state funding). The district is the administrative level responsible for land allocation in Son La. Households are allowed to harvest timber for house construction, firewood, and nontimber forest products but are not allowed to plant agricultural crops on allocated forestland. In some places, the forestland area of households is fragmented and scattered. In many places, all

forestland has been allocated to households, so there is no land reserve left to allocate to newborns, young couples who move out of their parents' household, in-migrants, or retirees.

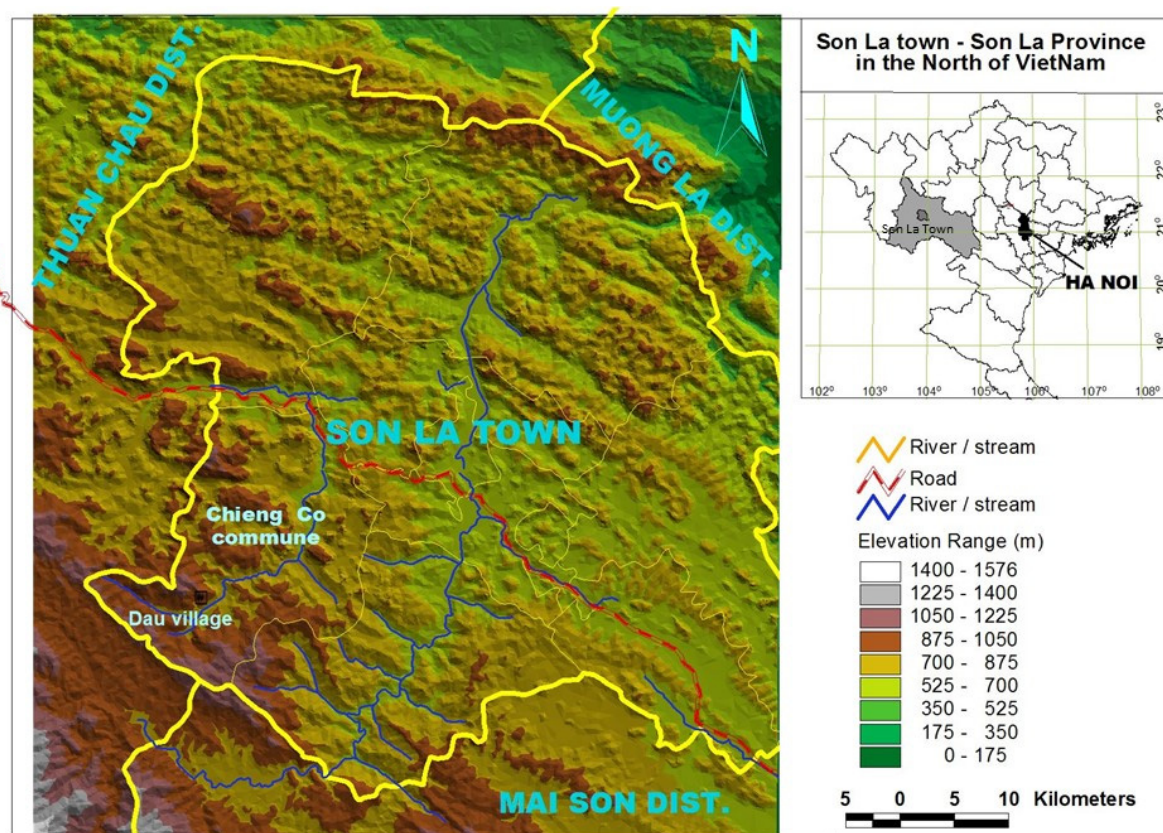


Figure 1. Location of study site.

The village land is classified into several types, including agricultural land (paddy and upland fields), forestland, fishponds, and residential (Table 2). Paddy land is allocated to each individual regardless of age. When allocation was done, each person was allocated more than 100 m<sup>2</sup>. A result of the land allocation process is that there is no agricultural land left for newly-formed households. Instead, parents have to share land with their children or newly-married couples have to borrow land from their relatives. As decided by law, paddy land will not be reallocated until 2020 and the reallocation of upland/forestland will not be done until 2049.

Table 2. Changes in land use of the study village (hectares).

