

Varying Impacts of Tourism Participation on Natural Resource Use in Communities in Southwest China

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Abstract Community-based tourism is often undertaken as a tool to accomplish rural development while reducing natural resource use, but research on household livelihoods suggests that tourism may substitute for or complement resource use activities depending on how households allocate a variety of assets. Drawing on intensive qualitative research and a household survey in communities with and without tourism operations in a protected area in southwest China, we examine impacts of tourism participation on non-timber forest product collection and livestock holdings. Impacts of tourism differ across resource uses and between tourism communities, due to specific ways tourism draws on labor and material inputs. Emerging commercial agriculture and off-farm labor simultaneously impact resource use, while tourism generates demand for labor and farm products from communities without tourism operations. The impacts of tourism on resource use depend on how tourism participation enters into asset allocation processes within particular social and biophysical landscapes

Keywords Livelihoods · Tourism · NTFPs · Agriculture · China

Introduction

In many locales, governments and communities have adopted tourism as a strategy to generate income in rural areas while

diminishing pressure on natural resources. Rural tourism operations, many of which take the rubric of ecotourism,¹ are often intended to lessen pressure on landscapes and ecosystems by reducing natural resource use. Yet the impacts of rural development interventions on natural resource use are complex, depending on household livelihood decisions, community contexts, and the biology of the resources in question. Impacts on different resource use activities may not align, and uncertainties about these impacts raise questions about claims made for tourism as a sustainable development strategy.

These questions are particularly pertinent in China, where tourism is a key element of national rural development policy. In this paper, we examine how tourism and other livelihood activities affect resource use in communities in southwest China. Drawing on participant observation, in-depth interviews, and a household survey, we examine the impacts of tourism participation on livestock husbandry and collection of non-timber forest products (NTFPs). We show that divergent patterns of NTFP collection and livestock husbandry across tourism-centered communities follow from specific ways tourism draws on labor and material inputs in the context of particular landscape configurations. Tourism has variable impacts across resource uses and locales, while emerging commercial agriculture and off-farm labor simultaneously influence resource use. These findings highlight how responses to tourism development depend on how participation in tourism intersects with other livelihood activities within and across communities.

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¹ “Ecotourism” is a contested term for which many operational and analytical definitions have been put forward (Fennell 2008; Weaver 2005; Weaver and Lawton 2007). We use it to denote tourism operations in which ways to link benefits from tourism to outcomes for local communities and ecosystems are specified in the design and operation of an attraction (cf. Kirkby *et al.* 2011). Because such links are not specified in the cases discussed here, we do not consider them instances of ecotourism.

Tourism, Asset Allocation, and Resource Use

Proponents of tourism development often emphasize the potential of tourism to serve as an alternative livelihood, offsetting participation in activities that use natural resources. Tourism is expected to act as a substitute for income and subsistence benefits people derive from resource-based activities (Forsyth 1995; Wunder 2000). In this view, if a household obtains added income from tourism, household members are likely to shift effort away from farming, grazing, and gathering forest products and replace what they had previously obtained from those activities with products bought on markets. Households with more income from tourism are expected to devote less labor to farm-based activities.

However, the introduction of non-farm activities, including tourism, frequently does not result in substitution. Some scholarship on ecotourism and payments for ecosystem services maintains that this is a question of targeting incentives. From this perspective, for tourism to induce changes in resource use, financial benefits must depend directly on the state of a well-specified resource or the performance of an activity known to affect a targeted resource (Ferraro and Kiss 2002; Ferraro and Simpson 2002). However, tourism operations that effectively align incentives with resource use are rare in practice (Kiss 2004). Making incentives directly conditional on resource conservation may be unfeasible or violate social norms (Muradian *et al.* 2010). Alternatively, rural tourism may lead to increased demand for food and energy resources (Nepal 2008). In many cases, links are indirect. Understanding these links requires uncovering the factors that mediate between tourism participation and resource use.

The impacts of tourism on resource use are likely to depend on how tourism enters into household asset allocation processes. In constructing and adapting livelihood strategies, households allocate a variety of assets including land, labor, financial capital, natural resource access, and social connections to pursue a range of objectives, such as enhancing consumption, hedging against shocks, and maintaining the long-term productivity of farm units (Ellis 2000; McSweeney 2004; Ploeg 2009). Agriculture, forest use, and other activities are linked together through household decision-making and community organization (McSweeney 2004; Roy Chowdhury 2010). Non-farm activities like tourism may substitute for resource use, as the alternative livelihoods hypothesis suggests, or they may prove complementary. Labor demands of tourism may lead households to reduce the allocation of labor to agriculture, NTFP harvesting, or hunting (Garcia-Frapolli *et al.* 2008; Stem *et al.* 2003; Wunder 2000), or households with available labor may use income from tourism to invest in intensified farming (Forsyth 1995; Yang *et al.* 2009a). Impacts depend on the distribution of assets within and across households; the assets tourism demands and provides, and the priorities households apply

in allocating labor, capital, and other assets, as well as the broader economic and policy environment within which households act (Ellis 2000; Scoones 1998).

That tourism is not alone in influencing resource use adds a further challenge. Many sites of rural tourism development simultaneously see the advance of commercial agriculture, growing markets for forest products, and opportunities for off-farm labor. These activities may affect household asset allocation and resource use in ways that parallel, augment, or counteract the effects of tourism. To accurately understand the impact of tourism requires accounting for other activities that may also influence resource use.

Because resource use activities have varying input requirements and bring varying benefits, it is necessary to distinguish among resource uses as well. Tourism projects may target a broad variety of resource uses, which vary in their economic benefits, requirements of labor and capital, levels of risk, and how these attributes relate to those of tourism activities. For example, livestock husbandry often makes small requirements of labor relative to crop cultivation, and as a result labor demand from tourism may affect livestock husbandry less than crop cultivation. A given tourism activity may exert contrasting influences on differing resource use activities due to the different asset allocation processes involved.

