

# The Houses That Matsutake Built<sup>1</sup>

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**The Houses That Matsutake Built.** In the mountains of northwest Yunnan, China, a valuable mushroom, matsutake or *song rong* (*Tricholoma matsutake*) was commodified in the 1980s. Since that time, it has been exported in large quantities to Japan. The sale of matsutake now contributes more to the income of Shangri-la County (Diqing Autonomous Tibetan Prefecture) than any other crop, including timber and livestock. During the 1980s and 1990s, villagers in this remote region used their mushroom earnings to build spacious, beautiful new houses in the traditional local (Kham) style, and in some cases to buy motor vehicles or open businesses. In villages with access to productive matsutake habitat, virtually every household was able to build a new house; entire villages were transformed. During the 1990s, several villages developed locally based management regimes to enhance production and to address the problems and conflicts that arose from the harvest of such a valuable product. More recently, government agencies and NGOs have played a highly visible role in promoting "sustainable" harvest policies. The implications of their involvement are briefly examined and the future of matsutake harvest in Yunnan is discussed.

**Key Words:** Khampa, matsutake, matsutake harvest, mushroom harvest, NTFPs, profitable harvest, sustainable harvest, Shangri-la, Yunnan, wild edible fungi

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## Introduction

In the early 1990s, while documenting the harvest and usage of wild mushrooms in northwestern Yunnan province, China, I stumbled upon a remarkable scene: Tibetan villages in a remote mountainous area that, by most accounts, should be among the poorest in China were instead sprinkled with magnificent new houses built in the traditional Kham (eastern Tibetan) style. These houses were far larger and more elaborately decorated than was typical for Yunnan then, or now. The villages were not tourist destinations and were seemingly engaged in nothing more than traditional subsistence agriculture—the raising of yaks, barley, buckwheat, etc. Contributing to the sense of unreality was the fact that during the daytime these villages and surrounding fields were virtually deserted, as if visited by a plague.

Closer investigation revealed that virtually all the villagers spent their summer days harvesting matsutake (*Tricholoma matsutake* [S. Ito & S. Imai] Singer, and closely related species) from the

forested hills above the villages; the sale of these mushrooms was their major source of income. I documented the houses with photographs and resolved to determine, through a simple interview process, the extent to which the matsutake harvest was responsible for the appearance of these remarkably beautiful new houses so far away from China's centers of power and wealth.

This paper documents a case of successful forest-based development in the mountains of northwestern Yunnan and briefly examines some of the issues surrounding the harvest that have arisen. Even though the matsutake harvest has enriched villagers fortunate enough to have access to productive habitat, commercial harvest of non-timber forest products (NTFPs) remains controversial. The initial enthusiasm for the idea of forest inhabitants earning more money from the harvest of fruits and nuts than timber was countered by skeptics such as Dove (1993a, 1993b), who argued that only the least valuable of forest products were likely to remain harvestable by the poor, while the more valuable products would be cultivated or otherwise appropriated by more powerful interests. Some (e.g.,

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Emery 2005) have gone so far as to oppose commodification of NTFPs on ideological grounds. However, Yeh (1998) pointed out that several of the precepts and assumptions underlying Dove's skepticism about NTFP harvest in tropical forests are not applicable to mushroom harvest in Yunnan. For example, the matsutake has eluded cultivation so far, and a significant portion of the wealth has accrued to local people. On the other hand, the success of the matsutake harvest described in this paper may not be completely transferable elsewhere, though some aspects of the harvest, such as some of the local management measures, may well be.

### Study Site

I conducted most of my interviews in two villages or townships in Diqing Tibetan Autonomous Prefecture: Jidi and Ge Za. Both are located in northwestern Yunnan province, a one-to-two-hour drive (50–80 kilometers) from the county seat and transport center of Zhongdian, in Zhongdian County (pop. 150,000). In 2001, both the county and town of Zhongdian were renamed Shangri-la as part of a government effort to appeal to the emerging domestic tourism boom. However, the name Zhongdian is still widely used locally.

Shangri-la (Zhongdian) is one of three counties comprising Diqing Tibetan Autonomous Prefecture, an area that shares borders with Myanmar, Tibet Autonomous Region, and Ganzi Prefecture of Sichuan province. As described by Yang et al. (2006), it is a region of forested ridges and steep, rugged canyons carved by three great rivers—the Yangtze, Mekong, and Salween. In part because of the steep elevation gradients, the biodiversity of this region is impressive and it has been declared one of the world's biodiversity hotspots (Myers et al. 2000). Mostly Tibetans inhabit the countryside but there are also significant numbers of Naxi and Yi, as well as smaller numbers of Lisu, Bai, and other minorities. Han Chinese are mainly confined to the larger towns. The town of Shangri-la (Zhongdian) is the largest in Diqing Tibetan Autonomous Prefecture and has the largest regional matsutake market in China. In former times, it was a major transport center for timber and other products, but a logging ban was instituted in 1998 to protect watersheds (Yeh 2000; Menzies and Li [n.d.]). Wild mushrooms and, more recently, tourism (Xu and Kruse 2003), are now major sources of local income.