Type of land	1990	1995	2000	2005	2010	2015
Paddy field	5.0	5.0	5.0	5.0	5.0	5.0
Upland field (rice)	16.8	17.5	18.0	5.0	0.0	0.0
Tree garden (plum, orange, coffee)	19.2	26.0	27.5	30.5	35.5	68.0
Forestry land for production	50.0	44.5	33.6	32.6	30.9	17.3
Forestry land for protection	180	178	172	172	172	172
Fish pond	1.0	1.1	1.2	1.5	1.5	1.5
Residential land	1.3	1.4	1.6	1.9	2.3	2.5
Total	273.3	273.5	258.9	248.5	247.2	266.3

This paper's research team visited the study site several times between 2015 and 2017. Interviews were conducted with household heads, key informants, and focus groups. All informants have lived in the village for at least 15 years, long enough to know how the coffee boom started in the local area

and affected their livelihoods and land use. Male informants dominated the sampled households (nearly 85%).

The researchers conducted household interviews, focus group discussion (FGD), and key informant interviews and applied a combination of random and nonrandom sampling. Forty six households were randomly selected from the village book and then adjusted using a quota sampling method to make sure representatives of poor and better off households were interviewed. The household interviews were conducted to collect information on how livelihood systems, land use, and farming practices have changed since the coffee boom started. Each interview took nearly an hour, using a semi-structured questionnaire guide. The questions focused on changes in the household's use of land, labor inputs in paddy rice, and upland farming practices.

Three FGD were convened among different groups of people such as coffee growers with large plantation areas, representatives of households that have hired labor to maintain and harvest their coffee fields, and representatives of households that have members that do nonfarm work. The FGDs consisted of 10–15 people each, including rich, upper middle, middle, poor, and near poor households, according to a local scaling of wealth. The gender balance was difficult as the local women preferred to have men talk about field size and “technical stuff” (their words). Various tools were used for the FGDs. For example, a historical timeline, developed by the participants, was used to discuss climate risk events, changes in crops, and land use related to the coffee boom, while decision-trees and adaptation pathways were used for discussion of the village's crop history and the village's profile in order to elicit discussion on hired labor and changes in rice farming practices.

Key informant/stakeholder interviews were done with provincial leaders who are responsible for the management and the planning of the coffee growing in order to discuss local government support for crop development. At the community level, meetings with the chairman and vice chairman of the Commune People's Committee were organized to discuss land use planning and the future of coffee in the village's socioeconomic development plan.

### 3. Results

#### 3.1. The Crop Boom Process

Prior to 1995, the households cultivated paddy rice and upland rice in swidden fields. By 1997, some households switched to growing maize and cassava in their swidden fields. Traditional practices in the past allowed harvested fields to stay fallow for over 10 years and each household used to have at least 3–4 plots of swidden fields that they rotationally cultivated [25]. Both paddy and swidden farming demanded intensive labor at different times. The villagers depended upon household labor for most of their agricultural production needs, but households would exchange labor during the agricultural “high season” when individual households' labor capacity could not adequately meet their needs. In wet rice harvest season, for example, three to five households, who had fields close to each other or had a family relationship, would organize to take turns to help each other harvest and transport rice to their home. By doing this, the time is shortened to one or two days, instead of four or five days, per household to harvest and transport rice.