Finally, to address adequately the impacts of tourism amid other activities on different focal resource uses requires a comparative framework attentive to differences across scales. A household-scale analysis might discover a negative relationship between tourism participation and resource use but fail to note an offsetting impact at the community level of specialization in resource use activities by households that do not take part in tourism. Alternatively, reduced resource use in some communities due to tourism or growing consumption among tourists may lead to increased demand for resources in other communities, generating complex effects across a landscape.

The questions motivating this study follow from these observations. Do the impacts of tourism on resource use differ by resource use type? Do the mechanisms through which tourism influences resource use vary correspondingly? What are the most relevant mechanisms? In this paper we operationalize them with respect to NTFP collection and livestock husbandry in a selection of communities in southwest China.

As in many other countries, governments in China have made tourism a central instrument of rural development, aiming to reduce poverty while improving environmental quality (Donaldson 2007; Zeng and Ryan 2012). Authorities often employ alternative livelihood reasoning, predicting that tourism development, by bringing economic benefits to communities, will lead residents to reduce their reliance on natural resources. The sustainability of tourism in China's protected areas is an issue of ongoing concern (Han and Zhuge 2001; Liu *et al.* 2013). While a growing literature examines socioeconomic impacts of tourism on rural communities

(e.g., Liu *et al.* 2012; Xu *et al.* 2009b; Yuan *et al.* 2008) and environmental impacts of tourist behaviors (e.g., Li *et al.* 2006; Yang *et al.* 2002), studies tend to focus only on communities directly involved in tourism. Yet participation is often uneven, with tourism concentrated in communities adjacent to natural amenities (Li *et al.* 2006). Findings on resource use impacts are mixed. In some cases households excluded from tourism participation have intensified collection of forest resources, which are in heavy demand among tourists (Yuan *et al.* 2008; Zhao *et al.* 2011). In others, households invest income from tourism in intensifying agricultural production (Yang *et al.* 2009a).

Study Area

This study focuses on four communities within Meili Snow Mountain Scenic Area in Deqin County at the northwestern margin of Yunnan Province.² Meili Snow Mountain Scenic Area is a property within the Three Parallel Rivers World Natural Heritage Site that includes lands pertaining to 16 communities. The landscape is extremely rugged, with elevation ranging from 1,840 m in the valley of the Lancang River (the upstream portion of the Mekong River) to 6,740 m at Kawagebo summit. Altitude gradients and monsoonal precipitation foster great ecosystem diversity and high levels of endemism (Ma *et al.* 2007), due to which Deqin County and the surrounding region have been designated the Mountains of Southwest China Biodiversity Hotspot (Myers *et al.* 2000). Rugged terrain presents varied and often challenging agro-ecological conditions. Of Deqin's population of 66,700 in 2010, approximately 80 % are ethnically Tibetan, and 90 % have rural household registration.

Livestock and NTFPs play central roles in rural livelihoods in the region, and both have been asserted to have important impacts on ecosystems (Xu and Wilkes 2004). In most rural communities in Deqin County, households plant grain in fields surrounding settlements and raise yaks, cattle, and yak-cattle hybrids. Livestock are pastured on a succession of alpine meadows in warmer months and stabled within settlements in the winter (Yi *et al.* 2007). Overall stocking rates have grown continuously since the 1970s (Deqin County Gazetteer

Editorial Committee 1997). Production of meat and dairy products for market exchange continues to grow in importance.

Residents have long gathered mushrooms and medicinal products for household consumption and for trade. The advent of *matsutake* export in the 1980s brought dramatic change; by the 1990s this mushroom had become Yunnan's largest agricultural export and a key source of income for rural households in northwest Yunnan (Arora 2008; Yang *et al.* 2009b). Domestic markets for medicinal products have expanded as well.

Tourism in Deqin centers on mountain scenery and ethnic culture, particularly surrounding Kawagebo, the tallest summit in Yunnan and a peak held sacred by people living across the Tibetan Plateau. Community tourism germinated in the late 1990s as local officials assisted residents in organizing to provide mule rides and accommodations to visitors. Tourism development has complicated relationships with natural resource use. Official policy statements present tourism as a means of reducing dependence on natural resources, portraying residents as caught in vicious cycles of poverty and resource degradation. Other official statements employ contrasting narratives supporting “traditional livelihood activities” conducted in harmony with nature. Local authorities encourage residents to maintain crop cultivation and livestock husbandry, and refrain from restricting other activities, such as gathering NTFPs.³

We focus on NTFPs and livestock due to their importance to local livelihoods and the contrasting ways they draw on household assets. Claims have been made that tourism affects both negatively. Yi and colleagues (2007) found an overall decline in livestock holdings since the mid-1990s in a selection of Deqin villages, particularly pronounced in communities involved in tourism. Studies of Yubeng, one of our study sites, have found that while in the early 2000s households obtained between 85 % and 90 % of their cash income from NTFPs, with every household selling several hundred kilograms of mushrooms per year (Guo 2007; Zhang 2006: 205), with the advent of tourism, NTFP collection there has declined (Chen 2009). Collecting NTFPs requires concentrated labor, with days or weeks spent on mountainsides during gathering season, while livestock husbandry is much less labor-intensive. However, raising livestock requires financial assets to obtain animals and the ability to provide winter feed. Given these different asset requirements, we expect tourism participation to affect NTFP collection and livestock husbandry through different pathways.

In selecting sites, we aimed to identify communities exemplifying contrasting models of community-based tourism

² The units referred to as “communities” are termed “natural villages” (*zirancun*) in official parlance. A “natural village” is a cluster of households defined by geographic proximity and shared identity; members generally conceive of themselves as a collective unit and are recognized as such by outsiders. Local government in rural China is administered in “administrative villages” (*xingzhengcun*). An administrative village is composed of a collection of teams (*she*, formerly called *dui*). Natural villages could be recognized at either of these levels, though they often lie in between. For example, one community in this study, the natural village of Xidang, is divided into Xidang Upper Team and Xidang Lower Team. The natural villages of Xidang (2 teams), Yubeng (2 teams), and Rongzong (3 teams) compose Xidang Administrative Village.

