

FRAGRANT FRONTIER

Global Spice Entanglements
from the Sino-Vietnamese Uplands



SARAH TURNER
ANNUSKA DERKS
JEAN-FRANÇOIS ROUSSEAU
~ editors



False promises

Cardamom, cinnamon, and star anise boom-bust cycles in Yunnan, China

Jennifer C. Langill and Zuo Zhenting

INTRODUCTION

Commodity booms and crop price volatility are increasingly familiar concepts for smallholder farmers across Asia. Market prices and the potential for stable, positive returns are two of the many factors producers consider in choosing what to cultivate on their farms. However, intensified crop boom-bust cycles are increasingly common at regional or even global scales, amidst processes of market integration, transitions away from subsistence production, changing commodity chains, and ongoing forces of globalisation. Such commodity booms and busts have important implications for small-scale farmers in Asia who have often selectively engaged in one or only a few cash crops, and who may have limited alternatives.¹

Farmers in Asia's agrarian frontiers have witnessed a sharp increase in cash crop production in recent years (Taylor, 2016; Junquera and Grêt-Regamey, 2019; Kong et al., 2019; Mahanty, 2019). These frontiers have become important sites for analysing smallholder participation in cash crop cultivation due to the added vulnerabilities that farmers often face in these settings, including environmental enclosures, economic and political marginalisation, and state-led territorialisation, as noted in Chapter 1 (see also Sturgeon et al., 2013; Eilenberg, 2014; Turner et al., 2015; Mahanty and Milne, 2016). Despite the attention to commodity booms in Asia and their relationships with a broad spectrum of social, political, and economic concerns, there is still a shortage of such research situated within China, and particularly within its southern borderland regions and agrarian frontiers (Borras Jr. et al., 2018; Yin et al.,

¹ Though see Chapter 5 for a discussion of the impacts for larger-scale cardamom cultivators.

2019). In this chapter we seek to help address this oversight, while focusing on the three spices at the heart of this collection.

The vast majority of studies that have examined boom-bust processes and their impacts for smallholder livelihoods in Asia have been based on one key commodity, such as coffee in Vietnam, cassava in Cambodia, rubber in Laos, or potatoes in Indonesia (Dang and Shively, 2008; Mahanty and Milne, 2016; Junquera and Grêt-Regamey, 2019; Griffin, 2020). In contrast, there has been limited attention to the occurrence of booms and busts across multiple different crops within a single country or region. To address this, in this chapter we take a comparative approach to all three of the spice crops of focus in this book — black cardamom, ‘cinnamon’, and star anise — and analyse the distinct vulnerabilities associated with their production by ethnic minority smallholder farmers in Yunnan Province, China. We examine the specific sociopolitical, economic, and environmental factors in this frontier region that have been relevant not just to the boom of each spice, but its specific bust as well. With an emphasis on livelihood continuity (McSweeney, 2004), we extend our discussion beyond the crux that caused the bust of each spice, including looking back to the initial motivations for farmers to cultivate each crop, as well as focusing on how affected farmers have responded to what became a ‘busted opportunity’.

We base our discussions here on data obtained through 52 in-depth semi-structured interviews with ethnic minority cultivators of black cardamom, cinnamon, and star anise in Yunnan Province. These interviews were completed in Wenshan and Honghe Prefectures, just north of the Sino-Vietnamese border (see Chapter 1, Map 1.1.). Interviewees included 18 Hmong (Miao), Yao, Yi, and Hani farmers cultivating black cardamom in Jinping County, Honghe Prefecture; 18 Hmong, Yao, and Zhuang farmers who either previously grew or continue to grow cinnamon in Hekou County, Honghe Prefecture; and 16 Hmong and Yao ethnic minority farmers cultivating star anise in Maguan County and Funing County, Wenshan Prefecture. Fieldwork was undertaken in 15 villages across the four counties, intentionally chosen for their involvement with spice cultivation and trade. Recognising the role of culture in shaping ethnic minority livelihoods and state-farmer relations (Tao et al., 2010; Forsyth and Michaud, 2011), we purposefully sampled an ethnically diverse participant pool that included interviewees from each of the five ethnic minority groups most engaged with these spices in Yunnan’s borderlands. We also interviewed 18 Han (Chinese

ethnic majority) traders, state officials, and cultivators in the four counties. Interviews were conducted by the second author in the local dialect of Mandarin Chinese or in Hmong in 2017 and 2018.

We frame our analysis, conceptually, at the intersection of crop boom-bust literature and rural livelihoods, with specific attention to livelihood vulnerabilities and diversification. We introduce these areas of the literature in the following section. We go on to contextualise our study within the sociopolitical and environmental backdrop of Yunnan Province, including a brief introduction to the three spice crops of focus within this context. We then dive into the specificities of each spice commodity, including the variety of environmental, economic, and political vulnerabilities that smallholder farmers have faced in their cultivation, as well as the subsequent responses that farmers have pursued. By analysing the booms and busts of cardamom, cinnamon, and star anise comparatively, we are able to tease out trends across spices and frontier livelihoods, including smallholder lived experiences of vulnerability, and stories of agency and resistance. In doing so, we also form nuanced understandings of the commodity volatility that extends beyond individual farms.

CONCEPTUALISING BOOM-BUST CYCLES AND LIVELIHOODS

Boom-bust cycles, defined in Chapter 1, are dynamic processes, with the specific trajectory of any single commodity having direct implications for the actors involved in its production. Previous studies have demonstrated that such cycles often connect with highly context-specific smallholder livelihood trajectories, inequality, labour relations, biodiversity and conservation, and land uses (cf. Clough et al., 2009; Meyfroidt et al., 2014; Gatto et al., 2015; Belton et al., 2017; Cramb et al., 2017; Filipski et al., 2017; Hervas, 2019, 2020; Ornetsmüller et al., 2019). While market trends and economic dimensions are often centrally involved in boom-bust scenarios, they cannot be understood in isolation from related social, cultural, and political factors, as well as environmental conditions and the broader livelihoods of the cultivating households (Vicol et al., 2018; Yin et al., 2019).

Conceptual approaches to livelihoods are thus also relevant here as they consider the many interconnected factors that relate to an individual's or a household's means of earning a living. As outlined in Chapter 1, this

includes the productive and reproductive activities that people engage in, the assets they mobilise to undertake these activities, the contexts within which they pursue their livelihoods – including regulating institutions and power structures – and the outcomes from these processes (Chambers and Conway, 1991; Ellis, 2000; Rakodi, 2002). Livelihoods are dynamic, historically embedded, under ongoing (re)negotiation, relational, and shaped by social difference and power imbalances. We draw on livelihood approaches here as a complementary conceptual field for understanding the lived implications of wider boom-bust processes, and the role of human agency in these analyses. Importantly, we employ a livelihoods perspective that looks beyond isolated economic dimensions to include sociopolitical considerations, culture, and ethnicity. Our perspective also recognises the myriad enabling and constraining forces that households face in pursuing their livelihoods, and to what outcomes.

