

Forest is Forest and Meadows are Meadows: Cultural Landscapes and Bureaucratic Landscapes in Jiuzhaigou County, Sichuan

*Stevan Harrell, Yang Qingxia, Sara Jo Viraldo, R. Keala Hagmann,
Thomas Hinckley, and Amanda H. Schmidt*

When we came upon the Party Secretary and the Old Monk, they were resting in a meadow where they had cut down a lot of trees, both on the margins and in the middle of the meadow; stacks of downed wood were scattered about the grass. They were cutting the trees because, as the Secretary indicated, “forest is forest and meadows are meadows,” and the Chinese government’s Returning Farmland to Forest policy was mistaken when it took places that should have been grassland or cropland and converted them to forest. If everything is forest, you can’t see anything, and you don’t have enough space for grasslands. In addition, the Secretary explained, it changes the fire regime. A few decades ago, when meadows were larger and grazing and burning kept grasses short, you could burn to preserve meadows without fear of setting off a larger forest fire. But now, if you are going to burn, you have to do it within a day or two of cutting, and do it in the wet season, or else you risk starting a major fire. You should also be able to graze animals on these areas, as long as you do it within limits. In addition to cutting trees, the Secretary and the Monk were also attempting to restore the local waterway to where it was before excessive logging caused it to change course.

It was paradoxical, the secretary continued, that the previous year a team of Forestry Bureau officials from various governmental levels had come to inspect the results of Returning Farmland to Forest in the region, and they had praised this valley for having the best reforestation results anywhere in the vicinity – they only care if the trees grow; they don’t care anything about people’s livelihood or biodiversity, added the Secretary.

The contrast between the Secretary’s local perspective and the reported attitude of the inspectors embodies the difference between a cultural landscape and a bureaucratic landscape. The cultural landscape is lived in, understood, worked according to local needs, sometimes even worshipped. It is the physical basis and physical outcome of local ecological knowledge. It is a place of life and death, of work and play, of story and ritual; it is home. But the same patch of land is also a bureaucratic landscape, something to be measured, counted, incorporated into larger national projects, such as forestry in the 1960s and 1970s, development of nature reserves since the late 1970s, and reforestation since 1999. It is a place

of plans, quotas, programs, results, and measurement.¹ But because the cultural landscape and the bureaucratic landscape occupy the same piece of land, they influence each other. The bureaucrats impose their schemes and their measures on a cultural landscape already there, and the local people adapt their own livelihoods and landscapes to the realities of the policies imposed from above. The results, however, are neither dictated by the policy nor predetermined by the local community. Even in the face of seemingly overwhelming policy mandates, local communities continue to adapt their landscapes to their livelihood needs.

LANDSCAPES AND LIVELIHOODS IN THE JIUZHAIGOU REGION

Our visit with the Secretary and the Old Monk was part of an ongoing multinational effort to understand the relationship between ecology and society in Jiuzhaigou County. Jiuzhaigou County lies in the Min Mountain region² in the far north of Sichuan and the far northeast of cultural Tibet, sometimes called Sharkhog in Tibetan sources. Jiuzhaigou County was called Nanping until 1998, when the name was changed to attract even more tourists to Jiuzhaigou proper (henceforth Jiuzhaigou Valley or Jiuzhai Valley), a National Nature Reserve with an area of 720 km², containing world-famous lakes, waterfalls, wetlands, and autumn leaves. But take away the lakes, waterfalls, and tourists, and Jiuzhaigou Valley (Dzitsa Degu in Tibetan) is just another of the numerous *gou* 沟 (valleys) that characterize this area of spectacular vertical topography. The highest peak within Jiuzhaigou Nature Reserve reaches (9.2): 4,764 meters and its valleys as low as 1,999 meters; its cool-temperate climate with moderate rainfall has provided a home for people practicing a mixed agro-pastoral-silvicultural economy as early as 3,500 years ago.³ The region's current rural inhabitants vary in language and ethnicity from valley to valley. Amdo-speaking Tibetans form the majority, but there are Han Chinese farmers in some lower-elevation valleys, along with members of the Baima ethnolinguistic group, also classified today as part of the *Zang minzu* 藏民族 (usually translated into English as the Tibetan Nationality). Most of the inhabitants of this area are all followers of the Bön religion, though some follow Tibetan Buddhism: present-day landscapes, already startlingly polychrome with the dark greens of forests, the light green of meadows, and, in season, the yellow of ripening crops or the parti-colors of autumn leaves, are

¹ Scott, *Seeing Like a State*, 2–4.

² Winkler, “Waldvegetation”; Upton, “Schooling Sharkhog.”

³ D’Alpoim Guedes et al., “Early Evidence”; Li, Lü, and Taylor, “An Archaeological Site”; Urgenson et al., “Traditional Livelihoods.”

rendered even more colorful by the presence of variegated prayer flags, streamers, and little windhorse confetti that people scatter at sacred sites from temples to stream crossings.

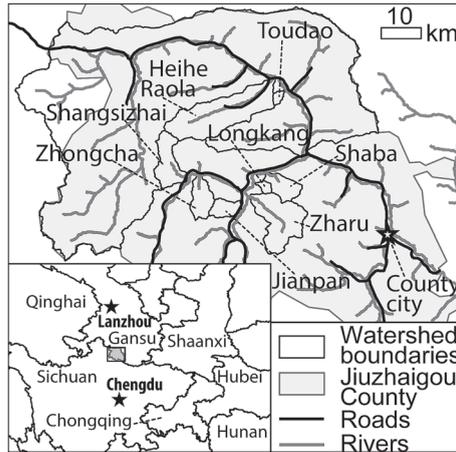


Fig. 1. Map of Jiuzhaigou County



Fig. 2. Flags and windhorses at a shrine in Zhongcha Valley

We cannot yet construct a detailed ecological history of the Jiuzhaigou region, but a combination of archaeological and geological reconstructions, a little written history, and local oral tradition allows us to paint a general picture of a region where small groups of people migrated frequently in and out of specific valleys, but generally practiced a tripartite subsistence regime of field crops, animal husbandry, and small-scale forestry, coupled with varying engagement in long-distance trade between the larger population centers of Gansu to the north

and Sichuan to the south. For the past 200 or 300 years, at least, we know that the majority of the inhabitants have spoken some variety of Amdo Tibetan and followed Bön rituals and customs.