³ These practices contrast with instances in which authorities have prohibited farming and grazing or promoted the removal of human settlements within protected areas (Li *et al.* 2006; Zhong *et al.* 2008).

common in the region as well as comparison communities without tourism attractions. We selected Xidang and Yubeng to reflect contrasting collective and entrepreneurial patterns of tourism operation. Xidang hosts a collectively organized mule ride rotation, while in Yubeng such a rotation is complemented by the operation of guesthouses by entrepreneurial households. These two configurations, collective and entrepreneurial, can be observed in community-based tourism sites across southwest China (Donaldson 2007; Kolas 2007). However, directly comparing the two sites is problematic. Xidang and Yubeng are located, respectively, at 2,400 m and 3,100 m above sea level. Growing seasons of different length, different times of peak agricultural labor demand, and different opportunities to market farm products result in contrasting agricultural practices. These conditions likely influence responses to tourism and other off-farm activities. Moreover, agricultural patterns in the region have shifted due to factors other than tourism (Salick *et al.* 2005). Aiming to facilitate comparison of these differing sites and to discriminate between changes due to tourism and those due to other factors, we identified a second pair of communities without tourism operations whose market access and agroecological conditions closely resemble those of the two tourism-centered communities. These communities, Sinong and Zhila, embody pathways of rural change that are broadly typical of other communities in the area (Table 1). While it cannot be assumed that in the absence of tourism development Xidang and Yubeng would have followed the same pathways as Sinong and Zhila, this paired comparison facilitates inference about how tourism affects resource use relative to other factors that influence livelihoods in the area. It also provides insights into how impacts of tourism spill over into nearby communities.

Xidang: Collective Tourism

Xidang occupies a slope above the Lancang River. Homes cluster around the motor road linking Xidang to the county seat. Above and below, broad terraces yield wheat in June and maize in October. Residents harvest and sell walnuts from trees lining the fields, and a small but growing proportion cultivate grapes as well. Nearly all households own yaks and cattle, butter and cheese from which are central to their diets. Residents also sell mushrooms and medicinal products collected in forests and meadows above the settlement. Starting in the late 1990s, tourists began hiring Xidang residents to provide mule rides to nearby Yubeng. More households obtained mules for this purpose, and, with local government support, they organized a rotation system. When a tourist requests a ride, a member of the next household in sequence prepares a mule to mount, then takes the visitor up the trail. An elected monitor manages the rotation. In 2009, each household earned about ¥20,000 from mule rides alone, more than the mean net household income for

the county that year of approximately ¥15,000.⁴ Three households also run guesthouses, but receive few guests, as nearly all visitors pass straight through Xidang to Yubeng.

Yubeng: Entrepreneurial and Collective Tourism

Located in a secluded valley with no motor road, Yubeng draws growing numbers of visitors seeking an alternative to crowded mass tourism sites. At over 3,000 m above sea level, the short growing season allows for one crop of barley annually; residents also plant maize in fields several kilometers downslope. Walnut trees are absent. Most households raise yaks and cattle. Between late spring and autumn a stream of tourists rolls over the ridge from Xidang, with larger numbers on national holidays in May and October. In 2005, the number of visits surpassed 10,000. Between 2007 and 2009, there were 30,000 to 40,000 per year.⁵ To visit an alpine lake and waterfall beyond Yubeng or to return to Xidang, many take mule rides in a rotation like that in Xidang. Because Yubeng has 34 households compared to Xidang's 74, any given number of tourists brings substantially more tourism-related work per household than in Xidang. Within Yubeng, visitors stay in guesthouses run by resident households. By 2010, 17 households had guesthouses, with beds for 800 guests, while others provided lodging in their homes during peak seasons. Tourists pay ¥20 to ¥100 per night for lodging and also purchase food and beverages, which must be hauled over the ridge.

Tourism has brought phenomenal income growth in what was once one of the region's poorest villages. The mean income reported by Yubeng respondents for 2009 was ¥80,000; the median was ¥59,000. Income is concentrated among households that run guesthouses. In recent years Yubeng residents have hired outside workers to perform agricultural work, horse-rides, and construction tasks, and now nearly all households hire non-family laborers at some time each year.

Sinong: Grape Cultivation

In Sinong, 12 km upstream from Xidang, residents also rotate maize with wheat as staple crops, raise cattle and yaks, and cultivate walnuts. Forests above Sinong are poor in *matsutake* habitat, and NTFPs provide substantial income for only a few households. However, under a county extension program promoting grape cultivation, by 2009, every household in Sinong had planted at least some cropland in grapes, and a handful had converted all grain fields to grapes. Although a glacier above the village attracts the occasional backpacker,

⁴ At the 2009 exchange rate, ¥1 was equal to US\$0.147.

⁵ As in most nature attractions in southwest China (Donaldson 2007), over 90 % of visitors to Xidang and Yubeng are domestic, primarily hailing from large coastal cities and urban areas within the province.

Table 1 Summary of community attributes

Community	Households, Total 2011	Households Surveyed	Percent Sampled	Median Household Size, Persons	Median Highest Education, Years	Elevation (m)	Main Crops	Tourism Format
Xidang	74	28	38 %	5.5	9	2,400	Wheat, Maize, Grapes, Walnuts	Mule Ride Rotation
Yubeng	34	21	62 %	5	6	3,100	Barley, Maize, Wheat	Mule Ride Rotation, Guesthouses
Sinong	62	31	50 %	5	9	2,400	Wheat, Maize, Grapes, Walnuts	None
Zhila	15	12	80 %	4.5	9.5	3,100	Barley, Maize, Wheat, Buckwheat	None
Overall	185	92	50 %	5	9			

the community has not become a major tourism attraction. Still, Sinong households take advantage of opportunities the tourism economy has spawned. Some drive passenger vehicles; others join troupes that showcase customary dances. Overall income levels resemble those in Xidang.