More specifically, we wish to focus on and also refine understandings of the vulnerability context within which actors negotiate their individual and shared livelihoods (Ellis, 2000; Rakodi, 2002). Building on critiques of the ways in which the term vulnerability has been mobilised rather apolitically at times (see Adger, 2006; Ribot, 2010), we account for possible historical, political, social, economic, and environmental considerations in our understandings of vulnerability (Bebbington, 2000; Staples, 2007). For example, this could include the political context of pursuing one's livelihood in a particular location such as within a designated nature reserve, or sociocultural dynamics that enable some individuals to gain access to more opportunities than others. This context might also involve unforeseen shocks such as price drops or family illness, and environmental factors such as seasonality or extreme weather events.

Actors may adjust their livelihood portfolios, strategies, and objectives in response to changing vulnerability contexts, effects of embedded power structures, or outcomes of previous or ongoing livelihood activities. As also noted in Chapter 3, individuals and households can deploy short-term coping mechanisms, such as reducing consumption or seeking additional wage work, or engage in longer-term adaptations and changes, such as reorganising the household division of labour or changing between sectoral specialisations (Niehof, 2004; Adger, 2006). These shifts are not always reactive or out of desperation; they can also testify to proactive pursuits of new livelihood opportunities or anticipation of future changes (Bebbington,

1999; Bouahom et al., 2004). Diversification represents one longer-term livelihood transition that is commonly observed, occurring when individuals or households add additional livelihood activities or replace previous undertakings with new ones. More diverse portfolios are often seen as more secure, with livelihood risks similarly diversified (Ellis, 2000; de Sherbinin et al., 2008). As with livelihood change and response mechanisms broadly, many socio-economic factors mediate diversification, and differential access to diversification options can perpetuate inequality (Rigg, 2006; Gautam and Andersen, 2016). Within livelihood transition literature, some authors have highlighted the need for greater attention to livelihood fluidity and continuity, as livelihood diversification is not a uniform or streamlined process (Bouahom et al., 2004; McSweeney, 2004). We thus apply these concepts to our investigation of spice crop boom and bust processes, extending our analysis beyond one snapshot of the ‘cycle’ and examining the longitudinal experiences of the ethnic minority households involved. This temporal analysis demonstrates that while there have been clear boom-bust phases for each spice crop in Yunnan, changes for smallholder livelihoods have been more iterative.

SPICE CULTIVATION IN YUNNAN’S AGRARIAN FRONTIER

This chapter focuses on Wenshan and Honghe Prefectures, two of 16 prefectures in Yunnan Province that together are home to nearly 8.5 million people in the province’s southeast region (Statistical Bureau of Yunnan Province, 2020). Marginalised socioculturally as much as geographically, numerous ethnic minority populations live alongside the ethnic majority Han Chinese in Wenshan and Honghe Prefectures, including the Hani, Hmong (part of the broader Miao group in China), Yao, Yi, and Zhuang (Xu et al., 2005; Michaud et al., 2016). For generations, ethnic minority farmers in this frontier region have undertaken semi-subsistence agrarian livelihoods, with wet or dry rice cultivation as their staple crop, maize cultivation as a complementary food source and, particularly in recent years, cash crops to earn income (Champalle and Turner, 2014; Rousseau et al., 2019). Regardless of local livelihood practices and preferences, these populations are often the target of agricultural and market extension programmes drafted in Beijing and Kunming to facilitate and orient local ‘development’ (Rousseau and Turner, 2018). These instances are a testament to the state’s broader discourse of ‘ecological modernisation’ and

‘scientific development’ as the objectives for how these rural areas should be governed (Yeh, 2009, 2013; Rousseau and Sturgeon, 2018). Intergenerational and culturally embedded relationships between ethnic minority populations and nature have thus been increasingly challenged over recent decades. For example, animist beliefs and practices – including worshipping sacred trees, forests, streams, and mountains – have been increasingly monitored and regulated, fomenting state–minority tensions surrounding forest management (Xu and Ribot, 2004). Forest classification and regulation, together with their uneven implementation, trigger diverse and evolving farm-level implications, which ultimately create confusion amongst farmers (Zhou and Grumbine, 2011; He et al., 2020).

Since the 1990s, numerous (and at times seemingly contradictory) national and provincial policies and programmes have shaped the local population’s access to land – an essential asset for growing spices such as black cardamom, cinnamon, and star anise. Four specific political campaigns are highly relevant for the Yunnan farmers we interviewed. The first is the ‘Returning Farmland to Forests Programme’ (more commonly known as the ‘Grain for Green Programme’). Implemented in the late 1990s, this initiative was designed to facilitate reforestation and ecological restoration nationwide (He and Sikor, 2015). Immense in scope and considered one of the largest conservation schemes in the world at the time, the implications of the ‘Grain for Green Programme’ continue to impact small-scale farmers in Yunnan (Weyerhaeuser et al., 2005; Delang and Yuan, 2015; Gao et al., 2020). The second campaign is the designation of ‘National Nature Reserves’ (NNRs). While first introduced by the Chinese government in 1956, the number of NNRs has rapidly increased in recent decades (Xue and Jiang, 1994; Zhou and Grumbine, 2011). The establishment of NNRs in general, and their bureaucratic and top-down style of planning and management in particular, have redefined resource access regimes and created further obstacles for local livelihoods (Zhou and Grumbine 2011; Yeh, 2013), as also seen across the border in northern Vietnam, in Chapter 3 of this collection. Third, the ‘China Western Development’ policy was instituted in 2000 with the objective of improving infrastructure, economic investment, and social welfare in the region by means of accelerated urbanisation and other land cover changes (Lai, 2002; Barabantseva, 2009). Multiple levels of government have accordingly championed large-scale cash cropping programmes, with direct effects on ethnic minority livelihoods (Goodman, 2004). The fourth and last

political campaign of note here is China's 'Collective Forest Tenure Reform', referring to a series of collective forest reforms rolled out since 2003. Directly incentivising individual households to participate in collective forestry, this initiative has reshuffled land tenure rights and regimes as well as how they are interpreted and enforced (He and Sikor, 2017).

Against this complex backdrop of Yunnan's forest policies and differential access rights, we focus on three spices that are cultivated in Wenshan and Honghe Prefectures, namely black cardamom, cinnamon, and star anise, all of which have been subject to different state policy incentives or restrictions. In addition to the social, political, and economic context that ethnic minority spice farmers in Yunnan navigate on a daily basis, including household-level incentives and restrictions for cash crop cultivation, each spice crop also has specific ecological characteristics and circulates through multi-nodal commodity chains that cultivators need to work with. As introduced in Chapter 1, black cardamom (*Lanxangia tsaoko*; hereafter cardamom) is a perennial plant that ethnic minority farmers have grown in these borderlands for generations for household consumption or use as a medicinal agent (Rousseau et al., 2019). Cardamom has become a booming cash crop among ethnic minority cultivators in Yunnan, amidst growing domestic and international demand over the past 30 years. Local government reports indicate that Hekou's cinnamon trees (possibly *Cinnamomum cassia*² at our study sites) were introduced to the region as diplomatic gifts from Vietnam during the 1950s and 1960s (Hekou County Government, 2015, 2017). Since then, as interviewees in Hekou County, Honghe Prefecture noted in 2018, cinnamon cultivation has been encouraged as a prosperous cash crop to help alleviate poverty, particularly within the 'Grain for Green Programme'. In Honghe Prefecture, the cinnamon bark is initially harvested for sale from pruned small branches without disrupting the tree's growth, which is viable approximately four years after planting. The trees reach maturity at about ten years of age, after which cultivators fell them and harvest the remaining bark.³

2 Interviewees at the Honghe Research Institute of Tropical Agricultural Science of Yunnan Province in 2018 informed us that the species of cinnamon being grown in Yunnan has yet to be properly identified; however, it is likely to be *Cinnamomum cassia*. See Chapter 4 of this collection for more on this classification confusion. We use the term cinnamon in this chapter, following farmers' preferred terminology.