Landscapes and culture in the Jiuzhaigou region have shaped each other for at least 3,500 years. Archaeological investigations undertaken in Jiuzhaigou Valley show that as early as 1,500 BCE, people built villages in a layer of rich loess soil, deposited in the Pleistocene at elevations several hundred meters above today's river valley floors. Like farmers of the mid-20th century, their early predecessors grew field crops, including barley, wheat, and millet; raised domestic horses, cattle, sheep, and goats; hunted pheasants in clearings; and harvested wood for construction and combustion in the luxuriant evergreen and deciduous forests.⁴

The most salient characteristics of the landscapes are patchiness and flexibility, or in other words diversity in space and time. Farmers clear areas of forest for cultivation almost exclusively on sunny (southwest-to-southeast facing) slopes. After cropping land for a few years, they allow it to return to forest or use it as pasture, perhaps coming back to cultivate it again after ten years or more. They have pastured their cattle and sheep in meadows, either created by natural causes or cleared for agriculture, and maintained by constant grazing and occasional burning, sometimes for centuries. They also raise yaks, which they pasture in the summertime in alpine meadows above the treeline at elevations well over 3,000 meters. In the winter, they bring the yaks down to areas near the villages and fodder-feed them with hay from lower elevation meadows or from the margins of wetlands, or with straw from the year's grain crops. In recent centuries, they have supplemented their original staple crops with maize and potatoes introduced from the Americas.

People have also maintained a variety of forest patches within their landscapes. Because local hardwoods, including most commonly maple, alder, birch, and oak, are best for burning, given their high energy to weight ratio, people have maintained early succession hardwood forests by periodic cutting and burning, not allowing the forests to proceed to a more mature successional stage that would be dominated by pine, spruce, and fir. But pine, spruce, and fir are also useful for house construction, whether for the all-wooden houses that predominated until the 1980s and still exist in some upland locations, or for the posts, beams, and door and window framing of today's houses built primarily out of stone.

This very anthropogenic landscape has not only provided sustainable subsistence for millennia, but has also given rise to world-renowned biodiversity. A catalogue of species and patch diversity, which even its authors admit is incomplete, lists

⁴ D'Alpoim Guedes et al., "Early Evidence"; Li, Lü, and Taylor, "An Archaeological Site."

1,936 species of vascular plants,⁵ along with over 400 species of algae,⁶ over 200 of fungi,⁷ 800 of invertebrates,⁸ 230 confirmed species of birds,⁹ and 78 of mammals,¹⁰ and has led to Jiuzhaigou National Nature Reserve's becoming a UNESCO world heritage site (despite its relative lack of built environment that sites so designated usually sport) as well as a Man and The Biosphere Reserve.

The residents of the various *gou* in the Jiuzhaigou County region have not preserved the flexibility, biodiversity, and long-term sustainability of these local landscapes by accident, but rather by conscious cultural attention to the principles of diversity in time and space, symbolized and motivated by religious considerations. For example, rules dictate that pilgrims and tourists performing the three day counterclockwise Bön *kora* around Zhayizhaga mountain take in nothing but what they require for subsistence, and bring out everything not consumed, including the walking sticks they stack neatly at the beginning of the circuit in the Zharu Valley. There are also numerous water-propelled prayer wheels turned in the requisite counterclockwise direction by the streams that feed into the main rivers in all the valleys.



Fig. 3. Walking sticks stacked at the start of the *kora* in Zharu Valley



Fig. 4. A water wheel that turns Tibetan Scriptures, Zharu Valley

Two yearly rituals clearly connect the spiritual and physical aspects of this animated landscape. In May, young women of each village, dressed in their finest, perform offerings to local water spirits to emphasize the importance of headwaters conservation as well as pray for good weather for the coming summer's crops. In

⁵ Liu et al., *Biodiversity*, 27.

⁶ *Ibid.*, 15.

⁷ *Ibid.*, 24.

⁸ *Ibid.*, 83–93.

⁹ *Ibid.*, 272–79.

¹⁰ *Ibid.*, 279–82.

November, men of each village dedicate colorful wooden weapons to mountain deities, asking that the deities protect the villages and their human and animal inhabitants from diseases and fire during the cold, dry winter season.

Han Chinese farmers center their sacred landscapes on *tudi* 土地 (earth god) shrines rather than on sūtra-turning watermills, but they also maintain the kind of landscape variability and plasticity¹¹ that has given them adaptive capacity, or the ability to adapt their landscapes to changing environmental, social, and political conditions.¹² This in turn has allowed long-term occupation and promoted increased biodiversity at the species and patch scales over the past two millennia or more.

In short, in the presence of ethnolinguistic and religious diversity, at relatively low population densities, the people of the Jiuzhaigou County region have nurtured landscapes that meet their material and spiritual needs, while also maintaining the rich natural diversity of the biotic and abiotic environment. How they have reacted to the PRC regime's imposition of bureaucratic landscapes is the focus of the ethnography in this article.

RECENT EPISODES OF LANDSCAPE CHANGE

The whole Min Mountain region has been literally a crossroads of history,¹³ and thus its cultural landscapes have never been stable. Local people have always faced outside pressures, adapting over the course of history through the general principle of cultural landscape plasticity. During the Qing period, the regional city of Songpan to the south, over the crest of the Min Mountains at the headwaters of the Min River, was an important trading center, and its importance increased with the introduction of extensive opium cultivation into the whole region beginning in the 1920s.¹⁴ In response to both economic opportunity and sometimes military coercion, local Tibetan farmers and Han migrants alike began cultivating opium both on previous grain fields and in newly opened areas of pasture and forest, probably causing overall proportion of forest in the landscape to decline and proportion of cultivated fields to increase.

After coming to power in the 1950s, the developmentalist regime of the CCP¹⁵ saw the region's extensive coniferous forest resources as an important source of construction materials, and established massive logging operations in many of

¹¹ Sturgeon, *Border Landscapes*, 9–10.

¹² Anderies et al., “A Framework to Analyze the Robustness.”

¹³ Hayes, *A Change in Worlds*.

¹⁴ Nyima and Tian, “Frontier Tea, Opium.”

¹⁵ See Shapiro, *Mao's War Against Nature*.

the region's valleys beginning in the middle 1960s, continuing in many areas into the 1990s.

At the national scale, however, environmentalist ideas began to creep slowly into Chinese government thinking and policymaking between the late 1970s and the 1990s.¹⁶ In Jiuzhaigou Valley, this change began when logging operations, the first bureaucratic imposition on the local landscape starting in 1965, were brought to a halt in 1977. Jiuzhaigou was declared a nature reserve in 1978 and opened to tourism in 1984, originally hosting a few thousand visitors per year. Improved road access and the rise of a domestic tourist industry among China's growing urban middle classes raised numbers of visitors to 163,000 in 1995, around two million by 2005, and a staggering 5.08 million in 2015.