Zhila: Off-Farm Work and On-Farm Diversification

Like Yubeng, Zhila is a high-elevation settlement that in 2009 lacked road access. (A road was built to Zhila in 2010.) Residents cultivate wheat and barley near the settlement and grow maize on downslope fields. Every household raises yaks or cattle. NTFPs are a major source of income. Residents earn little income from any activities related to tourism, while grapes cannot be cultivated at Zhila's high altitude. However, a majority of households have members taking off-farm employment. Residents seldom migrate to coastal manufacturing zones but rather find professional, manual, or tourism employment in nearby towns or rural agricultural work in other villages. While off-farm work provides a major supplement, overall incomes in Zhila are lower than in the other study sites.

Data and Methods

This study draws on qualitative observations and a household survey. In 2010, the first author conducted participant observation and in-depth interviews in several communities in Deqin County as part of a broader study of tourism in protected areas. During over 2 months of residence, based in Xidang, the author spent extended periods in Yubeng and Sinong and made shorter visits to other communities in the area. Interviews were conducted in Mandarin Chinese. Nearly all residents are ethnically Tibetan and speak a dialect of Tibetan as their first language. However, with continual exposure to Mandarin Chinese in schools and media and a decade assisting Mandarin-speaking tourists, nearly all men

and most women under age 50 speak fluent Mandarin, making communication generally straightforward. Interview data were coded iteratively, with themes identified from earlier interviews incorporated into subsequent interviews.

Building on qualitative observations of apparent patterns of variation in farming practices, livestock holdings, and NTFP gathering, the authors jointly designed a household questionnaire addressing household livelihoods. Six pilot questionnaires were taken in May 2011, and the results were used to refine the survey instrument. The authors and seven students conducted the survey in June 2011. In each community, we sought to interview as many households as possible, reflecting the full array of livelihood activity mixes present. We contacted respondents by walking door-to-door and through fields in each community. We also met residents at known gathering places like shops and hitching posts for mule rides. Interviews were conducted in Mandarin Chinese and took between 30 min and 1 h. No potential respondents refused to be interviewed, but two questionnaires were omitted, one due to incomplete information and one because the household had formed in 2010. Data from 92 valid questionnaires are used in this analysis.

The survey covered household demographics; participation in and labor allocation to on-farm, tourism, and other non-farm activities; and income from each activity in 2009. Respondents were asked to list any field and tree crops they planted and, for each, the area planted, the weight sold, and the amount of income there from. Corresponding questions were asked regarding NTFPs, livestock, and livestock products. Respondents were also asked about participation in a variety of non-farm activities, including tourism activities. For farm and non-farm activities, respondents indicated which members participated, for what periods of time, at what times of year, enabling the estimation of the number of person-days allocated to each activity. Income from different activities was summed into categories, including income from primary production (sale of ground crops, tree crops, livestock, livestock products, and non-timber forest products), tourism (giving mule rides, running a shop or guesthouse, sanitation work,

Table 2 Community means and overall descriptive statistics

Community	Crop Area, <i>mu</i>	Horse Ride Labor, person-days	Guesthouse Labor, person-days	Non-Tourism, Non-Farm Labor, person-days	NTPF Labor, person-days	Livestock, head
Xidang	5.05	141.70	19.85	140.54	42.61	2.86
Yubeng	15.20	113.21	120.00	96.90	11.25	8.38
Sinong	8.97	0.00	0.40	161.71	13.68	4.94
Zhila	22.78	0.00	0.00	205.00	46.96	10.33
Overall Mean	11.00	68.97	33.57	146.12	26.27	5.79
S.D.	9.02	80.60	94.78	194.38	29.09	5.81
Minimum	2	0	0	0	0	0
Median	8.2	0	0	30	15	4
Maximum	48.5	225	540	720	135	30

being a tour guide, and driving a passenger vehicle carrying tourists), and other non-farm work (outside labor for wages or salary as well as from driving a freight vehicle) (Table 2).⁶ The focal outcomes concern NTFP collection and livestock husbandry. The indicator of NTFP use is person-days of labor allocated to NTFP collection in 2009. For livestock husbandry, we focus on the number of cattle, yaks, and cattle-yak hybrids, inclusive, owned by a household in 2009. We choose this measure rather than labor allocation to grazing because livestock pasturing has small labor requirements relative to other farm activities. In northwest Yunnan, most labor associated with large livestock takes place during summer grazing, when persons tending livestock, mostly older men, reside on pastures for 3 to 5 months at a time. It is common for a small number of households in a community to specialize in grazing, tending other households' cattle in exchange for a proportion of the dairy products yielded (Fig 1).

Results

Activities and Income across Communities

While every household surveyed reported cultivating crops, the proportion involved in different non-farm activities varies across study sites (Fig. 2). In both Xidang and Yubeng, nearly every household takes part in providing mule rides. In Yubeng, nearly half reported running guesthouses as well. In the other two communities, these activities are absent, except for two little-used guesthouses in Sinong. In Sinong,

somewhat more respondents than in other communities reported making money driving a vehicle. Finally, in Zhila, tourism activities are absent, and lack of road access limits vehicle ownership, but two-thirds of households reported having members working outside the community.