3 While farmers on both sides of the Sino-Vietnamese border have been found to also harvest the leaves and twigs for essential oil production (Fang, 2005; see also Chapter 4, this collection), this was not observed or mentioned by interviewees at any of our study sites.

Like cardamom, star anise (*Illicium verum*) has been cultivated in Yunnan for generations as one of the numerous semi-subsistence farming crops. Star anise continues to boast many local uses – as a common ingredient in Chinese cooking, as a traditional medicine, and as an ingredient in locally produced cosmetics and alcoholic beverages (Han and Ning, 2006). Each of these three spices has long played an important role in local semi-subsistence livelihoods, for consumption and reproductive uses. However, Yunnan cultivators have faced numerous challenges regarding each of these spice crops, which we turn to next.

BUSTED PROMISES: VULNERABILITIES OF SPICE CULTIVATION

Our interviewees explained the occurrence of three distinct forms of livelihood vulnerabilities affecting spice crop farmers in the region, which we categorise as environmental, economic, and political vulnerabilities. We present these findings, disaggregating the livelihood vulnerabilities associated with each spice crop, as well as detailing the diverse responses that cultivators undertook to cope with and adapt to these vulnerability contexts.

Black cardamom

Some of our oldest interviewees recalled many decades of small-scale cardamom cultivation in Honghe Prefecture, with the spice mostly being used for medicinal purposes. They recounted a slight expansion of cardamom cultivation in the early 1980s, when a small number of farmers were invited to participate in a state initiative involving growing cardamom in protected forests. However, interviewees noted that attitudes toward cardamom shifted starkly with the onset of economic reforms from the late 1980s, when farmers began to view the spice as an important cash earning opportunity in China's emerging market economy. Within ten years, the boom in cardamom in Yunnan had generated an important rise in income for ethnic minority households, but stricter enforcement of centralised forest protection laws began to prevent additional expansion in forested areas. By the time of our interviews in 2017 and 2018, specific environmental and economic vulnerabilities had halted the boom in cardamom production and had nearly led to its disappearance from smallholder livelihood portfolios in Yunnan's borderlands.

‡ *Cardamom's environmental and economic vulnerabilities*

Cardamom plants are highly vulnerable to extreme weather events, which interviewees had observed to be increasing in frequency and severity in mountainous Yunnan Province. According to interviewees, these extreme weather events, in the form of cold spells, snow, and/or hail, had recently destroyed much of the cardamom cultivated in Yunnan. Interviewees noted that they had not seen snow in over three decades leading up to 2014, but had encountered snowfall every year since then, with the 2016 cold spell being one of the worst weather disasters in living memory – a finding also reported in Chapter 5. These extreme weather events had caused many smallholder farmers to lose their entire cardamom plantation, which for some was over 50 *mu*⁴. One young cultivator recalled:

There has been so much more snow over the past three years! Selling cardamom used to be our family's main source of cash income. We cultivated a large area for cardamom, as my father was one of the first four farmers who started growing cardamom in this village in the 1990s. However, we can't count on it to earn money anymore after these years with so much snow. We just don't know how to save our cardamom plants from these heavy snowfalls! (27-year-old Yi man, Adebo Township, Jinping County, Honghe Prefecture).

Cardamom cultivators were at a loss as to how they could reduce the environmental vulnerability of their crop, as this same young farmer explained:

There is basically no way to save our cardamom. You can see how large our cardamom plantations are, it would be impossible to cover them, especially for those cultivating on higher and steeper lands. The snow comes without any notice when you're not prepared. Within three or four days, the snow is done falling and all the cardamom is already frozen or dead.

Another farmer interviewee reported similar concerns:

For as long as I can remember, there were never any heavy snowfalls in this area. That all changed three years ago, when the snow, cold spells, and hailstorms started. These are the greatest disasters threatening us farmers, but I don't know any solution (35-year-old Yao man, Jinhe Township, Jinping County, Honghe Prefecture).

4 1 *mu* is 666.5 square metres.

These experiences were common among our interviewees, with many sharing stories of cardamom shrubs killed by even just a few days of snow or frost. These environmental vulnerabilities had long-term implications for interviewees, given that extreme weather events can leave cardamom plantations unproductive for at least four years. These trends had also exacerbated price fluctuations for cardamom, thereby increasing economic vulnerabilities for some cardamom growers, as discussed in greater depth in Chapter 5.

Many cardamom cultivators felt that they had unequal relationships with wholesalers, creating further economic vulnerabilities. As one cultivator explained, due to the remote location of his community's plantations, he and his neighbours were dependent on intermediaries to get their cardamom pods to marketplaces, unable to afford the transport costs on their own. Importantly, this reliance meant that intermediaries held disproportionate bargaining power in determining purchase prices for the cardamom pods. Farmer interviewees also lamented the fact that intermediaries and large-scale wholesalers engaged in unfair stockpiling and speculation. They noted that this afforded intermediaries and wholesalers greater power at later nodes of the commodity chains, which created further price fluctuations and uncertainty for farmers. One farmer outlined how this stockpiling and speculation had caused the farm-gate price of cardamom to drop from RMB100 [USD15] per kilogramme in 2016 to RMB80 [USD12] per kilogramme in 2017, and then to RMB60 [USD9] per kilogramme in 2018. Another cultivator remarked:

In recent years, the price of cardamom has been constantly changing. It's very difficult to decide when the best time is to sell your stock. My cousin refused to sell at RMB80 [USD12] per kilogramme and said he was waiting for a higher price, but then the price dropped to RMB60 [USD9] per kilogramme! You have no idea how much he regrets that decision. The prices are all controlled by the buyers. They stockpile the crops to drive down the prices they pay us farmers (58-year-old Hani man, Maandi Township, Jinping County, Honghe Prefecture).