Jidi and Ge Za are situated on two different unpaved roads; both are nestled in picturesque valleys surrounded by forested hills and ridges at elevations of 3,000–4,200 meters. The forests are dominated by pine and oak but also include fir, larch, birch, rhododendron, and bamboo. The matsutake are ectomycorrhizally associated primarily with species of oak (*Quercus*) and pine (*Pinus*), less commonly with larch (*Larix*) and possibly other hosts.

Both Jidi and Ge Za are comprised of several villages or subvillages. The subvillages in Jidi (pop. 1,600) are situated close to each other near the end of a broad, flat valley that features superior grazing lands, while those in Ge Za are widely scattered over a larger area or "township" along the Ge Za River. Although Ge Za township has a population of 6,000, my survey was restricted to only three villages in Ge Za comprising less than 1,000 people. In both Jidi and Ge Za, most of the matsutake gathering takes place in community-managed forests.

### Methods

I spent parts of five summers in Shangri-la County between 1993 and 1998. During these summers, I interviewed members of 24 households, 12 each in Jidi and Ge Za. Interviewees were selected from villagers selling matsutake at each village's evening matsutake market, though it is fair to say that those interviewed selected themselves as some were friendlier and more willing to be interviewed than others. The villages were noticeably deserted during the daytime because all the adults and adolescents were in the surrounding forests picking matsutake; thus, the 24 selected households were more representative of the villages than the selection site and method might suggest. Unanimity or near-unanimity of participation was confirmed by the fact that not a single person interviewed could name a family in their village that did not participate in the matsutake harvest.

The interviews were loosely structured and, when time permitted, wide-ranging. Most of them were conducted in the villagers' houses or while looking for matsutake in the forest. The following four questions were asked of everyone: (1) Do you have a new house? (2) What percentage of the cost of your new house was generated by matsutake? (3) What is your income from matsutake? (4) What percentage of your

yearly income derives from matsutake? Those interviewed more extensively were also asked to describe conditions in their villages prior to 1984 when matsutake were first exported and to share any thoughts they might have on the problems (if any) posed by the harvest, and on its benefits, rules, and management. Also, questions were asked about the habitat of *song rong* (the Chinese name for matsutake) and its fruiting behavior, and whether they themselves ever ate or used the mushroom.

Though villagers appeared to have little incentive to disguise or exaggerate their earnings, an effort was made to corroborate the data they provided by conducting interviews with village headmen in Jidi and Ge Za. Each headman was asked the same questions listed above but was asked to characterize *all* village households, not just his own. In addition, each headman was asked broader questions about management policies, if any, and changes that had occurred in the village as a result of the matsutake harvest.

The mayor's office of Shangri-la town was also interviewed, as well as various townspeople who were observed picking, buying, selling, or processing matsutake.

## Results

The results of the survey were striking. By 1995, all 24 families interviewed had built a new house or were in the process of building one, and some had built more than one. In every case, the new house was described as being much bigger and "stronger" and "more beautiful" than their previous dwelling. I visited many of the new houses and can testify to their spaciousness and beauty (Figs. 1, 2, and 3). Most were more than 100 square meters and all were constructed in the traditional local (Kham) style, i.e., elevated (with animals inhabiting the ground floor) within a walled compound, with each house featuring extravagantly decorated cupboards (Fig. 4), one or more impressive, unmilled tree trunks as central pillars (Fig. 5) around which were set a traditional wood-burning cook stove, altar, and very little if any furniture.