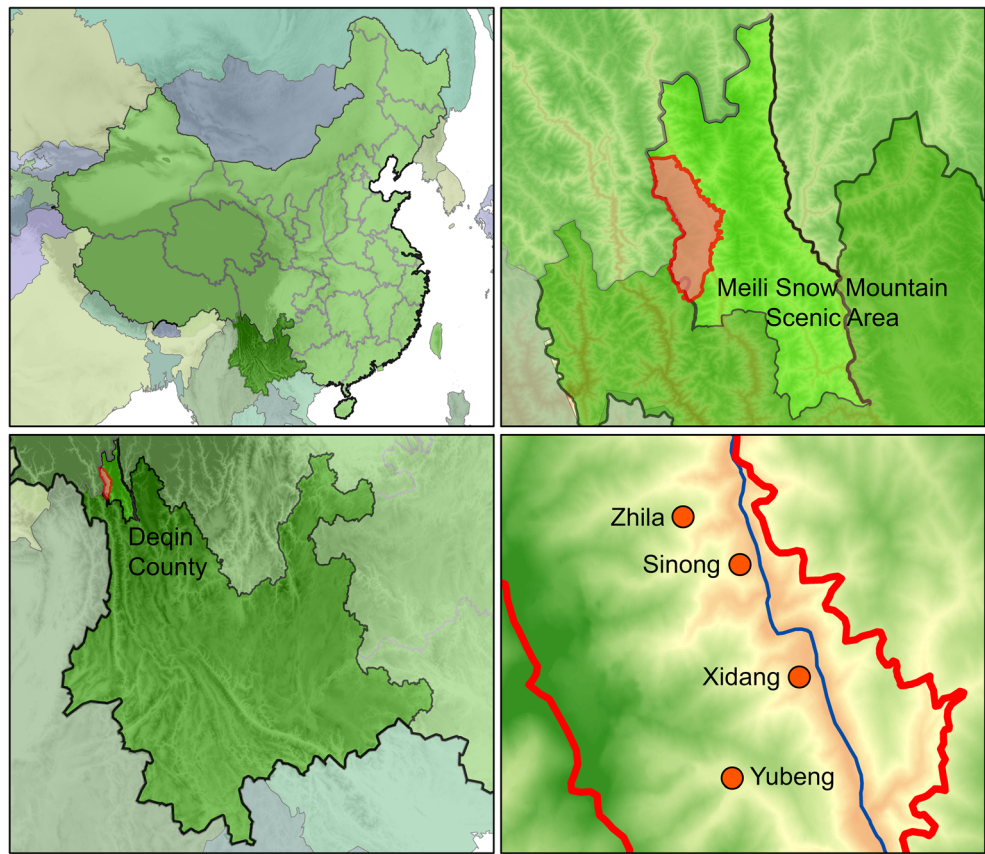
Comparing income across communities, disaggregated into income from primary production, tourism, and other non-farm sources (Table 3), several patterns emerge. First, in both tourism-centered communities, tourism accounts for the majority of income, though it is less dominant in Xidang. Xidang households obtain more than one-eighth of their income, on average, from crops, livestock, and NTFPs, and one-third of their income from work outside the village. In Xidang, tourism income ranged from none to 98.5 % of household income, while in Yubeng for no household did tourism account for less than 72 % of household income. At the community level, tourism appears to offset income from other sources, especially income from primary production, which is substantially lower in Xidang and Yubeng than in the comparison sites.

Communities without tourism operations also show contrasting patterns. Despite the lack of tourism, mean income in Sinong is greater than in Xidang. Road access gives Sinong residents access to income as self-employed passenger car drivers. In contrast, Zhila residents reported no income from any activities directly related to tourism. However, Zhila households drew the highest proportions of income from non-farm, non-tourism activities and from primary production, followed closely by Sinong. Agricultural income comes from different sources in these two communities. In Sinong, 74 % of primary production income comes from the sale of grapes, with an additional 19 % from selling walnuts. In Zhila, on-farm income is spread over a variety of income sources: 11 % from walnuts and other tree crops, 7 % from field crops, 36 % from livestock and livestock products, and 46 % from NTFPs.

Overall, at village and household levels, the four communities show contrasting patterns of diversification and

⁶ Measures of income do not include government subsidies for education, agricultural inputs, forest conservation, and assistance for the elderly. During questionnaire administration, it became clear that most respondents could not reliably recall subsidy amounts. Total subsidies per household seldom exceed ¥2,000 annually. Our measures modestly exaggerate the importance of the income categories represented, particularly for the poorest households.

Fig. 1 Locations of Field Sites within the People’s Republic of China



specialization. In Yubeng, households tend to concentrate on tourism. In Xidang, many households complement tourism income with income from outside employment and NTFP sales, while one household specializes in livestock grazing.

Sinong households concentrate on grape cultivation, often complemented with off-farm employment or vehicle driving. Finally, Zhila households diversify on-farm production, and most also seek off-farm employment.

Fig. 2 Proportion Reporting Participation in Selected Non-Farm Activities by Community

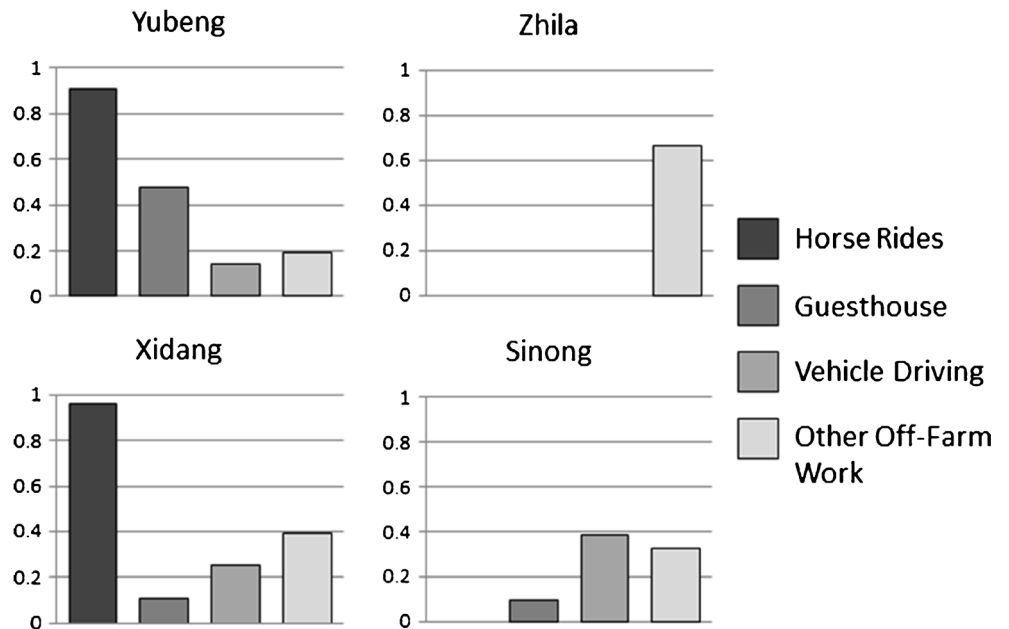


Table 3 Income from primary production, tourism, and other nonfarm sources, by community, *yuan*