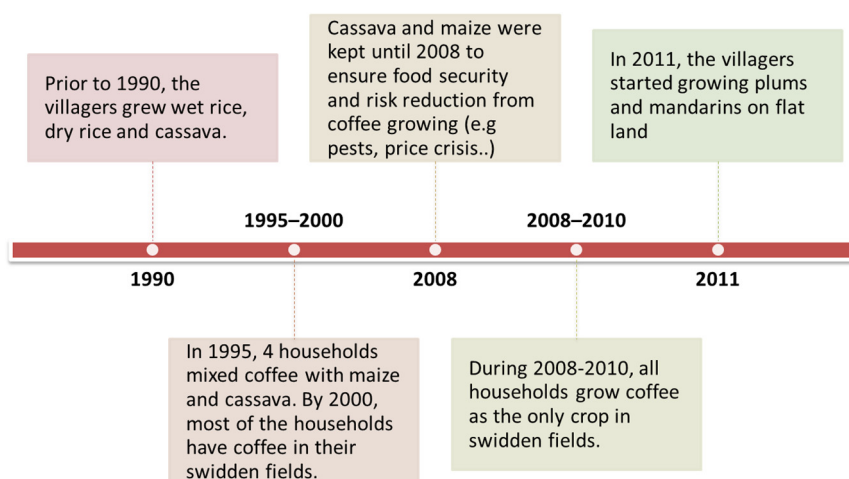
Rice was grown for household consumption and maize and cassava were consumed by households as a staple food and fed to livestock; a small portion of maize and cassava was sold for cash. During the precoffee boom period, in 2007–2008, maize and cassava sold at the village for 1000–1300 VND/kg. It was mainly sold to well off households and/or traders from outside the area. During the precoffee boom period, income for a family from one hectare of maize and cassava was 10 million VND per year.

Coffee trees were replanted in Ban Dau in 1995 when four households volunteered to plant coffee trees on part of their swidden fields. These households were better off households and received coffee seedlings, fertilizer, and pesticides as initial support from the government-owned Son La Coffee Company. Each of these households had more than 8000 square meters of swidden land where they grew their staple food crops. Informants report that the initial planting of coffee was done because

“the fields were worn out and needed a lot of fertilizing”. Five years later other households adopted coffee trees, reportedly after they observed that the first four households’ efforts were successful. The new households first planted coffee on 1000–2000 square meters. The new adopters continued to grow cassava and maize on their remaining swidden fields since they needed to continue to grow these crops for food. This initial process of coffee expansion stopped in 1999 when many coffee trees were damaged by frost and there was a drop in the price of coffee.

The current coffee tree boom started during 2008–2010. During this period, all the village’s remaining households switched to growing coffee. The process of this village-wide shift from subsistence farming to market orientation was gradual because a substantial amount of initial investment is needed for coffee growing, and not all households could afford to switch to coffee at the same time. However, strong kinship ties between households helped households with fewer resources gradually adopt the growing of coffee trees. Households within the village provide loans to each other in the form of labor exchange and working for other coffee growers and being paid by inputs (seedlings, fertilizers, help in harvesting). Households are also able to “borrow” small pieces of land from relatives to grow coffee on and only pay small amounts back. Households also borrow loans from relatives and sell their products to loan providers. Informants reported that in many cases, borrowers do not pay back loans when required, and the loan providers, since they are related, let them extend their loans for a few months. These kinship and neighbor based relationships remain strong among the ethnic Thai in the village and have helped less wealthy households join in the coffee boom.

As coffee trees are established, household labor inputs are reduced because the coffee growing related tasks include only maintenance activities such as weeding and some fertilizing. The households interviewed reported that, similar to the initial four households described above, they started growing coffee on 1000–2000 square meters and then expanded the cultivation of coffee trees to cover all their swidden fields. Those who had sufficient capital and labor started growing coffee early and expanded coffee production to cover all their fields within 2 to 3 years. These households acted in a timely fashion and experienced high returns when the coffee price in the market increased in 2011 and 2015. Other households took an average of 4 to 5 years to cover all their land with coffee trees. In special cases, the household head reported that it took them 10 years to cover 1.6 hectares of land with coffee trees. (Figure 2)



**Figure 2.** Coffee and changes in economic space (adapted from the village timeline).

The average area for coffee cultivation was more than 8000 square meters per household in 2015 (Table 3). A household can grow 20–30 coffee trees on 1000–2000 m<sup>2</sup> or 200 trees on one hectare of land. The size of coffee tree areas vary widely by household. This is due to the history of swidden field development in the village. When swidden fields were expanded into the forest 10 years prior to the coffee cultivation, some households were able to clear more forest—those households now have

more coffee tree area. Today forestland is allocated for reforestation and protection. However, the village leaders report that there have been cases where people were caught sneakily “rolling up forest land for coffee” (as one rolls up one’s sleeves). In other words, they slowly cut trees on forestland and replaced them with coffee trees. Households can also bid for land from the communal 5% land fund for permission to plant coffee on land for 20 consecutive years at a price of USD10 for 1000 square meters per year. This helps smallholders to expand their area of coffee growing.