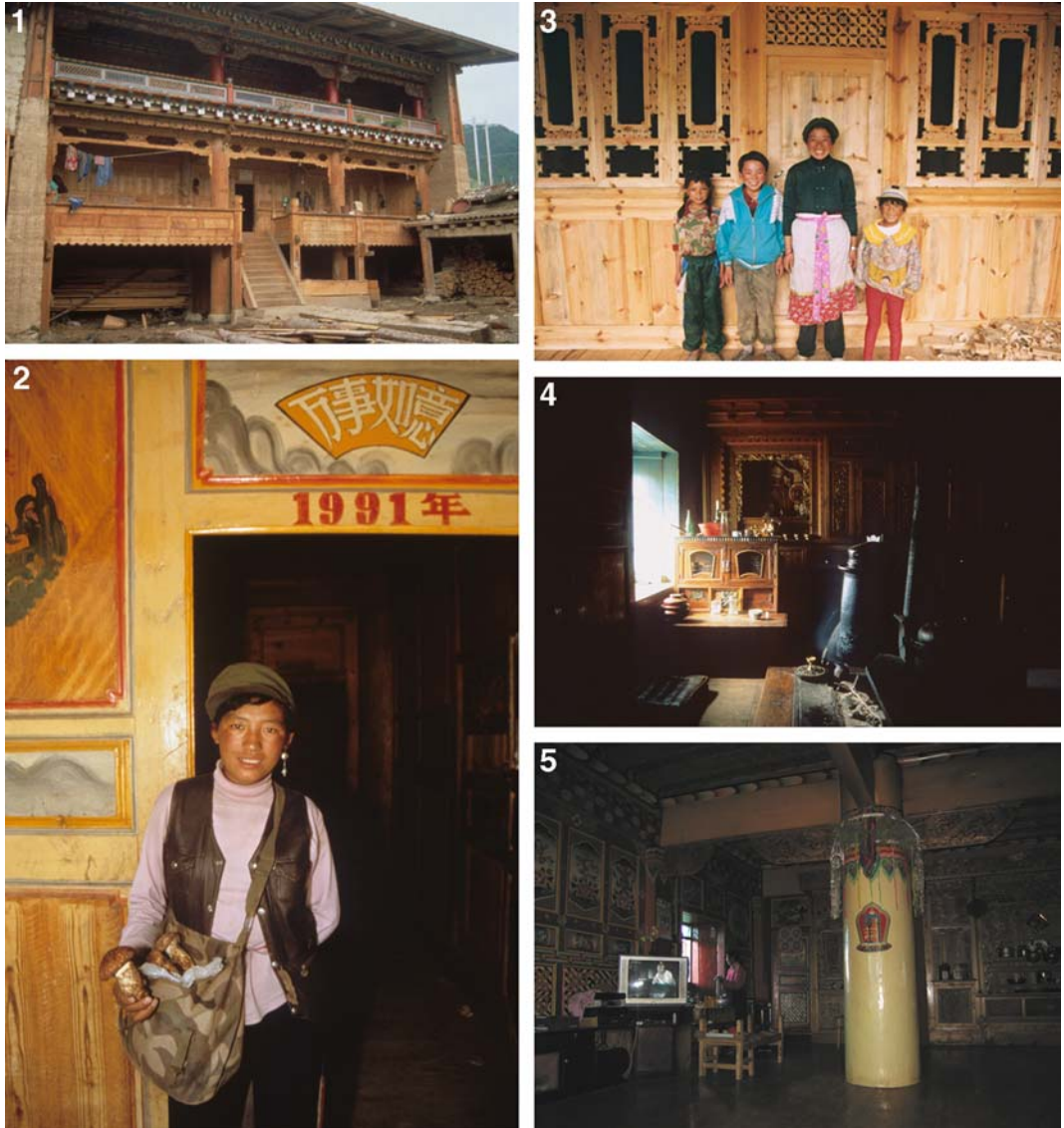
In Jidi, matsutake export began in the mid-1980s. The households I interviewed reported matsutake income ranging from ¥12,000 to ¥60,000, the range likely reflecting differences in family size and age composition as well as harvesting ability and motivation. The mean

household income from matsutake was ¥22,166 ( $n=12$ ), or about USD 2,760; the median was ¥18,000. As most households appeared to include two to five productive matsutake pickers, these figures were compatible with estimates provided by the village chief, who stated that adults in Jidi averaged ¥6,000–8,000 for the two-month matsutake season, or ¥5,000–6,000 per person including elders and children (most of whom also collected). He also stated that some pickers in Jidi made as much as ¥40,000, but that to do so required great skill in addition to getting up very early every morning and walking "so far" up the mountain.

In the villages of Ge Za township, matsutake harvest began in earnest between 1985 and 1987 according to most of those interviewed, though more casual harvesting efforts took place long before that, and then only for local consumption. The stated household matsutake income ranged from ¥13,000 to ¥30,000 ( $n=12$ ) and the resulting mean was lower than for Jidi: ¥19,583 (about \$2,448) per household. Again, these figures were compatible with those provided by the village headman, who stated that matsutake income for Ge Za (or at least the villages within Ge Za with which he was familiar) averaged ¥5,000–7,000 per adult for the two-month matsutake season with some highly motivated and knowledgeable pickers earning far more.