Community	Primary Production	Tourism	Other Nonfarm	Total
Xidang	5,669 (13.1 %)	23,141 (53.7 %)	14,311 (33.2 %)	43,121 (100.0 %)
Yubeng	3,210 (4.0 %)	75,629 (94.1 %)	1,543 (1.9 %)	80,382 (100.0 %)
Sinong	21,614 (45.8 %)	10,292 (21.8 %)	15,248 (32.3 %)	47,154 (100.0 %) ^a
Zhila	13,665 (52.3 %)	0 (0.0 %)	12,475 (47.7 %)	26,140 (100.0 %)

^a Values do not add up to 100 due to rounding error

Divergent Patterns of NTFP Harvest and Livestock Husbandry

Livestock Holdings: Mule Fodder and Grapes

Figures on livestock holdings also suggest that tourism acts as a substitute. Households in tourism-centered communities have significantly less livestock than households in communities without tourism attractions (Wilcoxon-Mann-Whitney test, $z=2.90$, $p<0.01$). At either elevation, the community without tourism has higher mean herd size than the community with tourism. Agro-ecological conditions associated with elevation are also important. For either tourism status, the community at higher elevation has larger herds than the community with the same tourism status at a low elevation (Fig. 3), and herd size is significantly greater in Yubeng than in Xidang ($z=-2.54$, $p<0.05$). Historical data for Yubeng support the claim that tourism is associated with diminished herd size. While Yubeng's herds are large relative to Xidang's, a 1999 study found that Yubeng households averaged over 12 cattle and yaks (Guo 2007), while a 2006 survey found a mean

of 10.2 (Chen 2009), compared with our finding of a mean of 9.2 in 2009.

Residents of Xidang and Yubeng emphasize the importance of fodder demand in determining choices concerning livestock:

Mules make money, sure, but people still have to spend a lot on food for them. Part of the year you can graze them on the mountain, but during the winter when it snows, you have to keep them in the cowshed and buy grain for them to eat. It used to be that people had enough grain, butter, and yak meat to survive. But now there aren't enough of those to get by. Instead of cattle, people raise mules. So now they have to buy things outside. (Interview, October 2010, Yubeng)

Hardly anyone raises goats anymore. There are only two households that do it. It used to be that every household had a flock. ... Everybody's too busy; no one has the time. Now there are three things. First, horse-pulling. Second, farming. Third, people spend a lot of time getting grass to feed mules and horses. Busy with all these, there's no time to raise goats. (Interview, September 2010, Xidang)

While households pasture livestock on alpine meadows in summer months and graze in forests and shrublands near the village in spring and autumn, cattle and yaks must be fed grain and corn cobs to pass the winter. Many in these communities also claim that the feed demands of mules have taken up portions of the grain crop that, before they started giving mule rides, they had used to sustain larger herds. People in households with small land endowments say they do not have enough grain to feed cattle. The impact of tourism on livestock husbandry is not directly an impact of labor demand, nor of income. Rather, it works through households' ability to support customary livestock alongside mules. In low-elevation communities with smaller land endowments, this land constraint poses a sharper trade-off. Greater availability of cropland in Yubeng enables households to maintain larger—though also declining—herds while also supporting mules.

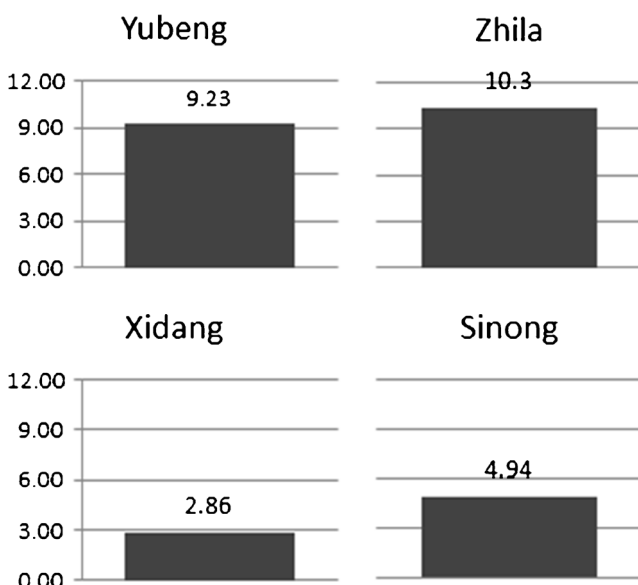


Fig. 3 Mean Livestock Ownership by Community, Head

Changes in husbandry practices are not limited to Xidang and Yubeng, though. Grape cultivation in Sinong also impacts fodder supplies:

Growing grapes, you lose two seasons of grain. While we used to have many cattle, with grapes we haven't enough fodder, so we have reduced to three cattle. Still, people from Mingyong and Xidang come here to buy fodder. If everyone just grew grapes, we wouldn't have any to sell. My mother doesn't let us sell fodder, though: we save it for our own cattle. (Interview, November 2010, Sinong)

All Sinong residents plant at least some of their cropland in grapes, as is the case in most communities along the Lancang River in Deqin. Grape cultivation has transformed agricultural routines. Perennial grapevines end the cycle of plowing and planting twice a year after maize and wheat harvests. Labor is redistributed over the growing season. While labor at harvest time is less than with grain crops, grapes require more water as well as regular application of pesticide and chemical fertilizer. Like mule rides, by displacing grain production, grape cultivation also reduces fodder available for cattle. Several Sinong residents claim they have reduced livestock holdings due to grape cultivation. Most in Sinong hedge risk by dividing their land between grain and grapes, though some nearby communities have switched wholesale to grapes. The difference in livestock holdings between Sinong and Xidang is likely smaller than it might have been without the promotion of grape cultivation. In contrast, some communities outside the river valley have enlarged herds in response to demand from tourists and a meat-processing firm based in the prefecture seat.