**Table 3.** Land holding per household.

Type of land	Area					
	Minimum		Maximum		Mean	
	m <sup>2</sup>	%	m <sup>2</sup>	%	m <sup>2</sup>	%
Paddy land	200	6.5	1200	1.5	608	2.7
Coffee land	1300	42.6	20,500	25.2	8138	36.0
Forestry land (allocated for replantation)	500	16.4	50,000	61.5	8874	39.3
Forest land (allocated for protection)	1000	32.7	8000	9.8	4429	19.6
Fish pond	30	1.0	800	1.0	280	1.2
Residential land	24	0.8	800	1.0	247	1.1
Total	3054	100.0	81,300	100.0	22,576	100.0

Source: Field interviews, 2015.

Currently, the village has 88 hectares of coffee trees intermixed with plum trees, areas where maize and cassava are still grown for livestock, and 3.8 hectares of paddy. Table 2 shows that each household has an average area of 8138 m<sup>2</sup> of coffee trees, and paddy area ranges from 200 m<sup>2</sup> to 1200 m<sup>2</sup> per household.

### 3.2. Government Support for Coffee

The provincial government developed procoffee programs and policies in response to the coffee crop boom in Vietnam, including low-interest loans, financial aid for purchase of seedlings, harvest machines, and drip irrigation systems. The Son La government issued policies in support of the recultivation and stabilization of the coffee area. For the period 2016–2020, support programs were set up to provide coffee seeds, seedlings, supplies, and access to bank loans to coffee growers and businesses. The government bank arranged a special mechanism for loans that are used for coffee recultivation (the replacement of old with young trees). The bank eased paperwork, shortened application procedures, and simplified the disbursement process. Interest rates are lower and loan terms are suitable for the cycle necessary to replenish coffee (approximately three to five years) or up to five or seven years to improve productivity and the quality of export coffee. At the same time, enterprises do not have to pay value-added tax if their business is to preprocess coffee. They are also exempted from land rent and land tax if they are doing business in poor and remote areas.

### 3.3. Benefits and Risks of Coffee Production

There are both benefits and risks to households with regards to coffee production. Relying on the market is both a risk and a benefit. Initially, in 2010 the province-owned “Son La Coffee Company” had an exclusive right, through a contractual arrangement, to buy coffee from the village. The province has a policy to develop coffee production, and the company received funding from the provincial budget to support coffee growers with seedlings, fertilizer, and pesticides. Through supporting households with such inputs, they had an informal contract with the households that included that they would return and buy the household’s coffee production from them at a preharvest agreed upon fixed price. At the beginning the households liked this arrangement because they did not know where else to sell their coffee. The Son La coffee company bought fresh coffee beans for between 7000 and 12,000 VND



per kilogram in 2011. However, the company went bankrupt due to the drop of coffee price in the international market in 2013 and, as a consequence, each household had to look for buyers. By this time most households had learned of other places to sell their coffee production and they started to sell it to traders who came from Son La city for 5000–8000 VND/kg, generating 62.5 million VND from one hectare of coffee during the period 2013 to 2016.

A risk that all households face is the pressure for cash. Poor households spend 40% of their income on rice and more than 30% on daily necessities. Fluctuation in the price of coffee directly affects their life, but households report that coffee production is about five times more profitable than what they made from producing only the staple crops of rice, maize, and cassava. One respondent said: “My family would not earn enough to live if we grew a hill of rice, but a hill of coffee could help, plus give us some extra cash to save”.