The numbers for both Jidi and Ge Za were lower than implied by Yeh (1998), who stated that it is "not uncommon" for families in unspecified villages to make ¥50,000–60,000 during the harvesting season. It should be noted, however, that many of the interviews I conducted were with couples in their twenties or thirties whose children (typically one or two) were not always old enough to be major contributors to family income, and that the income of the couples' parents were in many cases counted separately.

Because of designated village "rest days" (discussed below), there might be only 40 or so picking days over a two-month period. At ¥6,000 per person this averages to about ¥150 per person per day, or one-fifth the average per capita *yearly* income for Zhongdian in 1994 as cited by Yeh (1998), and seven to eight times the average wage for day labor (¥567 per month) in developed China (Shanghai) as reported by the *China Daily* in 1996. Given the remoteness of these Tibetan



**Fig. 1.** A new house under construction in Ge Za. (David Arora, all rights reserved). **Fig. 2.** Tibetan woman with matsutake standing at the doorway to her house. 1991 is the year that her house was completed. (David Arora, all rights reserved). **Fig. 3.** A Ge Za woman stands proudly with her children by the entrance to her new house, under construction. It was completed by the next year. (David Arora, all rights reserved). **Fig. 4.** Elaborately decorated and painted cupboard inside a house that matsutake built. (David Arora, all rights reserved). **Fig. 5.** Unmilled central pillars are a characteristic feature of Kham Tibetan houses in Shangri-la. (David Arora, all rights reserved).

villages from the centers of power and wealth in China, these figures are extraordinary.

All respondents in the two villages said that their new houses were paid for by matsutake money, yet nearly every household also said that they derived income from other sources, such as yaks, and the question of what percentage of their

overall income came from matsutake tended to elicit confusion and uncertainty. Further conversation revealed that those interviewed tended to view mushroom money as “new” (discretionary) income that was therefore designated for large projects such as house construction, which they previously couldn’t afford. Livestock products, on

the other hand, constituted “old” income typically dedicated for barter or small daily transactions. Therefore, though the matsutake money appeared to constitute anywhere from 40–90% of household income in the villages of Jidi and Ge Za (a range that agrees with other studies, e.g., Chen 2001; He 2004; Yang et al. 2008), the new houses were universally attributed to “*song rong* money.” This was further confirmed by my interview with the village headman of Jidi. When I asked him how many of the new houses in his village were built with *song rong* money, he first chuckled, then replied: “All.”

### Middlemen

The preponderance of middlemen involved in Shangri-la’s matsutake trade is one of its most visible features and has been commented upon by other observers (Yeh 1998; He 2004). While middlemen tend to be distrusted by NTFP researchers and often are portrayed as being exploitive (e.g., Bandala et al. 1997), in Shangri-la they seemed to embody the spreading of wealth rather than its concentration. A majority of the middlemen in the town of Shangri-la were women (Fig. 6), while most of those buying in outlying villages and towns or along roads were men (Figs. 7 and 8). Most of the middlemen I interviewed were Tibetan and many were local townspeople or villagers who did not have access to good matsutake habitat. Thus, the buying and selling of matsutake was the principal means for these people to benefit from the burgeoning matsutake industry and to develop business skills.

Some middlemen were also harvesters previously (for a somewhat analogous situation, see Prang 2004). Being a middleman is risky, however, because prices are volatile and the mushrooms lose value (through loss of freshness and weight) if kept more than one day. Thus, considerable business acumen is needed to be successful. Many middlemen worked for a particular company but most of those whom I interviewed were freelancers who would sell the mushrooms for incrementally more than they bought them, hoping to gain price leverage by re-selling them in quantity or by re-grading them (see Yang et al. 2008, this issue). Often, the matsutake were bought and sold several times before leaving Shangri-la. In one case, I tracked a particular batch of matsutake that changed hands eight times in a little more than

two hours, all within a two-block area in and around Shangri-la’s matsutake market (Fig. 9). Given that the matsutake are exponentially more abundant in some village forests than others, and given that most townspeople do not have village lands on which to pick matsutake, a simpler and more direct villager-to-broker-to-exporter market chain would benefit considerably fewer people. Middlemen, in turn, often spent money in makeshift restaurants, shops, outdoor pool halls, and karaoke bars that other enterprising townspeople set up near the mushroom market to capture their extra cash. Many townspeople also participated by buying low-grade matsutake, which they then dried for resale later. And of course, a range of artisans and laborers presumably benefited financially from the house construction boom precipitated by the matsutake harvest.