In order to promote nature conservationist values and advertise the "natural scenic beauty" of the Nature Reserve, the regime imposed another set of bureaucratic rules on the landscape of Jiuzhaigou Nature Reserve. Residents were prohibited from farming and from cutting firewood within the Valley in 1999, and from keeping pastured domestic animals in 2001.

The regime had been concerned with deforestation on a national scale ever since the end of the Great Leap Forward in the 1960s and had undertaken modest schemes of reforestation since the end of the Cultural Revolution in the late 1970s.¹⁷ In spite of this nominal concern, however, forest property rights reforms in the early 1980s inadvertently caused another rash of large-scale logging. But in 1998 a sea-change happened. Floods devastated the Middle Yangtze provinces of Hubei, Hunan, and Jiangxi, causing billions of dollars of property damage and leaving several million lowland farmers homeless. The 1998 floods fundamentally altered official thinking about the role of forests, shifting bureaucratic emphasis from maximizing resource production to balancing resource production and ecosystem services, resulting in several national-scale reforestation projects.

In the Min Mountain region, the policy that has had the greatest effect is called *tuigeng huanlin* 退耕还林, or Returning Farmland to Forest,¹⁸ begun in 1999, and later supplemented by local variations called Returning Farmland to Grassland (*tuigeng huancao* 退耕还草) and Returning Pasture to Grassland (*tuimu huancao* 退牧还草). These policies, often characterized as PES or payment for ecosystem services programs, required farmers or pastoralists to stop farming fields recently

¹⁶ Jahiel, "The Contradictory Impact"; Marks, *China*, 322–23.

¹⁷ Robbins and Harrell, "Paradoxes and Challenges."

¹⁸ The name of this program has often been rendered into English as either Sloping Land Conversion Program or Grain for Green. Both of these are inaccurate translations of the original name, and do not describe clearly what the program has actually done; hence we prefer the literal translation Returning Farmland to Forest.

cleared for farming or used for grazing, and to return those areas to their presumed “natural” state pre-farming or pre-grazing. In the *huanlin* (returning to forest) variation, Forestry Bureaus gave farmers seedlings of what the Bureaus considered to be appropriate species for rapid reforestation, paid them a small amount for planting them in former fields or pastures, and granted them a subsidy, first in grain and later in cash, to make up for the lost income from the crops or animals previously raised on that land. In the *huancao* (returning to grassland) variations of the program, there were no trees to plant, but bureaus gave former farmers or pastoralists subsidies per unit of area for a fixed period of time, and sometimes also furnished grass seed to plant in the areas designated for restoration.

Previous literature on these “Returning” programs has evaluated their success according to various criteria held by various stakeholders: policymakers and forestry bureaucrats concerned with increasing forest cover at the national scale, local bureaucrats concerned with meeting quotas handed down from above for reforested or restored area, local communities seeking to preserve livelihoods and landscapes that they consider to contribute to livelihoods (including the Party Secretary quoted above), advocates of local culture concerned about not succumbing to cultural homogenization, and meddling outside ecologists and conservationists who have their own ideas about livelihoods, landscapes, sustainability, and biodiversity (including some of us).¹⁹ In Jiuzhaigou County, we have conducted research in five local communities, each in its own *gou* or sub-*gou*, which have felt different impositions from the various conservationist policies, particularly the “Returning” programs.²⁰ They have reacted to them in various ways that embody both specific aspects of local landscape culture and the more general cultural value of preserving landscape adaptive capacity and plasticity, a value that has informed their relationship with their landscapes and their cultural ecology for the past centuries and continues to inform action today.

REFORESTATION AND REACTION IN SIX VALLEYS

To understand how policy, bureaucracy, culture, and landscape have interacted, we have carried out interviews and conducted extensive quantitative ecological measurements in Jiuzhai Valley and its sub-valleys over the past decade or so. We have also conducted smaller-scale quantitative surveys in Zhongcha Valley in 2007–8 and 2015, along with a few interviews and observations in Shangsizhai

¹⁹ Bennett, “China’s Sloping Land Conversion Program”; Bennett and Mehta, “Incomplete Property Rights”; J. Li et al., “Rural Household Income”; J. G. Liu, “Ecological and socioeconomic effects.”

²⁰ Trac et al., “Is the Returning Farmland to Forest Program a Success?”

and Heihe valleys in 2015. Through this potpourri of methods we have come to understand how national trends in conservation and tourism have affected landscapes differently across the region, demonstrating the limited flexibility of local landscape culture in the face of rapid modernization. Here we introduce the five valleys in turn, together with their reactions to reforestation and other conservationist initiatives.

Heye Valley, Jiuzhaigou National Nature Reserve

The Heye Valley lies to the west of the main stream of Jiuzhaigou Valley; in the early 20th century there were four small settlements in the loess layer: Woruo, Jianpan, Panya, and Yana. But there have been people in the area for a very long time. After local villagers told us about ceramics imbedded in loess slopes, a University of Washington archaeologist discovered charcoal at the abandoned village site of Yana in 2006. After it was carbon-dated at 2000 years plus or minus 200, Sichuan University Archaeologists decided to excavate a house site known as Ashaonao, located near Jianpan Village. The excavation demonstrated that people in the last few centuries BCE were pursuing a lifeway very similar to that practiced in the early 20th century, and that the site had been occupied, possibly continuously, for about 2200 years.²¹



Fig. 5. The house excavated at Ashaonao in the Heye Valley

That lifeway was a combination of herding, farming, and forestry. The area was mostly forested, with oak and birch the preferred species for firewood, yielding more energy per unit of weight than pine or poplar. Even during the years of agricultural

²¹ d'Alpoim Guedes et al., "Early Evidence."

expansion at the beginning of collectivization, people cleared only the *yang* 阳 or sunny slopes for agricultural fields, while leaving the *yin* 阴 or shady slopes in forest for firewood. At the time of collectivization, most of the families from the four villages in this valley were moved down to a newly established consolidated village site near Woruo, while they continued to farm on the upper slopes.