Besides market uncertainty, climate risk is a threat to the village. Informants, during a group discussion, stated that coffee trees in the study village have been affected by three major hazards since 1995. The first was the long period of frost in 1999, which killed two thirds of the coffee trees. The second was the prolonged extreme cold with frost in 2014. The third was the frost at the beginning of 2016 that killed all the coffee trees on the tops of the mountains and the hillsides. Households reported a loss of more than 50% in the 2016 harvest. One household said that they harvested only 10 tons of coffee beans in 2016, while they harvested 25 tons from the same area in 2015. However, one respondent also said, explaining that even with the hazards to coffee, “We don’t have to worry about risks because coffee generates more income. Even when there is a year of loss, we can recover the loss in the next harvest. When coffee was damaged in 2016, the entire crop was not lost, and income from the remaining trees was still higher than that from maize and cassava.” The villagers in Ban Dau still grow coffee despite loss from frosts because they are responding to market incentives. Growing coffee gives them higher economic return in terms of very high income per hectare. A study in Dak Lak also found that for most of the surveyed farmers, the calculation of net income per hectare, per man-labor, and water use for coffee production show high economic return [26]. The villagers in Ban Dau make coffee their crop choice despite loss from frosts because they are supported by changes in market forces. If they had only Son La Coffee Company as buyers at the beginning, they now have more options with traders coming from the Son La city or collectors coming from the neighbor commune or from this village.

#### 3.4. Farm Mechanization and Labor Arrangement

The households used coffee-generated cash to buy machines for farming. Coffee is harvested three times a year. The time spent for the harvest varies from household to household but in general, it takes place between September and December. November is the busiest month. Nearly 70% of the households now own coffee bean milling machines. This portable machine helps to significantly reduce the time spent harvesting (Table 4). Those who cannot buy a machine rent one from other households. A coffee bean picking machine can harvest ripe and green coffee beans and allows households to pick 1.2 to 2.0 tons of fresh coffee beans in one day. It requires the presence of only three people in the field (one to handle the machine and two others to lay the canvas for catching beans that are shaken from the tree and then to put the beans into sacks).

**Table 4.** Labor requirement for harvesting coffee.

	Average	Max	Min
Labor requirement (person day/1000m <sup>2</sup> )	27.5	32.0	24.0
Proportion of hired labor (%)	69.0	66.7	69.2

Source: Household interviews, 2017.

Household labor and hired labor is used for coffee. Respondents reported that all households, including poor ones, have to hire labor to assist with coffee cultivation and harvesting. Labor is hired to do land preparation, hole digging, weeding, and in particular, to pick coffee beans. If the beans are not picked fast enough, they fall to the ground and can no longer be harvested. On average, one needs to hire eight to ten laborers in addition to four laborers from the household to harvest one hectare of coffee in seven to ten days. Harvesters are paid at the rate of 2000 VND/kg of fresh coffee (rate in 2015). The wage for harvesters is around 150,000 VND per day, which is higher than that for maintenance work. In 2015, a household with a total output of 25 tons of coffee had to hire harvesters for 15 tons, and the total cost of hiring harvesters was about 30 million VND. Another household head reported that he paid nearly 13% of his household income to hire labor to harvest coffee from a growing area of two hectares. Having a large growing area of two to three hectares, two households had to sign contracts with a group of laborers from Thuan Chau district to make sure that they had labor during the peak season. Labor demand gets so intense in the coffee harvesting season that contracts are needed in order to secure laborers, but labor demand drops significantly after the harvest. Hired laborers arrive as individuals or in groups and often stay in the village for two to three months. Most of the hired laborers are from neighboring districts such as Thuan Chau, Muong La, Quynh Nhai, and Yen Chau, and even from Yen Bai, a neighboring province.

### 3.5. Other Agricultural Changes

Wet rice farming used to require intensive labor for land preparation, maintenance, and harvest activities. Since gaining income from coffee, many households have bought power tillers and portable threshing machines. A power tiller costs 22 million VND (1000 USD in 2011) and a weed cutter costs six million VND (250 USD in 2012). These machines are used by the households and rented to neighbors. With increased mechanization, the number of days of labor required in rice farming is reduced, particularly the time needed for land preparation and harvesting has decreased (Table 5).

**Table 5.** Changes in labor inputs on wet rice farming.

	No Machines	With Machines	% Time Reduced
Land preparation	85.3	5.3	93.8
Transplanting	37.3	16.0	57.1
Maintenance	42.7	18.7	56.3
Harvest	21.3	5.3	75.0

The mechanization of paddy farming has provided a substitute for labor in preparing the land and harvesting. It takes labor-intensive tasks off the shoulders of men and especially young and middle-aged men can go to other areas to work as hired laborers. Tasks which were mainly done by human labor, such as puddling, plowing, and harrowing, are now done by machine.