NTFPs: Labor, Price, and Convenience

While patterns of livestock husbandry support the conjecture that tourism substitutes for resource use, patterns of NTFP harvesting do not. There is no significant difference in labor allocation to NTFPs between tourism-centered communities and communities without tourism ($z=-1.23$, $p=0.22$). Patterns differ sharply across tourism-centered communities (Fig. 4). Average labor allocation to NTFP gathering in Yubeng is far lower than in Zhila, but significantly lower than in Xidang as well ($z=3.198$, $p<0.01$), while Xidang residents allocate much more labor to NTFP gathering than do Sinong residents.

Residents of both Xidang and Yubeng claim that tourism has led to reduced NTFP collection:

Now we depend totally on horse-pulling to earn money. Before, there wasn't tourism, and we would

gather *matsutake*, go out to find work, sell fruit. . . . Last year, there was too much tourism work, and we didn't have time to gather *matsutake*. If you have a lot of labor, you can have two people pulling horses and one go and gather *matsutake*. We only have me and my man. (Interview, September 2010, Xidang)

Observations conducted during tourism season, which coincides with the time of peak yield for *matsutake* mushrooms, explain the contrast between Xidang and Yubeng. The areas where Xidang residents harvest mushrooms are located in convenient proximity to trails leading from the pass that is the destination of most mule ride customers. After taking tourists to the pass, Xidang residents often proceed to gather mushrooms before returning home. In Yubeng, however, two key factors constrain NTFP collection. First, the time requirements of gathering mushrooms are greater for Yubeng residents due to the community's distance from roads. Middlemen come to Xidang to buy mushrooms from local residents. To market mushrooms, Yubeng residents must either go to Xidang or find someone to take mushrooms to the trading post. Second, nearly every Yubeng household employs hired hands to do manual labor including providing mule rides. These workers, coming from communities several kilometers away, are not familiar with the mountain forests where mushrooms can be found. Rather than seek mushrooms, these workers must return directly to the village after completing their duties. Even when Yubeng household members provided mule rides, they usually sped down to the village afterward. Impacts of tourism on NTFP gathering depend on

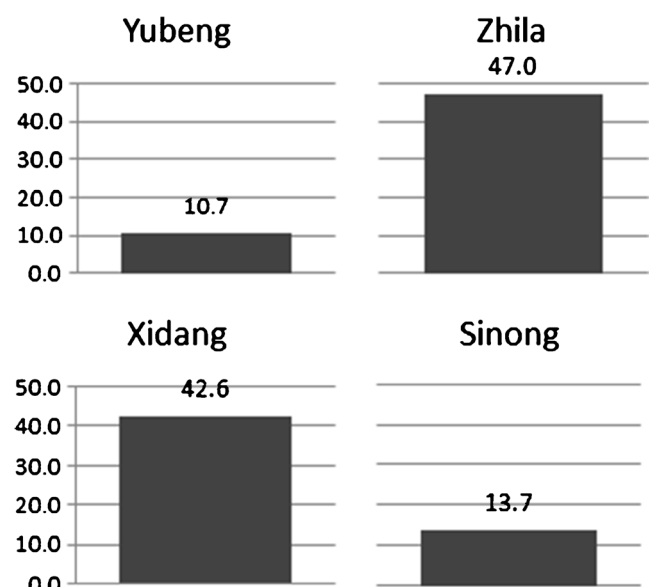


Fig. 4 Mean NTFP Harvesting Labor by Community, Person-Days

spatial locations of NTFP habitat and trading points relative to where tourism activities take place.⁷

Parallel Changes in Non-Tourism-Centered Communities

While tourism has transformed livelihoods in Xidang and Yubeng, parallel transformations have taken place in Sinong and Zhila. In Zhila, the last decade brought a great expansion in non-farm work, which was nearly absent in the 1990s. Some households undertake wage labor, most within the county, while in others, children who have come of age work as nurses, teachers, and clerks in the county town. Sinong also sees substantial participation in non-farm work (Fig. 2, Table 1).⁸ Vehicle driving has become an important source of income. Proximity to tourism attractions makes driving passengers in minivans or sport utility vehicles an especially appealing option for residents of Sinong and other nearby communities. A smaller number of households have used savings and accessed loans to purchase freight trucks. Freight drivers service construction sites or haul minerals from mines in Deqin County to refineries in regional centers, returning with food and consumer goods. Driving offers greater flexibility than other kinds of non-farm work, allowing drivers to rest at home between trips and return for harvests and holidays.

Driving, outside employment, and grape cultivation are present in Xidang and Yubeng, but at lower rates than in the respective comparison sites. Because these options are available for residents of Xidang and Yubeng, one can reasonably conjecture that if Yubeng had not become a tourist attraction, Xidang and Yubeng might have shown patterns similar to Sinong and Zhila.

Still, the ways social and economic connections link activities across these communities limit the reach of this logic. Tourism in Yubeng, Xidang, and the nearby community of Mingyong has generated demand for mule fodder, food products, manual labor, and road transportation. Some Sinong residents sell or give grain and stalks to people in tourism-centered communities. Households in surrounding communities sell farm products for consumption by guests in Yubeng guesthouses. Hired laborers in Yubeng come less from communities in the immediate vicinity than from poorer villages elsewhere in the county and in the Tibetan Autonomous Region. Finally, demand for rides from the county town creates opportunities in passenger transport. Close proximity, ethnic identity, and dense kinship networks link these

communities together and convey information about market demand and opportunities. Livelihood patterns in communities without tourism cannot be adequately understood in isolation from nearby attractions, and resources available in other communities shape tourism in Xidang and Yubeng.