‡ *Responses to cardamom vulnerabilities*

Households responded to the environmental and economic vulnerabilities linked to their cardamom cultivation through both on-farm and off-farm livelihood diversification. We found that older and poorer individuals were

more likely to diversify on-farm, whereas younger and wealthier interviewees were more inclined to pursue off-farm diversification. For some households, goat-rearing comprised an important on-farm diversification strategy. This was most common in one village in Muchang Township, Maguan County, particularly for households whose cardamom shrubs had succumbed to extreme weather events. In a village in Maandi Township, Jinping County, 25 households had collaborated in their response to this same weather-based vulnerability and had begun a collective goat-raising initiative. Most of the other households that had pursued on-farm diversification chose to plant new crop species to replace their cardamom. *Sharen* (砂仁, *Amomum villosum*, also known as *Wurfbainia villosa*), a different plant species that belongs to the same genus as black cardamom, was the most commonly reported replacement crop. However, farmers who had adopted goat-rearing and/or *sharen* cultivation mentioned that they were experiencing similar vulnerabilities to those they had experienced with cardamom cultivation. Both replacement on-farm diversification endeavours were similarly vulnerable to extreme weather events, with interviewees reporting significant losses of goats and *sharen* shrubs during recent cold spells. Other cardamom farmers had converted old rice or maize fields into banana plantations, contributing to a larger regional boom in banana cultivation ongoing in Honghe and Wenshan Prefectures since the early 2000s. However, the pervasive spread of fusarium wilt (more commonly known as ‘Panama disease’) had decimated many of these new plantations. Therefore, the most common on-farm diversification responses to the environmental vulnerability of cardamom had been largely unsuccessful at creating greater livelihood security.

Other crops that interviewees had less-commonly begun cultivating either alongside or instead of cardamom included *chong lou* herb (重楼, *Rhizoma paridis*), a traditional medicine used for treating cancer, and *da qing ye* (大青叶/板蓝根, *Isatis indigotica*, also known as Isatic root or Chinese indigo), a traditional remedy for respiratory infections and other conditions. However, overall most cardamom cultivators reported that such on-farm diversification had not generated enough cash income to meet their needs, and that these new activities had given rise to other forms of environmental and economic vulnerabilities. These shortcomings had led some farmers, especially younger household members, to focus on off-farm diversification undertakings instead, or to develop livelihood portfolios combining both on- and off-farm activities.

For households that had recently pursued off-farm income generation, this usually included multiple new endeavours. One Hmong man, who was a village leader, noted that over 50 per cent of working-age adults in his village had out-migrated to seek day labour in urban areas. While varying between villages, the most common off-farm diversification activities included day labour on nearby farms, salaried work in tourism or construction, small-scale trade and operating local businesses, and out-migration for urban-based wage labour. One man described his approach:

I do almost everything. You can see I offer meals and accommodation here, and I also sell tea, cardamom, and wine, not just to tourists but to local villagers too. I own two cars as well, so I can work as a driver if anyone needs (42-year-old Hani man, Maandi Township, Jinping County, Honghe Prefecture).

Another interviewee explained his diversification away from cardamom cultivation:

My cardamom all died following a heavy snowfall. Now I mostly earn my income as a silversmith. If I'm lucky, I can make over RMB3,000 [USD450] per month from this (35-year-old Yao man, Jinhe Township, Jinping County, Honghe Prefecture).

While less common amongst interviewees in terms of their responses to the economic vulnerabilities associated with cultivating cardamom, some decided to promote customary laws and collective management approaches to resist intermediaries' unfair behaviour and the broader price fluctuations discussed above. We encountered this at two of our study sites, where villagers had created 'Cardamom Associations'. In these associations, all households cultivating cardamom in a given village collaborated to increase price stability, mutually agreeing upon harvest and sales timing based on each group member's crop maturation date (see also Chapter 5, this collection). While this approach was not widely implemented nor able to counter environmental vulnerabilities, it may hold potential for other villages in the region in terms of managing economic vulnerabilities.

Cinnamon

Of the three crop commodities we investigate here, cinnamon has had the fastest boom-bust cycle. As part of state reforestation projects, planting



Figure 6.1. 'Cinnamon' tree trial plots at Honghe Research Institute of Tropical Agricultural Science, Yunnan Province, China. **Colour** p. 222.

cinnamon was widely encouraged in the early 1990s, with the state-run Honghe Research Institute of Tropical Agricultural Science distributing seedlings. Farming households quickly followed suit, planting cinnamon on forest reserve land (Figure 6.1.). Both individual cultivators and provincial and prefectural cadres saw that cinnamon held great promise, with its sale price booming while other cash crops grown in the region were failing. For example, incomes from citrus trees and pineapple – common cash crops at the time – were plummeting, and the high altitudes across most of Hekou County meant that rubber – a booming cash crop elsewhere in Yunnan – could not be grown successfully. However, most cinnamon was felled and replaced by bananas within a decade of the initial wave of planting that began in the late 1990s in Nanxi Township and in the early 2000s in Yaoshan Township. This rapid shift away from cinnamon cultivation was due to complex relationships between multiple forms of vulnerabilities.

‡ *Cinnamon's political, economic, and environmental vulnerabilities*

Among our three case study spices, cinnamon had some unique and notable political vulnerabilities associated with its production, which were closely

interrelated with additional economic and environmental vulnerabilities. After the government played a significant role in the boom in cinnamon cultivation in the region, particularly through the ‘Grain for Green Programme’ noted earlier, subsequent changes in government policies and their implementation produced livelihood vulnerabilities for cinnamon cultivators. This was often caused by a lack of clarity: while governmental subsidies and provisions of seedlings encouraged people to plant cinnamon, plantations were later (re)designated as protected forest reserves where ‘environmental protection’ guidelines forbade farmers from harvesting mature trees. Many households thus began cultivating cinnamon without knowing that they would be prohibited from harvesting their cinnamon trees or from growing other crops on that land once they had accepted the government’s subsidy. A local Yao leader explained:

In our community, we were encouraged to plant cinnamon trees rather than rubber trees, as the relatively high altitude here is not suitable for rubber tree growth. But now, most land plots planted with cinnamon are abandoned and we can’t cut the trees down, as the location was later deemed within the protected watershed area (Yao man, Nanxi Township, Hekou County, Honghe Prefecture).

The political vulnerabilities that farmers experienced facilitated the bust associated with cinnamon in this agrarian frontier. One Hmong farmer stated:

In our village, all the farmers chose not to plant any more cinnamon on forest land that was designated within the reserve, as it couldn’t be harvested or cut down. The more you plant, the more you waste (51-year-old Hmong man, Nanxi Township, Hekou County, Honghe Prefecture).

Even in areas where farmers were allowed to harvest cinnamon trees, the ‘Grain for Green Programme’ created additional economic and environmental vulnerabilities. For example, in Yaoshan Township, interviewees shared that they planted cinnamon following government recommendations, but that the government did not provide training or guidelines on proper cultivation. As it turned out, farmers unknowingly chose poor planting locations and soil conditions, and they planted cinnamon seedlings too close together. These uninformed decisions negatively impacted tree growth and the value of the bark, and ultimately led to many households exiting cinnamon cultivation. Farmers who were permitted to fell their trees told us they were forced

to sell their harvest for extremely low returns. As one 43-year-old Hmong man in Nanxi Township (Hekou County, Honghe Prefecture) put it: ‘We planted about 1000 cinnamon trees. When they were about eight or nine years old, we sold them all at once for RMB3,200 [USD480]. I know, it was such a cheap price, but we didn’t have a choice’. To put this in perspective, this income amount covered less than two months of living expenses and tuition fees for this interviewee’s children.