When agriculture was decollectivized in the early 1980s, many families returned to the old village sites to be closer to their farms, which are clearly visible in the 1999 photograph taken by Daniel Winkler at the upper left of Figure 6. In the foreground is the newly reinhabited village of Panya, including the ruins of a collective granary from the people's commune period; the smaller village of Jianpan is in the middle distance above the terraces. The terraces on the sunny slopes are farmed, probably in a combination of wheat or barley, buckwheat, and beans, while the shadier slopes at the right hand side of the picture are left in forest.

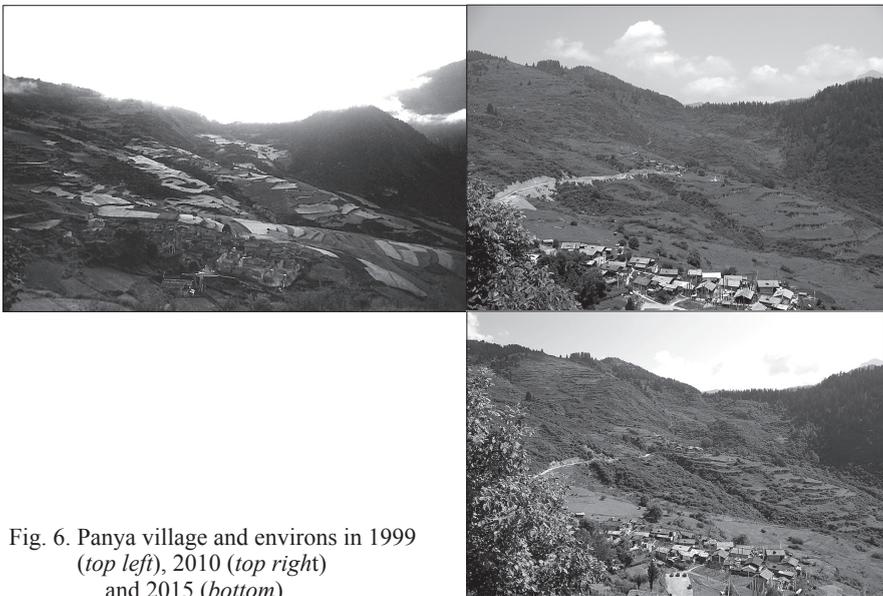


Fig. 6. Panya village and environs in 1999 (top left), 2010 (top right) and 2015 (bottom)

After 1999, however, agriculture was prohibited inside Jiuzhaigou Valley, and herding was curtailed after 2001. By the time the next picture was taken in 2010, the whole landscape had become more homogeneous. None of the fields are farmed anymore, and some deciduous trees are beginning to encroach on former fields just behind the village in the foreground. By 2015, the encroachment has proceeded much farther. The entire sloping hillside in the center of the scene,

which was farmed in 1999 and a patchwork of grass and scrub in 2010, now almost entirely covered with shrubs, possibly *Hippophae rhamnoides*, or sea buckthorn, and the swale below the ridge behind the terracettes, which was also farmed in the earliest picture, is now showing not just shrubs but apparently some conifers, probably seeding themselves from the area that was already forest in the 1999 photo.

A few households still live in the Heye Valley, but most of them have deserted the landscape, moving down to the new village of Heye beside the Feicui River among the lakes and waterfalls that attract tourists to Jiuzhaigou. Most of them keep small shops selling tourist souvenirs and snacks. The valley itself is reverting to what the bureaucratic landscape-makers would consider its “natural” state, undisturbed by crops, livestock, or forestry. As a result, the patch diversity that once characterized the landscape is slowly disappearing, giving way to uniform forests that will take over even the traditionally sunny slopes in a decade or two.

Zharu Valley, Jiuzhaigou National Nature Reserve

Zharu Valley is the watershed of a tributary of the main Feicui River that runs through Jiuzhaigou National Nature Reserve. Oral tradition records that its inhabitants originally came from Longkang Valley, to the east of Jiuzhaigou Valley, and later on from Heye Valley to the west within the Reserve and from Zechawa, the farthest upstream of the original villages within Jiuzhaigou Valley. They lived in two villages situated well above the floor of the valley, in the loess layer most suitable for cultivation: Zharu lay on the northeastern slope of the valley, facing southwest, and Guodu farther upstream on the opposite side. In the 1950s, Zharu had 8 mud and wooden houses built to face outward along the edge of one of the upper terracettes. Much of the terracette landscape was farmed with barley, wheat, beans, and other subsistence crops. In the Guodu area, 8 households lived in a more dispersed pattern. After collectivization in the late 1950s, the villagers from both Zharu and Guodu were moved downhill to the present site of Rexi, just above the river, but they continued to farm the upper slopes near the old villages. Older residents of Zharu recall making the laborious hour-long trek uphill in the morning, cooking lunch in little sheds built below the old village, and trekking downward, at harvest time burdened by heavy backpack-basket loads of crops, in the afternoon. When land was decollectivized in the 1980s, people continued to farm in the area, as well as use it as winter pasture for their yaks and sheep.



Fig. 7. Map of the Zharu Valley



Fig. 8. Ruins of a House on the edge of terraces at the former Zharu Village

Forests, mostly of pine and spruce, occupy the area between the valley floor and the farmed areas, and extend above the old villages to the treeline, above which are alpine meadows where people pastured yaks in the summertime. Along the upstream reaches of the valley floor was a mosaic landscape. There were meadows, used for grazing, but not for cultivation in recent times, except for a couple of unsuccessful attempts during the early collective period to grow barley. There are patches of deciduous forest, mostly maple and birch, which people cut regularly for firewood, in order to maintain the energy-rich hardwoods and not allow succession to conifers. There was an unsuccessful attempt, also at the beginning of the collective period, to grow oil seeds in one of these patches, but it was abandoned after two years. And there are larger areas of coniferous forest, extending up to the treeline in all directions. Large pines cored at various locations between Rexi and old Zharu, as well as above the road end on the way to Ranwugulang meadow, have yielded ages between 80 and 300 years. A large fire, however, devastated much of the valley in about 1935, taking out all but the largest trees in the lowland forests.

The Zharu Valley thus appears to have been a flexible, patchy, culturally appropriate landscape for the past several centuries. People have moved in and out, built and abandoned villages, utilized deciduous and evergreen forest, meadow, and alpine grassland resources, farmed a variety of crops, and kept several species of livestock in a landscape that was shifting at small scales but remarkably stable at larger spatial and temporal scales.