Discussion

The divergent impacts of tourism on resource use in these communities follow from differing mechanisms through which tourism is connected to each activity. In particular, labor allocation, material inputs, and the specific ways they interlock with natural capital mediate the impacts of tourism participation on NTFP collection and livestock holdings. Because NTFP collection is a labor-intensive activity, participation in tourism and other non-farm income-earning opportunities that occupy household members for substantial amounts of time have negative impacts on household NTFP collection. However, this impact also depends on the spatial distribution of NTFP habitat and its relationship to tourism activities. In Xidang, where NTFP sources are near to sites of mule ride labor and marketing is convenient, the impact of tourism on NTFP gathering is less pronounced than in Yubeng, where the predominance of hired labor and inconvenience of NTFP collection and marketing have led to sharper declines. Meanwhile, the scarcity of NTFP habitat around Sinong forecloses NTFP gathering opportunities. In contrast, livestock husbandry has relatively low labor requirements but is dependent on the availability of winter fodder. As a result, livestock holdings are negatively impacted by mule ride participation across Xidang and Yubeng alike—as well as by grape expansion in Sinong.

These findings show the importance of viewing tourism in the context of other rural activities. While several studies explicitly compare the impacts of tourism with other economic activities (e.g., Fabinyi 2010; Garcia-Frapolli *et al.* 2008; Leatherman and Marcouiller 1996), literature on tourism tends to focus narrowly on the impacts of tourism where it takes place. By comparing otherwise similar communities with and without tourism attractions, we were able to examine how tourism fits in among other livelihood activities emerging in the region. Tourism seldom simply displaces resource-based activities, which are valued for their contributions to livelihood security and their connections to local identities. Patterns accompanying cash crop cultivation in Sinong parallel the negative effects of tourism on livestock husbandry and on-farm diversification, an important consideration given the widespread expansion of commercial farming in China and elsewhere (Tilt 2008; Zhang and Donaldson 2010). Meanwhile, the coexistence of off-farm labor with on-farm diversification in Zhila highlights the complicated impacts of labor migration, which may contribute either to diminished on-farm resource use (Qin 2010) or investment of

⁷ Decreasing market prices for *matsutake* have likely also played a role, but do not explain why these communities obtain so much less income from these and other NTFPs than in Zhila.

⁸ In this region, labor migration to coastal areas, or even the provincial capital, is relatively rare. Remissions from migrant or local, non-migrant work are substantial and are included in “Non-Tourism, Non-farm Income” in Table 2 and Fig. 2.

off-farm income in farming (Childs *et al.* 2008; see also Rigg 2006). Tourism income may also provide capital for agricultural intensification (Forsyth 1995). Our data do not permit confident inferences on this account, but the use of hired labor for farm work in Yubeng and the adoption of grapes by some Xidang households suggest the use of tourism income to maintain agriculture, though households do not invest tourism income in livestock assets.

The variations in resource use identified here may have significant environmental impacts, though ascertaining these impacts is beyond the scope of this study. It is well known that the effects of resource use on rural environments may be indifferent or enhancing as often as degrading (Xu *et al.* 2009a). While the deleterious consequences of overgrazing are well documented (Haynes *et al.* 2013), livestock impacts on pastures depend not just on numbers but on management methods, mobility, timing, the biological characteristics of grasslands (Harris 2010; Yu and Farrell 2013). Similarly, evidence on the impacts of NTFP gathering on forests and alpine landscapes in southwest China is inconclusive (Arora 2008; Winkler 2008). Alongside variability in resource use responses to tourism, uncertainty about environmental impacts of resource use raises questions about the narratives of reducing resource dependence that are prevalent in local government policy statements concerning rural development. This study provides suggestive evidence concerning potential variation in pressure on natural resources, but to ascertain the extent to which livestock and NTFP gathering impact ecosystems in southwest China will require further research that robustly links socioeconomic data to ecological indicators.

The livelihood impacts of tourism depend on how tourism activities interlock with household assets and agro-ecological conditions. Given that rural households tend to diversify livelihood strategies when their asset holdings permit, tourism interventions are likely to have unexpected consequences. The conceptual framework of alternative livelihoods may not be a helpful guide given the complex ways tourism and other development interventions affect livelihoods. Where it is proposed to reduce dependence on natural resources by implementing tourism, it is advisable to carefully examine how proposed tourism activities are likely to affect household assets and activities. Moreover, tourism can bring both desired and unwanted spillovers in terms of financial benefits and resource use. Due to the context-specificity of livelihood impacts, it cannot be presumed that one kind of response in one locale will be replicated in another.

These concerns are of particular relevance in China and other countries that incorporate tourism into rural development policy. The current trend in China away from small-scale community tourism and toward high-volume tourism operations owned by outside entities (Zinda 2014) does not remove these concerns so much as raise them in other forms by generating different sorts of employment and income for

residents. How these changes will affect rural communities and landscapes will depend on how tourism interlocks with changing rural livelihoods.

These findings provide a glimpse of the dynamic and multifaceted change taking place across southwest China. Our data, covering a period of 2 years, provide only a snapshot amid swift and continuing change. Just as the trajectories these communities have taken were not apparent a decade ago, so future livelihood patterns will depend on events that are not fully foreseeable. As young people undertake non-farm labor in increasing numbers, whether accommodating tourists within their home places or taking jobs outside, generational shifts may bring changes in farming practices and resource use that are not yet evident. Decisions about tourism development, changes in agricultural policy, the vagaries of markets, and climate variability may alter the conditions under which people make decisions (Zheng *et al.* 2014). In different locales, different activities and mechanisms will be salient. Attention to dynamic change over time, as well as to variation across communities, households, and activities, is essential to evaluating the livelihood impacts of development interventions.

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