### 3.6. Livelihood Diversification

Respondents report that they now have enough labor surplus to diversify livelihoods to include growing fruit trees, raising livestock, having aquaculture ponds, harvesting woolly ferns from the forest for trade, and working as wage labor. Men from the village are now hired for jobs in the city and industrial zones in the Red River delta. It was revealed in interviews that there are groups of laborers from Son La province working in the TV assembly and textile factories in the Industrial Parks in Hung Yen province (over 320 km away).

The mixed cropping systems with coffee are one of the biggest livelihood changes. Three years after the coffee boom, households started interplanting sweet plums (*mận hậu*) and coffee. Later, they added mandarins to their gardens on flat land. They also started growing beans and peanuts by planting these between the rows of coffee trees for supplemental income. The latter started after the frost in 2016, households decided to mix beans and peanuts in their coffee field and grow fruit trees

to have supplemental income. Interviews conducted in March 2017 revealed that households in the village now grow mandarins interplanted with coffee on upland fields as well. Some households predict that by 2021 when they start to harvest the mandarins, their typical cropping system might be rice, coffee, plums, mandarins, and livestock.

### 3.7. Land Tenure in the Village

In the study area, coffee trees were planted on swidden fields, which were allocated to the households as agricultural production land in the 1990s. The households were granted certificates for their land plots. With the land certificates, the households have both rights and access to their land and they can now make their own decisions regarding the crops they grow. They were able to retain staple food crops to ensure food security and through sales of some of their crops the households generated cash income that they used over time to invest in expanding their coffee tree growing area. Berry [27] notes that secure land tenure is one of the fundamental conditions for smallholders to retain control over their means of production. Similar to what Fischer and Victor [28] found in Guatemala, households in the village, through their secure land tenure to their coffee fields, retain control over their means of production and this leads to a change in the village labor force as household members begin to work off-farm since they have to work less in their fields.

Although most interviewees admitted that they would keep their land or wished they could have more land so that they could be free to work whenever they wanted, a limited amount of land selling was observed. There were two households out of 94 in the study village who reported that they had sold part of their land to buy coffee seedlings and pay for land preparation. They did not sell all of their land and they kept a part of their land in order to continue farming. Four instances of land purchase between neighbors were reported in a neighboring village. The price of residential land reached USD 1000 per square meter in 2017. The village head reported that he did not want to certify such land purchases because he knew that only poor households wanted to sell their land, and it was almost impossible to repurchase land once sold. However, he admitted that the village leaders were ultimately powerless as the land use certificate legally grants households the right to transfer their land use rights to others. When asked whether they thought land purchasing would increase in the village, many households thought that the rapidly increasing land prices would cause the pace to slow.

## 4. Discussion: Transformation of Livelihoods and Land Use

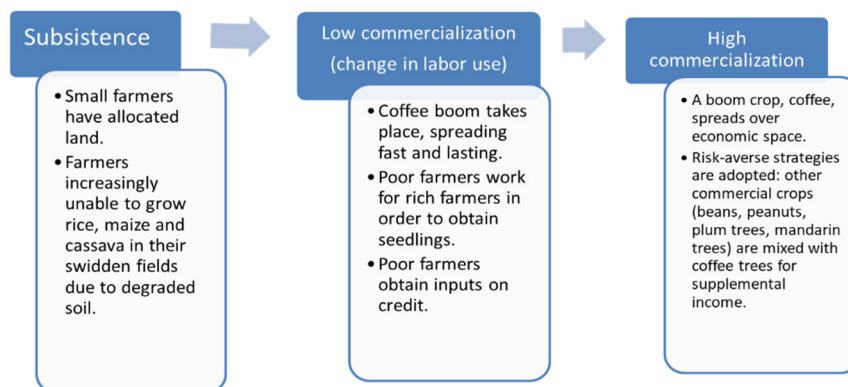
What took place in the study village with the adoption of coffee as a boom crop has structured the process of livelihood transformation and land use change (Table 6). The coffee boom has changed the local livelihoods from what was subsistence-based to a livelihood system oriented towards the market and based around the commercialization of farm products. Land use in the village has changed from having large areas devoted to swidden, to land being used predominantly for paddy and tree crops. Since converting to coffee, households have generated significant amounts of cash. Income from coffee accounted for one third of the whole household income in 2012 [29] and increased to more than half of the household income by 2017. Figure 3 gives a synoptic view of the commercialization process in the study village for the period from 1995 to 2016. This figure illustrates how livelihood transformation took place as the coffee boom led to the disappearance of swidden staple food crops and the increase of the growing of crops for sale in the market.