This regime of small-scale fluidity and large-scale stability has been interrupted, however, by recent conservation measures, particularly the cessation of farming, herding, and woodcutting, all of which were prohibited between 1999 and

2001, and by aggressive reforestation undertaken to fulfill quotas at provincial, prefectural, and county scales as mandated by the “Returning” programs. Changes are evident in former grazing, agricultural, and deciduous forest patches.

The most evident recent change, dating from the end of cultivation in 1999 and of officially permitted grazing in 2001, has been tree growth in former meadow and agricultural areas. At the former large pasture of Ranwugulang at the upper end of the valley, meadow area decreased an estimated 26% from 2007 to 2011 and another estimated 15% from 2011 to 2015. In addition, within the remaining meadow area, only 0.06% was covered by trees in 2007; by 2015 that had increased to 24%. There were 20 trees and 100 shrubs per hectare within the meadow in 2007; that had increased to 380 trees and 900 shrubs in 2011, and by 2015, each hectare contained 690 trees, although the number of shrubs had decreased slightly to 700 per hectare. It is clear that not only is the meadow perimeter shrinking, the interior of the meadow is also converting to forest. Zechawadi, another former grazing area, was a recognizable meadow in 2008, though trees were encroaching. By 2015 it was no longer a meadow, but an early-succession mixed forest, and very difficult to find.

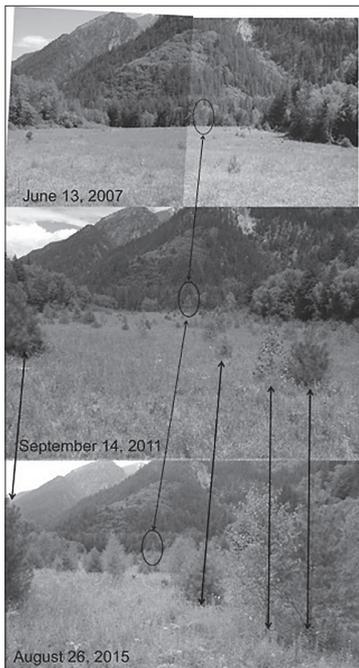


Fig. 9. Ranwugulang Meadow, 2007 (*top*), 2011 (*center*), 2015 (*bottom*)

There is no agriculture whatsoever at present in Zharu Valley. In addition, in the former large agricultural area on the terraces near Old Zharu Village, the state aggressively promoted spruce planting as part of the Returning Farmland to Forest program. In 2008, those trees were small and struggling, barely visible in the wide-angle photo at the left of Figure 10. By 2015, there were noticeable forest patches scattered about the area, with most of the trees between 1.5 and 2 meters in height. Still the bureaucratic landscape did not take over without resistance. 49 of 71 spruces we measured in a 50x20 meter plot laid out in 2015 had had their tops slashed off and left behind at least once since they were planted in the early 2000s. Inquiries confirmed that local people had been cutting the trees, which they saw as a danger to possible future productive use of the area as farmland.



Fig. 10. Formerly farmed terracettes in Old Zharu, 2008 (*left*), 2015 (*right*).

On the whole, then, the current landscape in Zharu is losing its patchiness and therefore much of its biodiversity. Everything is turning to forests. Very few people now would want to return to farming, even though they did sabotage the spruce plantations in the old agricultural area. Agricultural work is hard, and most families in Rexi now have a comfortable lifestyle, with spacious houses beautifully decorated in local style, cars (unlike tourists, residents are allowed to drive gasoline-powered vehicles within the Nature Reserve), fast internet access, and, for many of them, the opportunity to send their children to excellent schools in places as distant as Chengdu. Having enough to eat is no longer in question. But many older and middle-aged people worry about this loss of landscape heterogeneity. They miss being able to have animals, such an important part of their traditional life and culture. The plants they once gathered in meadows are becoming more difficult to find. Even more than that, people lament the loss of aesthetics and memory. Trees begin to block the expansive views enjoyed in the past, and elders worry that younger people will no longer know the stories associated with their families and the diverse landscape where they survived for so many generations.²²



Fig. 11. A typical Rexi house, built early 2000s

²² Urgenson et al., “Traditional Livelihoods,” 487.

Zhongcha Valley

Zhongcha is the next *gou* (valley) upstream from Jiuzhai Valley. It has 5 small natural villages, with a total of about 120 households, all Amdo Tibetans. Before the 1950s, the lower elevations of the valley were a mosaic of mostly coniferous forests, meadows used for grazing, and agricultural fields. Villagers grew barley, corn, buckwheat, and potatoes as staple crops, though corn would only grow in the lands near Buzenge, the lowest-elevation village just above the mouth of the valley. In the early and mid-20th century, people maintained meadow patches in the lower elevation conifer forests by cutting and burning. They would cut each meadow once every three years, in order to provide winter fodder for their horses. They also left the young shoots after cutting so the horses could eat them, and then in the second year they would burn off the remaining grass. Because the meadows were extensive and kept short by grazing and burning, there was little danger of forest fire, and they also prohibited burning near watercourses because of the increased runoff potential.

During the 1960s and 1970s, state forestry bureaus logged all the high-quality conifers from the lower elevations in the valley, so that current low-elevation conifer forests all date from the past few decades.

The “Returning” policies in Zhongcha have had effects both similar to and different from those in Heye and Zharu valleys inside Jiuzhaigou Nature Reserve. In 1999, much of the existing farmland was subjected to *tuigeng huancao*, or Returning Farmland to Grassland; people were prohibited from farming but not required to plant trees. Even so, they resisted, and the state relented slightly, allowing them to keep a few gardens very close to the villages, where they still grow vegetables and small amounts of barley and corn. In 2002, however, the policy was changed from *huancao* to *huanlin*, from Returning to grassland to Returning to forest, meaning that people were required to plant trees. In some areas they were required to plant *Robinia pseudoacacia*, a rapidly growing tree used for reforestation in the Republic of Korea after the Korean War.²³ People we spoke with think that planting *Robinia* plantations is a waste of space: It does have high heat content, making it suitable to burn, but there are other sources of firewood, and besides burning there is no use for *Robinia*.

²³ Lee and Lee, “Roles of Saemaul Undong in Reforestation,” 3.



Fig. 12. Robinia Plantation in Zhongcha Valley, 2015

In other areas, the prescribed species was spruce (*Picea purpurea*). On a large hillslope area on the west side of the valley, people first planted spruce in 2002. However, through what was probably a combination of neglect, sabotage, and unsuitable initial site conditions, the trees failed to flourish, and had to be replanted at least twice between 2003 and 2005. At present, they are still struggling.