### Matsutake Management

The prosperity generated by the matsutake harvest in the 1990s attracted the attention of numerous government agencies and NGOs such as China CITES (Convention for the International Trade in Endangered Species) Authority, China’s Endangered Species Import and Export Management Office (ESIEMO), the World Wildlife Federation (WWF), and the Nature Conservancy. These various agencies and NGOs have become especially visible in and around Shangri-la in the last seven years, and since some of them promote their involvement in helping to develop “sustainable” mushroom harvest practices (Menzies and Li [n.d.]), it is worth noting that both Jidi and Ge Za were already experimenting with their own management regimes in 1994. These management efforts were overseen by the village headmen, who periodically proclaimed “rest days” (usually 3–5 consecutive days) based on the size and quantity of matsutake being sold in the village markets. The institution of rest days was not a sustainability measure. Rather, it was first and foremost an effort to maximize profit in response to picking pressure, because as the profitability of matsutake harvest became apparent and competition increased, villagers picked undersized (and hence less valuable) matsutake even when they weren’t worth much; to leave them in the ground was simply to lose them to someone else. Locally sanctioned and enforced rest days were thus welcomed as a means of allowing the matsutake to grow larger and thus



**Fig. 6.** A female Tibetan middleman outside the matsutake market in Shangri-la. Many townspeople who do not have access to productive picking grounds buy and sell matsutake and other wild mushrooms. (David Arora, all rights reserved). **Fig. 7.** Matsutake pickers in a roadless Tibetan village in Deqin County crowd around one of the buyers who hikes into the village every day during the mushroom season to buy matsutake. (David Arora, all rights reserved). **Fig. 8.** Even monks, like these in the town of Bensilan, get in on the action by buying up matsutake and then selling them for incrementally more. (David Arora, all rights reserved). **Fig. 9.** The entrance to the largest matsutake market in China, Shangri-la town. (David Arora, all rights reserved).

become more valuable. A second reason for rest days cited by the local leader of Jidi was to provide people the opportunity to tend their crops and do other household chores without feeling that they were missing out on valuable income.

Recognizing the difficulty of hiking into the mountains, Jidi more recently designated a nearby forested area as a place reserved for elders to pick mushrooms, including matsutake. And Jidi has experimented with other measures, such as

rotating the picking areas (Yang et al. 2008). Both Jidi and Ge Za also took steps to minimize territorial conflict by requiring stiff fees from townspeople and other outsiders wishing to pick matsutake in village-administered forests, and by patrolling the most productive areas.

### Additional Observations

Signs of change and the beginnings of diversification have been evident in each subsequent visit that I have made to the Shangri-la/Zhongdian area. After building new houses, several families in Jidi and Ge Za have used money generated by the mushroom harvest to open the villages' first small shops stocking basic foodstuffs, snacks, cigarettes, and drinks. Others have invested in mobility by buying motorcycles, and some have even purchased used Chinese jeeps or cars that they rent out to matsutake buyers or use themselves to drive to other villages in order to buy mushrooms.

Also noticeable during my interviews was the youthful face of prosperity. Many of the owners of the grand, new houses were relatively young: in their twenties and thirties, rather than middle-aged, which would typically be peak earning years in a more diversified economy. Clearly, matsutake harvest is strenuous work, and the physical strength required to make daily hikes up into the mountains favored those who were young and fit when the Chinese economy was liberalized in the mid-1980s.

Jidi and Ge Za probably typify a number of villages within Shangri-la County, but certainly not all. Both are favorably situated, benefiting by their road access, by their proximity to the regional market in Shangri-la, and by the relative abundance of matsutake in their forested communal lands. All three of these factors are responsible for many buyers coming daily from Shangri-la to buy matsutake, resulting in higher prices for pickers than in more remote villages. Unsurprisingly, in villages without road access the prices and earnings are often less substantial though still significant (see Salick et al. 2005).

Proximity to the town of Shangri-la, however, is not a guarantee of prosperity. Abundance of matsutake varies greatly from village to village according to terrain, elevation, forest type, and history of land use (Yang et al. 2006). As a result, many of Shangri-la's outlying villages do not have highly productive matsutake habitat, and outward

appearances (i.e., the number and size of new houses) suggest a much greater income differential between villages than within them. Indeed, territorial conflict has erupted where the boundaries between village forests are poorly defined or where a village with highly productive forests abuts one with lesser productivity (Yeh 1998, 2000).