Moreover, the relatively long growth cycle of cinnamon, offering minimal returns for nearly ten years, created financial strains for farmers attempting to meet rapidly-increasing costs of living, as another Hmong farmer, this time a 38-year-old man in Nanxi Township, conveyed: ‘In our village, we tried planting many different cash crops, and cinnamon was one of them. We tried it for a while, but eventually we gave up on cinnamon, mostly due to the long growth cycle. We can’t wait that long’. This relationship between economic and environmental vulnerabilities thus caused many interviewees to turn to other cash crops that could generate income faster.

‡ *Responses to cinnamon vulnerabilities*

The majority of cinnamon farmer interviewees had already exited cinnamon production prior to our fieldwork. However, in contrast to those who had abandoned growing cardamom (or star anise, as we detail below), cinnamon cultivators had adopted nearly exclusively on-farm alternative livelihood activities. Banana cultivation was overwhelmingly the most common replacement for cinnamon, but certain interviewees also mentioned growing mango, grapefruit, *sharen*, taro, pomelo, jackfruit, plums, and macadamia nuts. Switching to new cash crops largely complemented ongoing subsistence rice and maize production and small-scale animal husbandry, as was the case when these households were growing cinnamon. However, this on-farm diversification oriented towards labour-intensive cash crops pushed some households to abandon subsistence production and to restructure their household livelihood portfolios altogether. As the same Hmong farmer introduced above explained, this often led to increased household expenses:

When we started planting cinnamon trees, our family also grew rice and maize. However, we had to quit growing them once we started our banana plantations. Now we have to buy maize from elsewhere to feed our pigs, which costs us about RMB3,000–4,000 [USD450–600]

every year (38-year-old Hmong man, Nanxi Township, Hekou County, Honghe Prefecture).

Diversifying away from cinnamon production solved many of the livelihood vulnerabilities specifically associated with this spice; however, banana cultivation generated new forms of vulnerability previously unseen with cinnamon, namely price fluctuations, additional labour input requirements, and widespread fusarium wilt. A few households were able to earn cash by renting out their agricultural land, but this was very uncommon among interviewees.

We only encountered two households who had yet to fell their cinnamon trees at the time of our fieldwork, with both clarifying that they were waiting for a good enough sale price before doing so. It was unclear from these discussions if the interviewees intended to harvest their trees legally or not, leading to our next finding.

Beyond the diversification strategies interviewees reported in response to livelihood vulnerabilities associated with cinnamon production, our analyses uncovered several examples of everyday resistance. Faced with political vulnerabilities related to changing forest regimes, some households felled their cinnamon trees as an active form of resistance. Members of these households explained that they cut down their cinnamon trees while they were still small, given their inability to harvest them once matured. Others felled their mature cinnamon trees and quickly replanted other tree species, thereby still ‘complying’ with the guidelines of the ‘Grain for Green Programme’. Still others reported their cinnamon trees as ‘stolen’ and claimed financial compensation from state officials. Households thus pursued everyday resistance strategies in different ways and at different scales, but pushed back in some way against the political vulnerabilities that grew alongside their cinnamon trees.

Star anise

Turning now to Maguan and Funing Counties, both in Wenshan Prefecture, the great promise of star anise as a financially rewarding cash crop enticed many farmers toward the spice, given its projected high returns and its relatively low investment requirements. Some households had cultivated star anise extensively as early as the 1940s, before losing ownership of their trees during the collectivisation era. These same trees were reallocated again in the onset of the late 1980s reforms, but most often to different households

than those who had planted them originally. The boom in star anise took off with the widespread establishment of plantations from 1999 onward, closely related to the ‘Grain for Green Programme’.

‡ *Star anise’s environmental and economic vulnerabilities*

While many farmers initially saw star anise as a safe and lucrative cash crop, it eventually became associated with a unique set of environmental and economic vulnerabilities that farmers had not anticipated. A crop disease never encountered before infected a significant portion of star anise trees across the region (Figure 6.2.). This environmental vulnerability, locally referred to as the ‘cancer of star anise’ or the ‘falling leaves disease’ either sharply reduced yields or killed the trees.⁵ None of our farmer interviewees knew what caused the disease or how they could have saved their trees, noting how different it was from other crop disease outbreaks they had dealt with in the past. One farmer explained how severe and unprecedented this problem was for his household:

We have about 17 *mu* of star anise. Those trees were our main source of income; we haven’t planted any other cash crops since we started growing star anise. However, since they got infected by the ‘cancer of star anise’ there is basically nothing for us to harvest from the trees. We just left them there and can’t do anything. I’ve worked in agriculture my entire life. I’m used to dealing with pest problems or unusual crop diseases, but I really don’t know how to solve this star anise disease. I’ve never seen anything like it before (49-year-old Hani man, Muchang Township, Maguan County, Wenshan Prefecture).

Farmers had shared their concerns with local civil servants, who were similarly perplexed. One former village leader commented: ‘Everyone, including the leaders of our village, is concerned about this weird disease, but nobody knows what to do to solve this problem’ (Muchang Township, Maguan County, Wenshan Prefecture).

Beyond the economic vulnerabilities inflicted by this disease, fluctuations in star anise farm-gate prices further perpetuated these farmers’ precarity. Most star anise cultivators sold their harvests to visiting wholesalers and, like

5 Interviews with officials at the Star Anise Research Institute, Funing County, suggested that the disease encountered by star anise farmers may have been *Colletotrichum gloeosporioides* Penz (see also Su et al., 2019); however, we were unable to confirm this at our field sites.

cardamom cultivators, noted that this created imbalanced power relations in negotiating sale prices. Moreover, star anise farmers had experienced an even more severe form of economic vulnerability through a price crash beginning around the year 2000 that rendered star anise cultivation largely unviable (as detailed in Chapter 2 across the Sino-Vietnamese uplands). Before this price drop, prices had been significantly higher during the late 1980s and 1990s, when many households had begun cultivating star anise. Interviewees recalled that they obtained as much as RMB25–50 [USD3.75–7.5] per kilogramme of dried star anise during these initial years, but that since then, prices had dropped to around RMB12 [USD1.80] per kilogramme, and sometimes to as low as RMB1 [USD0.15] per kilogramme. The household-level implications of this price bust cannot be overstated, particularly given the rapidly rising costs of living. Interviewees noted that they were able to earn a year's worth of cash income from star anise cultivation alone before the price crash, but that other income streams had become essential since the bust. One farmer detailed:

My family has 3 *mu* of star anise, about 200 trees. From what I can remember, star anise made the most money in the early 1990s, when my family made about RMB10,000 [USD1,500] per year. However, from about 2004 until 2013, we could only make about RMB3,000 [USD450] per year. It is a bit higher now. We have made about RMB4,000 [USD600] per year since 2014 (42-year-old Yao man, Dongbo Township, Funing County, Wenshan Prefecture).