Fig. 13. Struggling Spruce Plantation in Zhongcha Valley, 2015

Not all the farmland that villagers were required to abandon was replanted. There is a large area just above the village settlements where people grew buckwheat before and during the collective agriculture period; almost all households in the valley had first collective and then household plots here. Much of the area is still in grass, but trees and shrubs have begun to encroach, particularly *Salix* around the perimeter and *Berberis* in the middle of the area.



Fig. 14. Former buckwheat fields in Zhongcha Valley, 2015

When the Returning Farmland to Forest program began in 2002, people were given a subsidy of 260 CNY per *mu* (1/15 hectare) as compensation for food crops not grown, in accordance with the payment for ecosystem services aspect of the “Returning” policy. Several people told us that this was enough to feed themselves in 2002, when the price of rice was about 0.8 CNY per *jin* (500 g). But now the price is at least 2 CNY, so the subsidy is no longer sufficient to cover food costs, and people need to look for other sources of income. Moving from growing food to buying food has also led to dietary changes: people previously ate *tsampa* as their main staple, but now most households eat *tsampa* in the morning, rice at noon, and some kind of cake in the evening; the cake tastes better if it is made of barley rather than of the rather tasteless wheat.

These additional sources of income also affect the landscape. Many families continue to keep horses, for two reasons: Some of them need to ride to the summer pastures at the head of the valley (elevations 2,800 to 3,500 meters) where they continue to pasture yaks, of which they have about 2,000. Others have joined the recently formed horseback tourism cooperative, which attempts to draw more adventurous tourists who want something beyond the standard tour at Jiuzhai Valley. In the wintertime, all the horses and yaks need lowland pasture and fodder, and so people keep many lowland areas free of trees, and enclose some of them to provide hay that can serve as winter fodder.

Many families also earn income from foraging Chinese medicines at higher elevations, including the coveted Yartsa Gumbu (*Ophiocordyceps sinensis*), or caterpillar fungus, and several others. There is a danger of overharvesting. Others commute to the complex of tourist facilities just outside Jiuzhai Valley, where they work as wage laborers or open small shops.

In spite of all the reforestation and prohibitions on woodcutting, people still burn firewood, and this also has an effect on the landscape. Until 2013, forests were collectively owned, and people say there was a problem of managing common pool resources. The Party Secretary indicated that they solved this by community agreement; they allocated individual forest plots to families, where they are allowed to cut branches less than 5 cm thick. One sees these piled all along local roads and trails. Much of what they cut is *Hippophae rhamnoides*, or sea buckthorn, a vigorous shrub species with vicious thorns that is now encroaching on former meadows all throughout the region. But they also cut other high energy wood such as willow when available.



Fig. 15. Woodpile and drying barley straw in Zhongcha Valley, 2015

A bigger change is coming to Zhongcha, however. The Shandong-based Luneng Group, a major tourism and resort developer, has purchased rights to use land at several places in Zhongcha. They have begun building a reputed 5-star resort at the valley mouth, and have as yet undisclosed plans to use some of the land near the unsuccessful spruce plantations shown in Figure 13 for further tourist development activities. How the local population responds remains to be seen.

Shangsizhai Valley

Shangsizhai (Upper Four Villages) actually has seven small settlements. About 1,000 Amdo-speaking people live in Shangsizhai, which sits across the Baishui River valley and upstream from Zhongcha and Jiuzhaigou Valleys. In the 1930s, villagers grew mostly barley (for *tsampa*), potatoes, and fava beans in the area extending from the valley mouth to above the site of the current Ngowo village, the highest settlement upriver. At that time, people did not all live in the three

current concentrated villages, but many resided in small clusters of households on the hillsides above the agricultural area, where only a few people remained until the 2008 Wenchuan earthquake, after which the regime no longer allowed them to live there. In the flat meadow just above Ngowo, there was actually a proper town, with numerous residences and several stores. But bandits, based in Heihe Valley (see below), Longkang, and Shen Xian Chi, sacked the town several times, burning all the wood structures to the ground and stealing what they could. Local people would hide, sometimes for days, in the dense forest on the hillside above town and in limestone caves.

People in Shangsizhai did not grow wheat during the early and mid- 20th century, but in the sixties the PRC regime introduced a new strain that was suited to high elevations, and people grew it extensively in the areas above the sites of the current villages, even though yields were low. They alternated wheat and nitrogen-fixing fava beans, and also maintained fertility with animal manure.

Another big change that came with the Communist takeover was logging, and state companies logged much of the forested area of Shangsizhai between the 1960s and 1980s. After logging stopped in the mid-80s, the Party secretary at the time took the initiative to replant spruce trees, and some of the replanted areas are still visible on the lower slopes of the hills.



Fig. 16. A hillside reforested with spruce in the 1990s, Shangsizhai Valley

Cultivation stopped almost entirely, however, in 2002. At that time, the Returning Farmland to Grassland policy was implemented, and the only areas people were still allowed to farm were small patches below Ngowo and extending down to the valley mouth, where they still grow corn, potatoes, and vegetables. None of these plots are larger than 2 *mu* (0.13 ha), and some households have as little as 0.32 *mu*.



Fig. 17. Small-scale agriculture in lower Shangsizhai valley, 2015

As in neighboring valleys, the relatively lax policy of Returning Farmland to Grassland, which at least required little work and preserved plenty of pasture, did not last long: in 2005 the policy changed to Returning Farmland to Forest, which meant planting trees, mostly spruce and *Robinia*. The government gave people seedlings and paid them 200–300 CNY per *mu* to plant them, but because people were unenthusiastic about creating what they saw as unnecessary forests, animals ate most of the *Robinia* seedlings, so the Valley still fell short of its reforestation quota. To remedy this, someone had the bright idea to reforest with *Hippophae*, which grew in abundance at higher elevations, and whose cuttings would readily take when planted at the right season. So they fulfilled their quota by planting a relatively useless shrub, and the odd spectacle of *Hippophae* planted in neat rows greets a visitor to some of the mid-elevation meadows.