Figure 3 also illustrates the greater, societal transformation of the village. People in the study area are all minority Thai. The subsistence livelihood activities were operated in the context of Scott's [12] moral economy with a series of accompanying social/cultural and technical arrangements to ensure proactive production. Households in the study area knew how to avoid risks. In his analysis of the debt problem of ethnic minority groups, Hoang Cam [10] argues that the traditional livelihoods of Thai people in Son La depend on the "subsistence ethics" of a moral economy. The shift to coffee has exposed people in the study village to a new mechanism where cultural-social and technical arrangements, including mutual support and the utilization of available resources in the livelihood

model, may no longer operate the same. For a minority group, social and cultural capital is of decisive meaning to the success or failure in livelihood transformation [10]. The results of this research suggest that as the transformation from subsistence to market orientation has taken place, practices such as the accumulation of social and cultural capital, from equal reciprocity and labor exchange, have been modified and practiced to better support the transition to more effective coffee growing.

**Table 6.** Changes in cropped area and number of livestock of the study village.

Kind of Crop/Livestock	1990	1995	2000	2005	2010	2015
Cropped area (ha)						
Paddy	5.0	5.0	5.0	5.0	5.0	5.0
Upland rice	16.8	17.5	18.0	5.0	0.0	0.0
Maize	12.5	13.0	15.0	17.0	15.5	5.0
Cassava	10	12	15	10	6	0
Bean	1.2	2	1.5	1.2	1.2	1.2
Peanut	1.0	1.0	1.0	1.0	1.0	1.0
Coffee	0.0	0.0	10.0	26.0	36.0	71.8
Plum	1.0	15.0	20.0	25.0	30.0	36.0
Mandarin	10.0	8.0	5.0	3.0	2.0	4.0
Livestock (head)						
Buffalo	46	35	30	27	19	12
Cattle	52	47	38	25	16	14
Pigs	1200	1500	2000	2200	1360	876
Chicken	2000	2300	2600	3000	2306	2800



**Figure 3.** Livelihood transformation process in the study village.

Coffee production has also changed labor demand and supply in the study area. Income from coffee generates capital for households to invest in machinery to mechanize coffee harvesting and land preparation for paddy farming. Mechanization inputs have reduced labor demand as it alters the way labor is utilized and provides significant labor substitution [30]. The cash income from coffee also enables coffee growers to hire laborers as substitute workers. Labor inputs, which used to be family-based and were needed all year round to take care of family farming, now fluctuate before and after the coffee harvest season. This seasonal demand gets so intense in the harvesting season that contracts are needed in order to ensure the availability of workers at that time, but labor demand drops significantly after harvest. Such a business-like operation with labor contracts and wage payments had never taken place in the village before. The practice of hiring labor creates flows of seasonal (circular) inward migration in the area. It also allows for outward flows of labor to industrial parks in the Red River Delta. Remittances from the out-migrants are used to invest in coffee planting, to buy rice, or to invest in machinery for coffee tending and rice farming. As a result, coffee production

continues to expand into a wider area. In the study area, the coffee crop boom is an opportunity for local smallholders to access capital in the absence of a functioning credit market similar to what Fischer and Victor [28] found in Guatemala. Thus, what is found in the study area as a consequence of the coffee crop boom is quite different from what happened in the Central Highlands and other places where crop booms resulted in the loss of the basis for the local livelihood system to function and led to insecure livelihoods.