For star anise cultivators fortunate enough not to have had their trees infected by disease, the farm-gate prices they could have received were insufficient to make a profit, and oftentimes too low to even cover the labour costs incurred during the harvest period. Therefore, star anise trees have been left idle for years in the hopes of a future price boom, but star anise prices have yet to recover from the crash in the early 2000s. This economic vulnerability, coupled with the environmental vulnerabilities of the spice, has led most star anise farmers to abandon its cultivation. An official at the Star Anise Research Institute expanded on this: ‘The price of star anise has remained low in recent years. The farmers don’t have the same level of interest as before. We’re trying to promote some projects to help them enhance the productivity of the trees to improve this situation’ (Star Anise Research Institute, Funing County, Wenshan Prefecture). However, while



Figure 6.2. Diseased star anise trees in Maguan County, Wenshan Prefecture, Yunnan Province, China. **Colour** p. 222.

local government and research institute officials were aware of the local bust in star anise production, at the time of our interviews no solutions had been found to re-engage farmers in its cultivation.

‡ *Responses to star anise vulnerabilities*

Livelihood diversification was the most common response to the vulnerabilities interviewees experienced with star anise cultivation, as was the case with cardamom and cinnamon cultivators. However, in contrast to the other two spices, most star anise cultivators pursued off-farm livelihood activities rather than on-farm alternatives. It seemed that many interviewees portrayed the star anise boom as a distant memory, reflecting on how limited their livelihood

portfolios were at that time. They mentioned that they now pursue a much broader spectrum of activities, among which migrant and day labour were the most common, followed by growing additional crops on family farms, including chayote, *sharen*, sugar cane, and various vegetables. Like respondents quoted earlier, star anise cultivators noted that these new livelihood activities presented their own sets of associated challenges, reiterating that livelihood change and diversification were no automatic panacea. For instance, interviewees whose household members pursued migrant labour noted how physically challenging this work tended to be. Meanwhile, *sharen*'s long growth cycle created financial concerns for other households, and households that began cultivating sugar cane discovered how difficult it was to grow this crop and navigate power-laden sugar cane commodity chains.

Stories of everyday resistance were also fairly common in our interviews with star anise cultivators facing the economic vulnerabilities associated with this spice. This was most frequently observed through farmers 'improving' the appearance of their star anise before its sale. We repeatedly heard from interviewees that the size, colour, and shape of their star anise dictated the price they obtained for it. They therefore developed micro-resistance strategies to improve their harvest's appearance. For example, star anise could be boiled and dried in the sun to increase its weight and improve its appearance, or alternatively, could be coloured with chemical dyes – each approach fetching higher sale prices than selling directly from the harvest.

Beyond these small-scale and individual tactics, some interviewees shared stories of a larger-scale resistance movement that occurred in the wake of a major price crash in the 1980s. At that time, farmers sold most of their star anise directly to a state cooperative, and therefore farmers blamed the economic losses they endured on the government. In response, many producers harvested their star anise, transported it to cooperatives, and then burnt it in protest. As price drops and fluctuations are now associated with the market rather than the government, such resistance strategies have become obsolete. Leaving their star anise crop unharvested so as not to waste time and resources selling it for insufficient returns represents the only option that farmer interviewees deemed reasonable.

Vulnerabilities and responses across spice crops

Our comparative approach to three boom-bust cycles in Yunnan revealed the complex and interwoven forms of environmental, economic, and

political vulnerabilities that ethnic minority farmers have faced with spice crop cultivation. Both environmental and economic vulnerabilities were experienced by cardamom, cinnamon, and star anise cultivators; however, these vulnerabilities manifested differently depending on which crop was involved. Cardamom and star anise were prone to environmental hazard-driven vulnerability, with farmers losing substantial yields and at times entire harvests or plantations. For cardamom farmers, these crop losses were caused by the increasing frequency of extreme weather events, whereas for star anise farmers, a new and unidentified crop disease proved fatal for most of their spice plantations. By contrast, the environmental vulnerability linked with cinnamon stemmed from poor tree growth (and therefore, poor yields) resulting from inappropriate growing methods that farmers had used, not knowing them to be inappropriate. Economic vulnerability was similarly reported amongst farmers growing all three spices, which manifested in more uniform ways across the spices than the other forms of vulnerability. Cash shortages, price drops and fluctuations, and unequal bargaining power with intermediaries and wholesalers further along the commodity chain (particularly for cardamom farmers) comprised common manifestations of economic vulnerability as interviewees experienced it.

Unlike environmental and economic vulnerabilities, political vulnerability was less commonly observed across our field sites and was only mentioned by cinnamon farmers. For cinnamon farmers, this political vulnerability was closely related to the national context and political campaigns that directly affected smallholder livelihoods, particularly the ‘Grain for Green Programme’. Unclear and fluctuating government policies led farmers to plant cinnamon trees – with the intent to eventually harvest them – only to then have these same trees retroactively deemed ‘protected’ within forest reserves.

CONCLUSION: BIG BOOMS AND SMALLHOLDER RESPONSES

Recognising the ubiquity of crop booms worldwide, it is important to examine the significant implications that these processes present for the smallholder farmers involved – especially when a quick boom results in an equally rapid bust. This was the case for our ethnic minority spice cultivator interviewees in Yunnan Province, China, who discovered the complex environmental, economic, and political vulnerabilities associated with growing

cardamom, cinnamon, and star anise the hard way. Some of our interviewees responded to these conditions by undertaking additional livelihood activities in conjunction with spice crop cultivation. However, much more commonly, as each spice crop underwent its bust, respondents' households focused on longer-term adjustments to their livelihood portfolios that involved either largely or completely exiting spice cultivation. These findings demonstrate the extreme instability of cultivating boom crops, and the resulting precarity for those who rely on such crops as a key livelihood component.

In turn, most of the farmers we interviewed felt that they had received little to no support to cope with this instability. In some cases, governmental bodies facilitated households' involvement in spice crop cultivation – such as providing seedlings – but then failed to support farmers afterwards. We would thus argue that research institutes and government departments with a vested interest in maintaining cardamom, cinnamon, and star anise production in Yunnan need to better understand the specificities of cash crop vulnerabilities. Such an understanding is necessary if there is to be any chance of making these crops viable options in achieving long-term local livelihood security. While abrupt changes in market prices and demand often resulted from market behaviours that occurred further along the commodity chains, finding ways to reduce vulnerability and support successful response mechanisms would lessen the losses that farmers face as they rapidly transition between different boom crops. Here, non-governmental organisations may be better equipped to support smallholders and their nuanced livelihood vulnerabilities, as the capacity of civil society actors is harshly limited in the Chinese context, especially in frontier regions (Yeh, 2013).