Fig. 18. *Hippophae* plantation, Shangsizhai, 2015

Shangsizhai, like all the other valleys in the region, has thus lost its agricultural base, and people depend on purchased food. But now that people need to purchase food, they need cash income. Like Zhongcha and in contrast to Jianpan and Zharu, Shangsizhai has managed to preserve the pastoral and silvicultural aspects of its landscape, and these patches provide cash income as well as food and fuel for their own use. Forty-one of the 120 families in the valley keep yaks, with herd sizes ranging from thirty to over two-hundred to over two hundred; they pasture them in the high country, at elevations 3,700 meters and above, that connects the upper end of Shangsizhai with Heihe (see below). Unlike high-altitude pastoralists in other parts of Tibet, local families do not milk their animals or use milk products from their own herds; they purchase the small amounts of butter that they use. What they do with the yaks is sell them; a herd of seventy animals will produce fifteen to twenty calves in a year, so they can easily replenish the herds and still sell animals; the largest might sell for as much as 9,000 CNY, while an average one will bring between 3,000 CNY and 5,000. Thus the part of the local landscape above the treeline is very valuable.

Still, yak-herding families need to bring their animals back to lower elevations in the winter, meaning that many young men travel back and forth to the high pastures on horseback. In addition, about fifteen families keep horses that tourists can ride, and a few take their handsomest horses to resorts higher in the mountains to show them off to high-paying guests. The horses, of course, also need pasture and fodder in the wintertime, so that between the horses and the yaks, people need to keep lowland meadows unforested, cutting them for winter fodder in July and then letting them grow again in the summer wet season, after which the livestock can graze on the second growth in the fall before they need to turn to the July-cut hay in the wintertime.

Similarly, Shangsizhai people, like their neighbors in Zhongcha, still cut their own firewood. By community consensus, people are allowed to cut wood only in November and December; they visit the still-collectively owned forests on tractors, and haul back mostly birch. They burn most of the wood themselves, but some of them keep big piles to sell to hotels and other tourist businesses. They also earn some cash by selling medicinal herbs that they pick in the mountains, but perhaps the largest source of cash for families without yaks is wage labor in local tourist businesses. There are enough jobs locally that no one migrates to Chengdu or other major cities to work.

Despite the continually increasing commodification of the landscape and its resources in Shangsizhai, the landscape there still has its sacred aspects. In one of the centers of tourist businesses near the Nature Reserve entrance, there is a 4-meter high limestone image of the Bodhisattva Tārā (Jetsun Dölma in Tibetan), carved from a single piece of stone quarried in 2014 about 500 meters above the

upper end of the former agricultural fields in Shangsizhai. The physical scars are evident enough to human visitors, but apparently local mountain deities took even greater umbrage at the wound in the earth. In 2014 and 2015 alone, three people died in close association with the quarry and the sculpture, one in the quarrying process itself, one while crossing the quarry site on a motorcycle, and one at the construction site. There was also an unseasonable flood in 2015 that people thought might be attributable to disturbing the mountain. Residents quickly decided that they would not allow any more limestone to be cut from that site.



Fig. 19. The scars of the short-lived limestone quarry in Shangsizhai, 2015



Fig. 20 The Tārā Statue in one of the tourist complexes near the nature reserve entrance

Toudao Village, Heihe Valley

To get to Heihe (Black River) from Jiuzhaigou is a drive of over an hour, down the main highway toward Jiuzhaigou County Town, and then, from the mouth of the Black River valley at only about 1,500 meters elevation, up a side highway that eventually leads to the Tibetan pastoral area of Zoige (Rou'ergai). The first few kilometers upstream from the mouth of the Black River are spectacular but unpopulated box canyons; after that the valleys widen out to have enough flat land to farm, and the villages start. There are seven administrative villages in Heihe, six populated by Han farmers and one, upstream, by Amdo Tibetans. Toudao, about 15 km from the valley mouth, is one of these Han villages, with its lowest point at 1,900 meters.

This area was sparsely populated until the early 20th century, when the opium boom that enveloped the whole region led drug entrepreneurs to recruit farm laborers from poor villages in the Sichuan Basin, working fields near their homes on the high benches two hundred or three hundred meters above the valley floor. They lived there until agricultural collectivization in the late 1950s, when they moved their houses to the valley, but still farmed (not opium by this time,

but wheat, buckwheat, potatoes, and fava beans) in the high fields. They also cultivated corn and other crops in the valleys.

In 2002, the Returning Farmland to Forest program arrived, restricting Toudao's agriculture to the lowlands, as the higher fields were reforested with *Robinia*. Farmers were paid only a one-time compensation of 200 CNY per *mu* of reforested land.



Fig. 21. Cornfields and a cabbage patch in Toudao, Heihe, 2015

Farmers in Toudao still cultivate the lowlands along the main Black River and their own tributary; they grow some corn (which they use to feed pigs that they sell) and some vegetables, but their main cash crops are walnuts and *huajiao* 花椒 (*Xanthoxylum piperitum*, Sichuan peppercorn), along with a few apples and pears. Both walnuts and *huajiao* are comparatively lucrative – in a good year like 2015, a *mu* of *huajiao* trees can yield as much as 1,200 CNY cash income. Similarly one of the immense walnut trees, of which most families have one to three, can yield as much as 200–300 *jin* of nuts, which at 15 CNY per *jin* comes out to as much as 4,500 CNY per tree. Most trees are smaller and yield a fraction of that amount.

Unlike many of their Tibetan neighbors, the Han farmers here keep only a few yaks, perhaps two hundred for the village as a whole, making the pastoral part of their economy insignificant, and the forests have also lost value as people have mostly switched to coal and grid electricity for cooking and heating fuel.

In short, the villagers of Toudao are quite constrained at present in the ways they can use the landscape that once provided them with food, fuel, and building materials. Theirs has become almost entirely a cash economy, and the income from their *huajiao*, walnuts, and pigs is not enough to support them. So almost every household is now dependent on wage labor. Still, wage labor in Jiuzhaigou

County does not mean making shoes in the Pearl River Delta or building skyscrapers in Beijing; almost everyone works in the tourist economy in and around Jiuzhai Valley.



Fig. 22. Old Walnut Tree in Toudao, 2015

Raola Village, Heihe Valley

About 8 kilometers upstream from Toudao a small road branches off to the left, leading eventually to Raola Administrative Village, which consists of two Han settlements and one, higher up the valley, populated by 33 households of Amdo Tibetans, about 120 people total. Raola kept a piece of its pre-modern subsistence economy longer than any of the other villages we describe here: until 2006, the families lived in a compact village two hundred or three hundred meters above the valley floor, at an elevation of about 2,600 or 2,700 meters, where they grew barley, wheat, beans, and potatoes in a swidden system, cutting and burning a patch of forest, cultivating the cleared area for a few years, and then moving on. No one now knows how long they had lived there, but it was definitely many generations.