I have also stayed in several villages where other commercially harvested but less valuable mushrooms (e.g., species of *Cantharellus*, *Boletus*, *Lyophyllum*, *Rozites*, *Catathelasma*, *Ramaria*, and *Sarcodon*) were much more numerous than matsutake. Although these villages were also sprinkled with new houses, the houses were smaller and less exuberantly decorated than the "matsutake mansions" previously described. Informal discussions with villagers indicated that the new houses were built mostly with mushroom money, but that per-capita mushroom income (and overall income) was substantially lower than in Jidi and Ge Za.

### Overharvest: Fact or Fiction?

A noticeable aspect of the scientific discourse around the Yunnan matsutake harvest is its strong bias toward the North American research focus on sustainable harvest versus the Japanese research focus on habitat enhancement (Tsing and Satsuka 2008, this issue). Thus, "overharvest" or "overcollecting"—by which is usually meant the picking of too many mushrooms—is cited repeatedly by NGOs and researchers as a problem in Yunnan (e.g., "the disappearing of these natural resources due to overcollecting": IWEMM 2007: 73). This trend is strongly reminiscent of North American panic over the commercial harvest of chanterelles (*Cantharellus* spp.) in Oregon and Washington in the 1980s and 1990s, an overreaction that led to increased bureaucratic intrusion (McLain et al. 1998), but proved ultimately to be unjustified. (Bumper chanterelle crops in recent years have forced prices downward and buyers had to stop buying on several occasions because supply exceeded demand; despite overproduction, the bureaucracy remains.)

Peer-reviewed studies have repeatedly failed to show adverse effects from the intensive harvest of wild mushrooms (Arnolds 1991; Norvell 1995; Egli et al. 2006). While these plot studies cannot replicate the harvest of mushrooms across an entire landscape, they do strongly suggest that removal of mushrooms from the forest need not

be an overriding management concern as it is for certain Tibetan medicinal plants (Buntaine et al. 2007). A huge, complex, and fertile field of possibilities thus opens up as to why mushroom declines have been observed locally in some areas of Yunnan (Wang Yun, pers. comm.) but not in others. As but one example, Feng (2007) reports that controlling the spread of an understory weed, *Eupatorium adenophorum* Spreng., significantly improved yields of another heavily harvested ectomycorrhizal Yunnan mushroom, *ganbajun* (a species of *Thelephora*). Yet observers, NGOs, and some researchers involved with the Yunnan matsutake harvest either seem unaware of the harvesting studies cited above or incapable of absorbing their lessons: The focus on “overharvest” appears to be an instinctive, almost moral stance rather than one emerging from objective scientific inquiry, lending credence to Johnson’s (1996) contention that “conservationists believe almost as reflex” that any observed decrease is due to harvesting pressure.

Wild mushroom crops tend to fluctuate wildly from year to year and matsutake are no exception (Amaranthus et al. 2000). Official figures from The Endangered Species Import and Export Management Office (ESIEMO-Kunming) and the Shangri-la Matsutake Office show that matsutake production declined in Shangri-la between 1995 and 2003, but then increased in 2004 and 2005 (Yang et al. 2008, this issue). Those wedded to the notion of overharvest tend either to stop their discussion with the year 2003, or else attribute the recent upward trend to new areas being harvested. However, recent declines in the price of matsutake cast doubt on the latter interpretation, for as the picking of matsutake becomes less profitable, villagers are less likely to hike long distances to find them. It is also important to realize that production figures measure weight only, not the numbers of mushrooms picked, and that a matsutake button allowed to attain full size can be 10 times (or more) heavier (He 2004) than one that is picked very small (Figs. 10 and 11). It is quite possible, then, that the decline and subsequent rebound in matsutake production reflect not only year-to-year fluctuations in mushroom crops, but also the changing picking practices of the villagers. As noted above, the incentive to pick undersized matsutake increases mainly as a function of competitive pressure. As more villages institute



**Fig. 10.** Undersized or “baby” matsutake are worth very little, but are nevertheless picked when competitive pressure is great. (David Arora, all rights reserved).

“rest days” and other measures aimed at increasing the value of their crop, the number of tiny buttons harvested can be expected to decline. In summary, production declines reflexively attributed to “overharvest” may be at least partially attributable to what could more accurately be called premature harvest or “underharvest”; i.e., the picking of undersized or “baby” matsutake.