Returning to the conceptual fields of boom-bust cycles and rural livelihoods, we have captured wider political and economic trends and their everyday implications for vulnerable spice cultivators. The concept of boom-bust cycles implies economic booms and busts; however, we found numerous understudied, yet interconnected sociopolitical and environmental drivers related to farmers entering and exiting commodity production beyond just price volatility. These drivers included extreme weather events and crop disease, changing environmental governance, and the power inequalities characterising the relations that farmers maintain with wholesalers and intermediaries. Despite the diversity seen between various commodity booms and busts across the Global South, their associated livelihood implications, particularly for smallholder cultivators, remain largely under-examined in the

literature. The very term ‘boom-bust cycle’ suggests that the same or similar events are occurring with each boom and bust, which then repeat cyclically. Boom-bust processes may be large-scale events and connect with regional or global trends, but this broad conceptualisation often fails to capture the lived realities of smallholder farmers. These are the individuals who directly experience the booms and busts, and who shape their responses according to the specific vulnerability contexts they face. By drawing upon a people-centred livelihood analysis, we have demonstrated the important nuances in the booms and busts of these three spice crops in Yunnan, China. This approach has further illustrated that boom-bust processes are extremely non-uniform, with differentiation between spice commodities, the impacts these processes present to smallholder households, and the adjustments farmers make to each spice’s complex vulnerabilities – all within a single agrarian frontier.

REFERENCES

- Adger, W. N. (2006). ‘Vulnerability.’ *Global Environmental Change*, 16: 268–281.
- Barabantseva, V. E. (2009). ‘Development as localization: Ethnic minorities in China’s official discourse on the Western Development Project.’ *Critical Asian Studies*, 41(2): 225–254.
- Bebbington, A. (1999). ‘Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty.’ *World Development*, 27(12): 2021–2044.
- Bebbington, A. (2000). ‘Re-encountering development: livelihood transitions and place transformations in the Andes.’ *Annals of the Association of American Geographers*, 90(3): 495–520.
- Belton, B., van Asseldonk, I. J. M. and Bush, S. R. (2017). ‘Domestic crop booms, livelihood pathways and nested transitions: charting the implications of Bangladesh’s pangasium boom.’ *Journal of Agrarian Change*, 17(4): 694–714.
- Borras Jr., S. M., Liu J., Hu Z., Li H., Wang C., Xu Y., Franco, J. C. and Ye J. (2018). ‘Land control and crop booms inside China: implications for how we think about the global land rush.’ *Globalizations*, 15(1): 134–151.
- Bouahom, B., Douangsavanh, L. and Rigg, J. (2004). ‘Building sustainable livelihoods in Laos: untangling farm from non-farm, progress from distress.’ *Geoforum*, 35(5): 607–619.
- Chambers, R. and Conway, G. (1991). *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*. Institute of Development Studies.
- Champalle, C. and Turner, S. (2014). ‘Cash crops and climate shocks : flexible livelihoods and food security in southeast Yunnan, China.’ *Chinese Journal of Applied Anthropology*, 3(1): 47–78.

- Clough, Y., Faust, H. and Tschardtke, T. (2009). 'Cacao boom and bust: sustainability of agroforests and opportunities for biodiversity conservation.' *Conservation Letters*, 2(5): 197–205.
- Cramb, R., Manivong, V., Newby, J. C., Sothorn, K. and Sibat, P. S. (2017). 'Alternatives to land grabbing: exploring conditions for smallholder inclusion in agricultural commodity chains in Southeast Asia.' *Journal of Peasant Studies*, 44(4): 939–967.
- Dang T.H. and Shively, G. (2008). 'Coffee boom, coffee bust and smallholder response in Vietnam's central highlands.' *Review of Development Economics*, 12(2): 312–326.
- de Sherbinin, A., VanWey, L.K., McSweeney, K., Aggarwal, R., Barbieri, A., Henry, S., Hunter, L.M., Twine, W. and Walker, R. (2008). 'Rural household demographics, livelihoods and the environment.' *Global Environmental Change*, 18(1): 38–53.
- Delang, C. O., and Yuan Z. (2015). *China's Grain for Green Program A Review of the Largest Ecological Restoration and Rural Development Program in the World*. Springer.
- Eilenberg, M. (2014). 'Frontier constellations: agrarian expansion and sovereignty on the Indonesian–Malaysian border.' *Journal of Peasant Studies*, 41(2): 157–182.
- Ellis, F. (2000). *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press.
- Fang Q. (2005). '肉桂规范化种植 (GAP) 研究' [“The study on good agriculture practice (GAP) of cinnamomum cassia presl’]. (MA Thesis, Guangzhou University of Traditional Chinese Medicine.)
- Filipski, M., Aboudrare, A., Lybbert, T.J. and Taylor, J. E. (2017). 'Spice price spikes: simulating impacts of saffron price volatility in a gendered local economy-wide model.' *World Development*, 91: 84–99.
- Forsyth, T. and Michaud, J. (2011). 'Rethinking the relationships between livelihoods and ethnicity in highland China, Vietnam, and Laos.' In J. Michaud and T. Forsyth (eds), *Moving Mountains: Ethnicity and Livelihoods in Highland China, Vietnam, and Laos* (pp. 1–27). University of British Columbia Press.
- Gao Y., Liu Z., Li R. and Shi Z. (2020). 'Long-term impact of China's returning farmland to forest program on rural economic development.' *Sustainability*, 12(4): 1492.
- Gatto, M., Wollni, M. and Qaim, M. (2015). 'Oil palm boom and land-use dynamics in Indonesia: the role of policies and socioeconomic factors.' *Land Use Policy*, 46: 292–303.
- Gautam, Y. and Andersen, P. (2016). 'Rural livelihood diversification and household well-being: insights from Humla, Nepal.' *Journal of Rural Studies*, 44: 239–249.
- Goodman, D.S.G. (2004). 'The campaign to “open up the West”: national, provincial-level and local perspectives.' *The China Quarterly*, 178: 317–334.