Since 2006, the farmers have lived in a compact village on the valley floor, where they grow a bit of corn and potatoes, all for cattle and pig feed. But every family has yaks, with an average herd size of about forty-five; like their neighbors in Shangsizhai, they pasture the yaks in the high mountains during the summer months – their pastures connect to those of Shangsizhai by the high-elevation “back door” – and bring them back to areas only a kilometer or so above the village in the winter, where they have recently built barns to stall the animals.

But if the highland agro-silvio-pastoralist landscape endured until 2006, that is not true for the landscape of the valley floor, which was the scene of intensive extractive logging first by state forestry bureaus and then by state-owned

companies, from 1966 until the fateful year of 1998. There was a logging camp next to the site of the current village, and in fact its picturesque ruins are still visible. The logging, mostly highgrading spruce and fir, extended up the valley to the treeline, 19 km distant. In an attempt at sustainable forestry, areas closer to the village that were logged earlier were replanted earlier. At the very end of the logging camp's existence, loggers harvested some of the replanted second growth, and some of those forests are still being cut for wood; we counted thirty-two rings on a recently cut stump, indicating that it was planted shortly before 1983; many other trees in the same forest look to be of similar age.

Most of the logging camp is in fact in ruins, but there are still a few workers there, replanting the upper regions of the logged-out forests.



Fig. 23. Logging camp ruins in Raola, 2015

CAN CULTURAL LANDSCAPES SURVIVE BUREAUCRATIC PLANS?

Reforestation and tourist development are only the latest in a centuries-long series of outside forces that have impinged on cultural landscapes in the Min Mountain region, from bandits to opium growers to agricultural collectivization and the Great Leap Forward to the grain-production programs of the Cultural Revolution. The Chengdu-Lanzhou railroad is coming, scheduled for completion in February, 2018, with a stop at Jiuzhaigou.²⁴ Over the years, local communities have adapted to these imposed changes, maintaining the plasticity of their landscapes – not keeping them exactly the same, but retaining their ability to adapt them to changing circumstances. Without presuming to predict the future,

²⁴ See Baidu Encyclopedia, “Cheng–Lan tie lu,” visited on December 1, 2016.. <http://baike.baidu.com/view/1410689.htm>.

what can the detailed examination of adaptation in six valleys tell us about the ability to maintain adaptive capacity?

Within Jiuzhaigou Nature Reserve, tourism development and reforestation have combined to inhibit local residents' ability to maintain a diverse landscape, or more generally their ability to adapt their landscape to changing conditions. The primary goal of tourism development is to promote regional economic growth by exhibiting the lakes, waterfalls, and mountains in Jiuzhaigou Nature Reserve. To do this, planners have had to undertake two contradictory projects, both of which potentially reduce adaptive capacity and landscape plasticity. Within Jiuzhaigou Valley, by prohibiting farming, herding, and forestry, they have set in motion a process that has already begun to reduce the biodiversity and patch diversity of the landscape, which were maintained for millennia by low-level human activities. Reforestation programs, by favoring bureaucratic over cultural landscapes, and by mandating monocultural plantations of species that do not always grow well in the designated environment, have intensified the loss of biodiversity and landscape diversity.

Along the Baishui River corridor, tourism development has constricted landscape diversity in another way. Despite the natural beauty of the area and the religious practices governing many of the relationships between people and landscape, the roads are congested, traffic noise is pervasive, and there is trash in the river. Hundreds of buildings – stores, hotels, theaters, restaurants – outside Jiuzhaigou Valley now severely limit the ability to return any of the landscape along the Baishui River to anything resembling its previous condition. If perchance the tourist market were to dry up, these buildings would still remain. Thus intensifying human impacts on one part of the landscape and prohibiting them in another part have both had the same effect of limiting the ability to maintain landscape diversity and biodiversity.

In the other *gou*, however, the direct effects of tourism development have mitigated to some extent the effects of reforestation programs. The Returning Farmland to Forest Program has severely inhibited residents' ability to earn a livelihood off their land (although, unlike people in Zharu and Heye Valleys, they can still pasture their animals and cut firewood). But employment opportunities in the tourist sector have allowed most families to maintain or elevate their standard of living while remaining in the region – they earn wages not in the factories and construction sites of Chengdu or Beijing but in local hotels, restaurants, and shops. If they derived no opportunities from tourist development but were still forced into reforestation, they would be scattered all over the country and perhaps not able to care for their cultural landscapes at all. However, at least in the case of Zhongcha, big tourist facilities are coming, and this will further constrict the area where people can maintain adaptive landscapes.

At the same time, local residents have been far from powerless in the face of tourism development and reforestation. They have adapted in ways that reflect both their creativity and their cultural background, but also differ from one valley to another. Their beliefs in animate landscapes are still reflected in the rituals performed by Zharu residents and the prohibition of further quarrying in Shangsizhai, and even in the scripture flags and windhorse confetti that add colors other than green and brown to the landscape. Waterwheels turn scriptures counterclockwise almost everywhere. Villagers in Zharu, Zhongcha, and Shangsizhai valleys have sabotaged reforestation projects, sometimes by actively cutting planted trees but more often simply by allowing their animals to graze on the tender seedlings. They have done so explicitly for the purpose of maintaining patch diversity – forest is forest, and meadows are meadows, as the Secretary said. Han villagers in Toudao have adopted cash crops of *huajiao* and walnuts on the lands where they are still permitted to farm, and in Zhongcha and Shangsizhai they still maintain patches of corn, barley, and vegetables, as well as enclosed meadows that provide hay for winter fodder. Tibetan villagers in Raola, Zhongcha, and Shangsizhai have if anything increased their yak herds, providing a source of cash income not directly dependent on the tourist industry.

Cultural landscapes are thus far from dead in the Min Mountains, despite the imposition of bureaucratic requirements. But their scope is now limited, and some of the bureaucratic impositions may be difficult to reverse in the short term. If loss of patch diversity leads to loss of species diversity, it may be hard to restore species that are extirpated. Monocultural tree plantations are a rational, bureaucratic response to extensive logging, but they represent biodiversity loss of another kind, again not easily reversible in a short time span. Built environments are difficult to unbuild, more so with modern concrete and steel than with traditional wood and mud. Working in the tourist industry means replacing traditional landscape knowledge with a different kind of knowledge, and this in turn means that younger generations may no longer understand how to keep landscapes diverse, culturally meaningful, and plastic. Cultural landscapes will survive in the region, but probably in a depauperate form with less biodiversity and lower adaptive capacity.

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