As explained in the results, the mechanism that is behind the livelihood transformations and ultimately land use changes are incentives and assistance that were offered to households in the study area to grow coffee in the face of declining soil fertility. However, further changes in livelihood systems and land use to include other cash crops in their fields resulted from the increased household level of market engagement/participation that took place as coffee growing expanded in the village. Households growing coffee sell their products locally, and through intermediaries, to international markets generating an important revenue source for households. Even under the previous subsistence oriented livelihood system based around swidden land use, households needed some cash in order to purchase some necessities. Thus, they were already engaged in the market, albeit not strongly engaged. With the replacement of staple swidden crops, the village's households' need for cash increased, and as noted above coffee trees could be damaged by inclement weather. Households look to mitigate these damages by integrating more cash crops into their fields (beans, peanuts, mandarin, and plum trees) and through adoption of off-farm and nonfarm work. These changes provide them with more cash, enable them to purchase more goods from the market, and lead them to a cycle of more market engagement and participation. Thus, the increased engagement/participation in the markets leads to a further village-wide shift from subsistence to market orientation.

In addition to livelihood system changes and land use changes, changes in the land tenure system and in public interventions also have taken place in the study area. As previously noted, households were given land certificates for their land, and this was one of the mechanisms that encouraged them to plant coffee trees on their land. However, planting coffee trees, and later plum and mandarin trees, also increased their land tenure security, as planting trees on land is locally considered a symbol of land ownership. Similar to Berry [27], the results of this study suggest that secure land holding is one of the fundamental underlying conditions of a successful pathway to livelihood transformation. While there were households who lost access to land, their number was quite limited, and the ownership of the land they lost, usually sold, stayed within the village. Because village households initially had rights to land, and further secured it through the process of the coffee boom, external investors did not intervene in the production of coffee.

Another point that needs to be recognized is that in the context of the scarce opportunities in the NMR, due to poor market channels, the reported government support programs found in the study area provide opportunities for household growers, including ethnic minorities, to become specialized in coffee cultivation. The effect of these government programs is amplified, especially at the initial stage, through the kinship support mechanisms in the village. Unlike in the Central Highlands where the Kinh majority were involved in the coffee boom and took out private loans to finance that coffee expansion [10], the kinship support in the study area meant that households were less exposed to private lending sources and the households had more flexibility in paying back loans. Thus, this, in addition to government service and activities of the private sector, plays a supplemental but essential role in achieving a sustainable pathway of transformation in the study area and the NMR.

## 5. Conclusions

Unlike the case in the Central Highlands, the transformation found in the study area is inclusive and smallholders are so far achieving a sustainable pathway of livelihood transformation. Through a mixture of government support and local kinship support, social capital, the boom is highly managed and successful. The resulting adoption of coffee has triggered the transformation of the local livelihoods from subsistence to market based and also led to changes in the way land is used in the village. Before

1995, farming in the study village was based around paddy cultivation and swidden cultivation and most products were for household consumption. Wet rice remains cultivated today, but households have converted their land to growing coffee, and recently started to interplant cash-generating tree crops (plums and mandarins) with the coffee trees. The coffee boom triggered the diversification of the village's cropping system. In order to minimize risks, households intercrop staple crops with coffee, shifting gradually to commercial crops with the aid of social capital from the community as a mechanism to "minimize risk". The households mixed maize and cassava with coffee in the initial years, mixed plum trees with coffee, and planted mandarin trees in lowland areas, as well as continuing to grow paddy rice, as insurance to overcome coffee crop failures or price drops. Such experience was derived from the households' risk-averse attitude in dealing with climate risks and unstable market prices in the past.

The coffee crop boom in the NMR shares similarities with characteristics of boom crops noted by other researchers. There are, however, divergences in the findings that are worth mentioning. The coffee boom in the study village is a distinct case as it did not end in a bust when the coffee price dropped drastically. The multicropping structure (rice, coffee, and fruit trees) that the study area has transformed into is an effective strategy to cope with price fluctuation and reduce climate risks. The coffee boom in the local context is built on local social relations and creates links between farming and other economic activities, such as wage employment and nonfarm employment, in other branches of production. With land tenure security ensured, local people are seen to be experts at developing risk-averse strategies and social relations provide supplemental support to cover the labor deficits in periods of high labor needs. In this case a coffee boom crop, managed at multiple levels ranging from national to provincial to district and even to village and kinship levels, has successfully triggered a transformation of local livelihoods from subsistence to market orientation and led to landscape level land use changes.

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