- Griffin, C. (2020). “Prosperity beyond belief”: the interaction between a potato crop boom, vulnerability and volcanic hazard in central Java, Indonesia.’ *Singapore Journal of Tropical Geography*, 41(1): 23–39.
- Han M., and Ning D. (2006). ‘云南八角生产的主要问题及其对策’ [‘Major problems and development strategy analysis on production of illicium verum in Yunnan’]. *Journal of West China Forestry Science*, 35(1): 125–128.
- He J., Kebede, B., Martin, A. and Gross-Camp, N. (2020). ‘Privatization or communalization: a multi-level analysis of changes in forest property regimes in China.’ *Ecological Economics*, 174: 106629.
- He J. and Sikor, T. (2015). ‘Notions of justice in payments for ecosystem services: Insights from China’s sloping land conversion program in Yunnan Province.’ *Land Use Policy*, 43: 207–216.
- He J. and Sikor, T. (2017). ‘Looking beyond tenure in China’s collective forest tenure reform: insights from Yunnan province, southwest China.’ *International Forestry Review*, 19(1): 29–41.
- Hekou County Government (2015). ‘河口瑶族自治县志’ [‘County annals of Hekou, Yunnan’]. Yunnan People’s Publishing House.
- Hekou County Government (2017). ‘河口瑶族自治县志’ [‘County annals of Hekou, Yunnan’]. Yunnan People’s Publishing House.
- Hervas, A. (2019). ‘The socio-ecological ramifications of boom crops: examining the impacts of oil palm expansion upon food system vulnerability in northern Guatemala.’ (Doctoral Dissertation, University of Toronto).
- Hervas, A. (2020). ‘Cultivating vulnerability: oil palm expansion and the socio-ecological food system in the Lachuá Ecoregion, Guatemala.’ *Regional Environmental Change*, 20(2): 45.
- Junquera, V. and Grêt-Regamey, A. (2019). ‘Crop booms at the forest frontier: triggers, reinforcing dynamics, and the diffusion of knowledge and norms.’ *Global Environmental Change*, 57: 101929.
- Kong R., Diepart, J.-C., Castella, J.-C., Lestrelin, G., Tivet, F., Belmain, E. and Bégué, A. (2019). ‘Understanding the drivers of deforestation and agricultural transformations in the Northwestern uplands of Cambodia.’ *Applied Geography*, 102: 84–98.
- Lai, H.H. (2002). ‘China’s western development program: its rationale, implementation, and prospects.’ *Modern China*, 28: 432–466.
- Mahanty, S. (2019). ‘Shadow economies and the state: A comparison of cassava and timber networks on the Cambodia–Vietnam frontier.’ *Journal of Contemporary Asia*, 49(2): 193–215.
- Mahanty, S. and Milne, S. (2016). ‘Anatomy of a boom: cassava as a “gateway” crop in Cambodia’s north eastern borderland.’ *Asia Pacific Viewpoint*, 57(2): 180–193.
- McSweeney, K. (2004). ‘The dugout canoe trade in Central America’s Mosquitia: approaching rural livelihoods through systems of exchange.’ *Annals of the Association of American Geographers*, 94(3): 638–661.

- Meyfroidt, P., Carlson, K. M., Fagan, M. E., Gutiérrez-Vélez, V.H., Macedo, M. N., Curran, L. M., DeFries, R. S., Dyer, G. A., Gibbs, H. K., Lambin, E. F., Morton, D. C. and Robiglio, V. (2014). 'Multiple pathways of commodity crop expansion in tropical forest landscapes.' *Environmental Research Letters*, 9(7): 074012.
- Michaud, J., Barkataki Ruscheweyh, M. and Swain, M.B. (2016). *Historical Dictionary of the Peoples of the South-East Asian Massif*. Second Edition. Rowman and Littlefield.
- Niehof, A. (2004). 'The significance of diversification for rural livelihood systems.' *Food Policy*, 29: 321–338.
- Ornetsmüller, C., Castella, J.-C., Thanichanon, P., Lestrelin, G. and Verburg, P.H. (2019). 'Modelling the location and spatial pattern of a crop boom. A case study from Laos.' *Environmental Science and Policy*, 99: 58–71.
- Rakodi, C. (2002). 'A livelihoods approach – conceptual issues and definitions.' In C. Rakodi and T. Lloyd-Jones (eds), *Urban Livelihoods: A People-Centred Approach to Reducing Poverty* (pp. 3–22). Earthscan.
- Ribot, J. (2010). 'Vulnerability does not just fall from the sky: toward multi-scale pro-poor climate policy.' In R. Mearns and A. Norton (eds), *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World* (pp. 47–74). The World Bank.
- Rigg, J. (2006). 'Land, farming, livelihoods, and poverty: rethinking the links in the rural South.' *World Development*, 34(1): 180–202.
- Rousseau, J.-F. and Sturgeon, J. (2018). 'The disappearance of water buffalo from agrarian landscapes in Western China.' *Journal of Agrarian Change*, 19(2): 319–336.
- Rousseau, J.-F. and Turner, S. (2018). 'Not at all costs: frontier modernization schemes and ethnic minority livelihood debates in the Sino-Vietnamese borderlands.' *Verge: Studies in Global Asias*, 4(1): 133–159.
- Rousseau, J.-F., Turner, S. and Xu Y. (2019). 'Cardamom casualties: extreme weather events and ethnic minority livelihood vulnerability in the Sino-Vietnamese borderlands.' *Climate*, 7(1): 1–15.
- Staples, J. (2007). 'Introduction: livelihoods at the margins.' In J. Staples (ed.), *Livelihoods at the Margins: Surviving the City* (pp. 9–30). Left Coast Press.
- Statistical Bureau of Yunnan Province (2020). *Yunnan Statistical Yearbook of 2020*. China Statistics Press.
- Sturgeon, J. C., Menzies, N. K., Lagerqvist, Y.F., Thomas, D., Ekasingh, B., Lebel, L., Phanvilay, K. and Thongmanivong, S. (2013). 'Enclosing ethnic minorities and forests in the golden economic quadrangle.' *Development and Change*, 44(1): 53–79.
- Su X., Jiang X., Liu R., Mo X., He S. and Guo L. (2019). '八角主要病虫害发生规律研究' ['The regularity of the main insect pests and diseases of *Illicium verum*']. *Journal of Anhui Agricultural Sciences*, 47(2): 132–134.
- Tao, T. C., Wall, G. and Wismer, S. (2010). 'Culture and sustainable livelihoods.' *Journal of Human Ecology*, 29(1): 1–21.

- Taylor, P. (2016). 'Frontier commoditisation in post-socialist Southeast Asia.' *Asia Pacific Viewpoint*, 57(2): 145–153.
- Turner, S., Bonnin, C. and Michaud, J. (2015). *Frontier Livelihoods: Hmong in the Sino-Vietnamese Borderlands*. University of Washington Press.
- Vicol, M., Pritchard, B. and Yu Htay (2018). 'Rethinking the role of agriculture as a driver of social and economic transformation in Southeast Asia's upland regions: the view from Chin State, Myanmar.' *Land Use Policy*, 72: 451–460.
- Weyerhaeuser, H., Wilkes, A. and Kahrl, F. (2005). 'Local impacts and responses to regional forest conservation and rehabilitation programs in China's northwest Yunnan province.' *Agricultural Systems*, 85: 234–253.
- Xu J., Ma E. T., Tashi D., Fu Y., Lu Z. and Melick, D. (2005). 'Integrating sacred knowledge for conservation: cultures and landscapes in southwest China.' *Ecology and Society*, 10(2): 7.
- Xu J. and Ribot, J. C. (2004). 'Decentralisation and accountability in forest management: a case from Yunnan, Southwest China.' *European Journal of Development Research*, 16(1): 153–173.
- Xue D. and Jiang M. (1994). 'A study on categorizing standard of nature reserves in China.' *China Environmental Science*, 4: 246–251.
- Yeh, E.T. (2009). 'Greening western China: A critical view.' *Geoforum*, 40(5), 884–894.
- Yeh, E. T. (2013). 'The politics of conservation in contemporary rural China.' *The Journal of Peasant Studies*, 40(6): 1165–1188.
- Yin D., Qian J. and Zhu H. (2019). 'Frontier development in the midst of ecological civilization: unravelling the production of maca in Yunnan, China.' *Geoforum*, 106: 144–154.
- Zhou D. and Grumbine, R. E. (2011). 'National parks in China: experiments with protecting nature and human livelihoods in Yunnan province, People's Republic of China (PRC).' *Biological Conservation*, 144(5): 1314–1321.