



## Changing human–landscape interactions after development of tourism in the northern Vietnamese Highlands



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### ABSTRACT

In developing countries in tropical regions, the poorest segments of the rural population often rely on forests for survival. The creation of off-farm jobs in the tourism sector, construction or manufacturing has been suggested as a potential way to alleviate pressure on tropical forests. Using Sa Pa district as a case study, we evaluated the coupling of human and forest dynamics. The district was opened for international tourism in 1993, which had a large impact on daily life in Sa Pa town and its surrounding communities. Analysis of land cover change for the period 1993–2014, using high-resolution satellite images from three timeperiods and an analysis of covariance, detected possible associations between forest cover change and socio-economic, cultural and biophysical variables at the village level. Between 1993 and 2006, Sa Pa district experienced a net decrease of forest in favour of arable land, while this trend was reversed in the period 2006–2014. However, trends at district level mask substantial heterogeneity at village level. Results show that deforestation is considerably lower in villages that are strongly involved in tourism activities. Marginal agricultural fields with low productivity are also preferentially abandoned. Because of diversification in alternative economic activities, rural households may become less dependent on natural resources and agricultural products for their survival. These results suggest that the creation of off-farm income sources activities can be a driver of shifts in human–environment interactions, as new livelihood strategies can offset the pressure on forested land.

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### Introduction

Many tropical areas worldwide are characterized by high rates of deforestation. According to Lambin and Geist (2003), one-third of the humid forest in Southeast Asia was cleared between the beginning of the twentieth century and World War II. The decline in forest cover continued after the 1950s. Presently, forests cover 46–48% of the land surface in Southeast Asia, but less than 10% of the primary tropical rainforest is preserved (FAO, 2010; Dong et al., 2012). Recent deforestation rates for this region are assessed at 1.5% per year (FAO, 2006; Grainger, 2008). Nevertheless, forest

dynamics are diverse. In some countries, such as the Philippines or Cambodia, the deforestation rate is much higher than the Southeast Asian average; while in other countries, such as Vietnam, the start of a forest transition is reported (FAO, 2006; Meyfroidt and Lambin, 2008b). Forest transition is defined by a reversal of the trend of deforestation so that net reforestation occurs (Meyfroidt and Lambin, 2008b). Causes of tropical deforestation and forest transition are still poorly understood, and are the scope of ongoing research programmes. Deforestation and reforestation patterns are linked to multiple biophysical and socio-economic variables such as ethnicity (Castella et al., 2005; Vu et al., 2013), land tenure (Mottet et al., 2006), increasing demand for food production (Zhang, 2000; Geist and Lambin, 2001; Casse et al., 2004; Meyfroidt and Lambin, 2008a), poverty (Hobbs, 2001; Adams et al., 2004; Dasgupta et al., 2005; Robinson, 2006; Zwane, 2007), soil fertility (Szillassi et al., 2010; Vanacker et al., 2014), and accessibility (Koning, 2000; Castella et al., 2005; Etter et al., 2006; Van Dessel et al., 2008).

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In rural areas in developing countries, the poorest segments of the population often rely on forests for survival (Tugault-Lafleur, 2007; Coulibaly-Lingani et al., 2009). The use of forest products allows livelihood diversification, but may lead to forest degradation and/or net deforestation when it is not controlled (Jadin et al., 2013). The Vietnamese mountain areas are dominantly populated by ethnic minorities that speak local languages and still adopt a traditional livelihood based on self-subsistence farming (Fox et al., 2000; Tugault-Lafleur, 2007). These minorities often live in relatively isolated conditions and do not fully participate in the major economic transformation of Vietnam that is taking place in the lowlands. The livelihood of these local people strongly depends on the available natural resources because of a lack of infrastructure and education that would allow them to participate in market-oriented activities (Frontier Vietnam, 1997). During past decades, the scarcity of arable land coupled with population growth has led to increasing pressure on forests (Burgess and Barbier, 2001). Exploitation of forest resources by ethnic minorities, responding to socio-economic pressures, is generally thought to be the cause of rapid forest degradation and/or deforestation in Southeast Asia (Fox et al., 2000; Geist and Lambin, 2001). Studies by Jodha (1998), Ravnborg (2003), Scherr (2000) and Jadin et al. (2013), however, showed that deforestation is not necessarily associated with poverty.