Other factors may also be involved in any given matsutake harvest fluctuation or decline. For example, Egli et al. (2006) report that soil compaction resulting from foot traffic may inhibit the fruiting of some mushroom species, while Luoma et al. (2006) present data showing that unnecessary disruption of the soil or humus layer (precisely the opposite of compaction) can adversely affect same-year production of American matsutake (*Tricholoma magnivelare* [Peck] Red-head), presumably by uprooting tiny mushroom “pins” before they fully develop (Note: most Tibetan matsutake pickers use small, carved sticks for probing the forest soil as depicted in Fig. 12). Other factors that may adversely impact matsutake production include aging forests (matsutake associated with pine in Japan and Korea peak in numbers when the trees are 40–50 years old before declining), a build-up of brush or an increase in shade (Hosford et al. 1997; Ogawa 1982; Saito and Mitsumata 2008), and systemic causes such as pollution (Arnolds 1991) or climate change (Martínez-Carrera et al. 2002). Conversely, judicious thinning of older forests can significantly increase both the numbers and diversity of ectomycorrhizal mushrooms (Egli and Ayer 2007).

Despite a range of possible causes for observed harvest fluctuations, NGOs and agencies such as





**Fig. 11.** Full-sized matsutake that have not opened to reveal their gills, and thus are classified as top-grade “number ones.” Pickers often wrap them in leaves to protect them during transport. (David Arora, all rights reserved).



**Fig. 12.** An elderly Tibetan matsutake picker stands by the wall in her home where her family hangs their “matsutake sticks”—simple, carved wooden or bamboo implements for digging up matsutake. (David Arora, all rights reserved). **Fig. 13.** This Ge Za woman gets up before dawn to hike up the mountain looking for matsutake, rain or shine. Because pickers are limited to village lands and to the distances they can walk, the quantities collected by each picker are modest compared to those collected by pickers in countries such as the U.S. and Canada where most pickers have their own vehicles and can range widely. (David Arora, all rights reserved).

China CITES Authority have trumpeted conservation measures without any basis in peer-reviewed research; for example, their recommendation that villages forbid the picking and transport of older, sporulating matsutake (Menzies and Li [n.d.]). Such a practice runs contrary to the long histories and practices of mushroom harvest in other countries around the world, where mature mushrooms are gathered along with young ones, and could negate any positive effects that humans might have as vigorous, wide-ranging, goal-oriented vectors of purposeful or unintentional spore dispersal. While the helpfulness of humans as spore vectors has not been proven, neither has it been shown that it is advantageous for a mature mushroom to be left where it grows (and where most of its spores will be dumped directly beneath it), as opposed to transporting it around the forest, or hanging it in a tree, or purposefully kicking or rolling it down a hill as the Karuk Indians of northern California do with mature American matsutake (*Tricholoma magnivelare*). The efficacy of long-distance spore dispersal by wind has not been demonstrated, yet I have encountered more than one NGO worker who was under the impression that mushrooms spread spores solely by the wind, and that spores can simply germinate where they land and produce mushrooms. But most mushroom spores are monokaryotic, i.e., they must mate with sexually compatible spores that have germinated nearby in order to form a mycelium capable of producing mushrooms. The chances of this occurring decrease exponentially as one gains distance from the source of the spores. In contrast, animals tend to transport spores in groups on their noses, paws, in their gut, etc., and these “spore packets” contain many sexually compatible spores; furthermore, animals are goal-oriented, favoring certain habitats over others, whereas the wind blows with equal indifference over forest, field, and water.

### Discussion: Sustainable Harvest and Profitable Harvest

“Sustainable harvest” of NTFPs has become a prominent, unifying theme of NTFP conferences worldwide. Nevertheless, it is interesting to note that while the concept of “sustainable harvest” has flourished, the term “profitable harvest” seems nearly to have disappeared from the academic vocabulary. (On April 21, 2008, a Google search conducted for NTFPs + “sustainable harvest”

turned up 2,680 entries, while NTFPs + “profitable harvest” turned up just six.)

Matsutake and other wild mushrooms have quickly become Yunnan’s largest agricultural export (Yang et al. 2008, this issue) and China’s fifth largest (IWEMM 2007), bringing unprecedented prosperity to villagers across Yunnan. Two recent mushroom harvest conferences held in Yunnan (Workshop on Sustainable Use and Conservation of Matsutake, July 2006; Fifth International Workshop of Edible Mycorrhizal Mushrooms, August 2007) provided a striking dichotomy: bustling, colorful markets in the host cities brimming with a huge assortment of wild mushrooms for sale, and Chinese researchers and government officials expressing the strong belief that, without proper guidance, Yunnan’s uneducated villagers would destroy the “golden goose” in their near-sighted pursuit of profit (IWEMM 2007: 73, 84). While the intensity of Yunnan’s mushroom harvest is undeniable, statements such as “the conservation of the matsutake resource are to be popularized in many places of Yunnan by the management authorities, the science institutes, the NGO and other organizations” (IWEMM 2007: 32) give pause. Since the wild mushroom industry is almost entirely a creation of private enterprise, such pronouncements can be seen as attempts to assert institutional relevance and extend bureaucratic control. Such statements also distinctly echo the broader Chinese push for “scientific development” and what Yeh (1998) describes as the “official myth that villagers are ‘low quality’ and cannot manage their forest resources very well.” According to this version of reality, the villagers, if left to their own devices, will quickly destroy their resource base, and thus intervention—even if it is a case of the “blind” leading the “near-sighted”—is justified.

While concern for the future health of Yunnan’s wild mushroom industry is commendable, Diqing Tibetan Autonomous Prefecture (including Shangri-la County) produced nearly 400 metric tons of matsutake in 2007 (Yang Xuefei, pers. comm.)—a robust amount approximately equal to what it produced in 2004 and in 2005 (Yang et al. 2008, this issue). There has never been evidence to support the notion that the matsutake is in danger of being extirpated, which makes the involvement of the China CITES Authority and the Endangered Species Import and Export Management Office (ESIEMO) especially puzzling. (In the book,

“Guidelines on the Import and Export of Wildlife” [ESIEMO and GPRBMC 2007], photographs of matsutake products are prominently featured along with those of truly endangered species such as tiger and rhinoceros.) Although Yeh (1998) states ominously that the harvesting of very small matsutake “has implications for the forest ecosystem,” she doesn’t spell out what these implications might be or what other sources of income might have fewer or less serious implications for the ecosystem. Matsutake, in fact, have not been shown to be a “keystone” species upon whose health the entire forest ecosystem depends. Various animals dine on matsutake opportunistically, but no species is known to be matsutake-dependent. NGOs and conservationists were not even aware of matsutake until pickers prospered from its harvest. A decline in matsutake would likely have a more pronounced effect on pickers than on anyone else.

There has been a recent softening of demand for matsutake in Japan—perhaps reflecting an unwillingness on the part of newer generations of Japanese to pay such a high price for matsutake—and a concomitant downward trend in prices paid to the matsutake pickers in many countries, from North America to China. During my most recent visits to northwest Yunnan in 2006 and 2007, the main concern expressed by villagers was over declining *prices* for matsutake, not declining numbers. Women, with fewer alternative sources of income, have been particularly hard hit (Yeh 2000). Efforts are being made to increase the domestic (Chinese) demand for matsutake, but the matsutake’s prestigious position in Japan is as much a cultural phenomenon as it is a culinary one, and cannot necessarily be replicated elsewhere. However, if the rudimentary diversification now seen in villages continues to develop, then falling prices for matsutake may well be offset by fewer numbers of people picking mushrooms, resulting in more matsutake per collector. Thus matsutake income, though not as lucrative overall, would be divided into fewer, bigger slices.

My interviews also suggest that many young people in these villages do not necessarily want to pick mushrooms the rest of their lives for the same reason they do want to herd animals (Buntaine et al. 2007) — it is a physically demanding lifestyle (Fig. 13). Yet, some of the active NGOs and researchers in Yunnan, while speaking of organizing the harvest so as to be sustainable far into the future, tend to define sustainability narrowly, that

is, solely in terms of mushroom productivity (Yeh 1998). Considerably less attention is given to competing lifestyles (Buntaine et al. 2007) and the nature and structure of the market, and how these might affect future sustainability of the matsutake industry in Yunnan. Mushroom picking does not require large outlays of capital or special language skills, hence it has been a welcome source of income for Tibetan villagers confronted with the daunting problem of how to jump-start a remote subsistence economy where no one had money to buy goods from each other. Given the market problems described above, however, it may be wiser to view the matsutake harvest as the starting point of the local economy rather than as a primary basis for future sustenance. The fact that nearly all the matsutake are exported to one volatile market (Japan) argues for diversification being a priority.

Whatever its future, the Shangri-la matsutake harvest should be recognized as a private sector success story that has already made a huge difference in some Tibetan villages as evidenced by the large number of spacious new houses built with mushroom money and an exponential increase in villagers’ discretionary income. Substantial wealth was transferred, in a very short time, from urban Japan to these remote Tibetan villages, enabling them to prosper as never before, and to do so without destroying their forests. Credit for this prosperity belongs not to NGOs or government agencies but to the nascent Tibetan and Chinese private sectors, a handful of enterprising Japanese businessmen, and to the villagers and their creative management efforts. The magnificent houses bear testament to their success.

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