The creation of off-farm jobs has been suggested as a potential way to alleviate pressures on tropical forests (Mather, 1992; Rudel et al., 2005; Getahun et al., 2013; Teka-Belay et al., 2013). Off-farm jobs are often created by economic development of urban areas resulting in rural–urban migrations (Vanegas and Henry, 2012; Vermeiren et al., 2012). Development of tourism activities in rural areas has also been suggested as a viable means to offset pressures on forests (García-Martínez et al., 2011; Nyaupane and Poudel, 2011). When rural households can generate additional income from tourism activities, abandonment of low-productive farmland and spontaneous establishment of secondary forest on former agricultural plots may result. Dong et al. (2008) supported this hypothesis based on a case-study in Lugu lake (China). Job and Paesler (2013) also described how the intensification of tourism in Wasini (Kenya) has led to less intensive land use for agricultural purposes, eventually resulting in a decrease of farmland and an increase of the forest area. Nevertheless, this hypothesis has been challenged by other studies suggesting that tourism activities stimulate deforestation and forest degradation. Research by Forsyth (1995) in northern Thailand showed that the growth of the tourism sector did not decrease agricultural pressure on forests and soil resources because households invested their income from tourism in the expansion of arable fields and increasing frequency of cultivation by hiring external labour. Additionally, Gaughan et al. (2009) showed that the increased number of visitors to the archaeological sites of Angkor Wat in Cambodia accelerated deforestation in the Angkor basin. The deforestation occurred due to increased charcoal production for new restaurants and hotels, which required wood products from forests. In the coastal areas of Hainan Island (Southern China) and the Mediterranean (Turkey), Wang and Liu (2013) and Atik et al. (2010) respectively indicated that tourism development led to a rapid increase of the built-up area. These activities resulted in a decrease of agricultural land and coastal forest, causing landscape fragmentation and coastal erosion.

In this study, we evaluate possible changes in the human–environment interactions after the development of tourism activities. Using Sa Pa district in the northern Vietnamese Highlands as a test case, we addressed the following questions: First, how has forest cover changed in the period between 1993 and 2014? Second, how does forest cover change relate to tourism development? Third, what are the likely impacts of the changing human–landscape relationships on local livelihoods?

## Study area

Sa Pa district is located in Northern Vietnam (Fig. 1) and covers an area of ca. 680 km<sup>2</sup>. It has a total of 55,900 inhabitants (GSO, 2010) living in 17 communes and its administrative centre, Sa Pa town. The district is considered as a gateway to the northern Vietnamese Highlands. The topography is rough, with an elevation of 180 m in the Muong Hoa valley and up to 3143 m at the Fansipan peak (highest elevation in Vietnam, located within Hoang Lien National Park). The major rivers are the Muong Hoa and Ta Trung Ho River that flow in the Red River nearby Lao Cai. The region is characterized by a sub-tropical and temperate climate with an annual rainfall of 2763 mm (Frontier Vietnam, 1999).

Sa Pa district is home to 6 major ethnic groups: the Hmong, the Yao, the Tày, the Giáy, the Xa Pho and the Kinh. The Tày occupied the fertile valleys and middle altitudes. The other ethnic groups such as the Hmong and Yao entered Northern Vietnam only in the 19th century (Michaud and Turner, 2006), and settled on steep forested slopes generally above 800 m. Before 1960s, there were only a few Kinh lowlanders living in Sa Pa town as the surveillance and maintenance staffs of French military (Michaud and Turner, 2006). From 1960s onwards, Kinh migrated to Sa Pa district as this was stimulated by the New Economic Zone Policy of the national government (Michaud and Turner, 2000, 2006). The Kinh were mainly involved in administration, tourism, and education and settled in the district's capital, while most of the other ethnic groups practiced different types of subsistence agriculture mostly in the form of shifting cultivation (Tugault-Lafleur, 2007). Apart from the shifting cultivation, ethnic minorities also used to cultivate opium and collect forest products for their survival (Michaud and Turner, 2000; Sowerwine, 2004b; Turner, 2012), which could have contributed to past forest clearance. Today, the ethnic groups cultivate water rice on permanent terraced paddy fields; maize and other crops on upland fields (Leisz et al., 2004; Turner, 2011). Terraced paddy fields were first introduced by the Hmong and Yao who migrated from southern China to northern Vietnam during the late 19th and early 20th centuries (Michaud, 1997). Additionally, many households cultivate cardamom (*Amomum aromaticum*) under forest cover as a substitute cash crop, after the ban on opium in 1992 (Tugault-Lafleur and Turner, 2009; Turner, 2011).

Because of its scenic landscape and presence of five ethnic groups with their traditional way of living, Sa Pa is considered as one of the most attractive tourism areas in Vietnam. The Hoang Lien Mountains comprise probably the last remnants of native forest of the northern Vietnamese highlands. It became one of the first areas recognized as a 'special use forest' in Vietnam, and it was converted into the Hoang Lien National Park (HLNP) in July 2002 following the Prime Minister's Decision 90/2002/QĐ-TTg to protect biodiversity by preserving the subtropical and temperate forest ecosystems (Le, 2004; Jadin et al., 2013). Already under the French Regime (1887–1940), Sa Pa district was a well-known holiday and relaxation resort (Michaud and Turner, 2006). Northern Vietnam suffered a lot under the first Indochina war (1945–1954). The town sunk into oblivion, as a large part of the population of Sa Pa town fled away from the hostilities. In the early 1960s, in the framework of the New Economic Zones Policy, migration schemes were designed by the new socialist regime that stimulated the Vietnamese Kinh from the lowlands to populate the northern Vietnamese Highlands (Hardy, 2005). The decision of the national government to open Sa Pa district for international tourism in 1993 had a large impact on daily life in Sa Pa town and its surrounding communities. The number of domestic and international visitors increased exponentially from 16,100 in 1995 to 405,000 in 2009 (GSO, 1995, 2010) (Fig. 1). Tourism is now the most important economic activity in the area, and it generated 58% of Sa Pa

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