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ORIGINAL PAPER

Seeing the wood for the trees: how conservation policies can place greater pressure on village forests in southwest China

David Melick · Xuefei Yang · Jianchu Xu

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Abstract In the last 6 years China has introduced a number of policies to try and conserve forests and protect watershed integrity; these include a ban on commercial logging, reforestation projects, restrictions on upland farming and burning, and controls on livestock grazing. The blanket nature of these impositions when combined with rapid socio-economic changes have increased pressures on many small rural communities. In this paper, we examine the case of Jisha Village in northwestern Yunnan, China—a typical rural Tibetan community sustained by traditional agriculture and livestock management. The cessation of commercial logging has seen the community turn to towards other income streams such as non-timber forest products (NTFP), increased livestock and attempts to foster tourism. However, timber quotas together with new road access have spurred the development of unofficial markets for village firewood and enhanced access to nearby forests. In addition, the decline of bamboo—a traditional fencing material—has resulted in an estimated 35-fold increase in demand for pine wood. Wood demands in this community are swiftly exceeding the sustainable harvest levels. Forest loss does not merely represent the depletion or degradation of future village timber resources, but also the loss of NTFP habitat. Moreover, due to proscriptions on rangeland burning, pasturelands are becoming degraded and grazing in forests is more intensive—reducing forest regeneration. These findings support calls to improve the flexibility and incorporate local needs into forest policy—the problems highlighted here seem indicative of the practical and philosophical challenges facing environmental planning and research in China.

Keywords Community forest · Firewood collection · Logging ban · Non-timber forest products · Northwest Yunnan · *Pinus densata* · Tibetan villagers

D. Melick (✉) · X. Yang · J. Xu
Department of Biogeography and Ecology, Kunming Institute of Botany (KIB), Heilongtan, Kunming, Yunnan 650204, China
e-mail: dmelick@mail.kib.ac.cn

Introduction

In August 1998, after catastrophic downstream flooding, China's government introduced an immediate ban on all commercial logging of state forests in 18 provinces and autonomous regions (*Natural Forest Protection Program*, NFPP). Although applied generally, the NFPP is especially targeted at the headwaters of the Yangtze and, to a lesser extent, Yellow rivers (Zhang et al. 2000). Despite the fact that the ban was designed for state forest regions of specific environmental sensitivity, in 2001 Xinjiang instituted a complete logging ban in all natural forests regardless of ownership—apparently to impress the central government. Sichuan and Yunnan soon followed suit and introduced similar logging bans, which were supported by the central government (Zuo 2001, cited in Miao and West 2004). Along with the logging ban, the government also introduced a policy to reafforest sloping farm lands (*Sloping Land Conversion Program*, SLCP), together with more stringent controls on shrub and pasture burning.

Six years on, the success of these policies is a matter of perspective. The large investment in reforestation and the commitment to stabilize mountain catchments has been widely applauded by international forestry groups such as CIFOR (2005). While there is no doubt that Chinese policies to increase forest cover are admirable, it is still too early to know if downstream water quality and flood control have improved, and the quality of the new forests is debatable. Many replanted forests are monocultures, and areas designated as forest may be scrub communities of limited biodiversity and natural resource value (Rozelle et al. 2003; Willson 2006). Moreover, while the NFPP and SCLP may deliver long-term national benefits, these broad-reaching environmental policy changes have potentially large impacts upon local communities. The most common concerns include the loss and/or confusion of community user's rights, reduction in agricultural and grazing land, and poor targeting of appropriate ecological areas (Miao and West 2004; Xu and Ribot 2004; Xu et al. 2004; Weyerhaeuser et al. 2005). Such changes, coupled with past over-exploitation and degradation of natural resources, together with rapid socio-economic changes, could exacerbate existing poverty differentials and place the future of rural minority communities in a very vulnerable position.

Within affected local communities, the most obvious change from the logging ban is the drastic loss of income. Losses vary but are generally very significant in affected regions; in Sichuan official revenues reduced by up to 64–75% (Winkler 2003; Miao and West 2004), while in Diqing—the subject of this study—logging accounted for up to 80% of regional income (Hillman 2003). Although commercial logging was effectively a state monopoly carried out by provincial or county logging enterprises, many villagers were dependent upon this industry, either working directly for logging companies or investing heavily to provide transport and support services (Zheng 2004). In addition it has been widely discussed that though local government may have borne the brunt of massive revenue decreases, this resulted in the reduction or loss of services delivery to communities (e.g. compensation for income and/or resources loss, education services, development of alternative industries)—crucially at a time when many communities are in greatest need of local government assistance and direction. The central government was certainly aware of the challenges facing affected communities and outlined several goals, noting the need to reduce and meet demands for wood products, reduce rural firewood

dependency and rapidly develop alternative revenue sources such as tourism and animal husbandry (Zhang et al. 2000; Winkler 2003). Such aspirations to improve standards and reduce poverty are clearly behind the *Develop the West* policies, which aim to bring new industries and opportunities to these regions as rapidly as possible. Immediately obvious results of this in Diqing are the expansion of road and transport links, attempts to improve communications and considerable development of tourist infrastructure.

The desire to conserve while promoting development is at the crux of the problems facing China—it is neatly encapsulated by the rural village communities, which are being pulled simultaneously in different directions by competing needs and interests. In many cases, threats to rural livelihoods are exacerbated, not only by the logging ban but also by the reduction of traditional materials and resources because of past state-driven over-exploitation. Moreover, associated conservation policies, such as the drive to reforest and bans on burning are also conspiring against moves to increase animal husbandry, placing further pressure on the already stretched local agricultural and forest systems. Similarly, development and poverty alleviation projects, such as road access and exposure to market forces have a double barrel effect of creating a rapid need for disposable cash income, while also facilitating greater access to village forest areas for exploitation.

In a recent survey of the Tibetan community at Jisha village in northwest Yunnan, we found that local use of fuelwood forest had intensified very rapidly in the last few years—having potentially serious ramifications for the intermediate to long-term sustainability of these community pine forests (Melick and Yang, unpublished data). In this paper we trace the causes of these changes, further investigating and quantifying the changing demands and pressures on this community with respect to their use of their traditional forest resources. We track the recent rapid political and ecological changes affecting this village and examine the long-term consequences. Finally we look towards ways in which policy may be amended to help these communities to escape the destructive cycle in which they appear to be becoming trapped.

Methods

This study is based on a synthesis of data collected over field trips to the region since early 2004. This work builds upon an ongoing community livelihood program in the Xiaozhongdian Township run by the Kunming based *Center for Biodiversity and Indigenous Knowledge* (CBIK). Participatory mapping of this region to identify major land-use types and histories has been undertaken with villagers at Jisha over several years; for this study this information was augmented with high resolution QuickBird satellite imagery. In June 2005, detailed forest field surveys were made: different community pine forests were surveyed for stand characteristics, structural and floristic diversity (Melick and Yang, unpublished data). Site visits were made throughout the village and local households questioned about wood consumption needs and forest use. Observations were made and measurements collected of firewood supplies and fence lines to determine local wood consumption. Lengths of fence lines were determined from field observations and from the QuickBird satellite images. Basal areas and stand volumes were calculated from stand assessments made

during the forests survey (Melick and Yang, unpublished data). *Pinus densata* volumes were calculated from the survey data using a metric variant of Honer's 1967 volume equation using coefficients for white pine (Honer et al. 1983). Volumes were calculated for all measured trees within a size class, which were then multiplied by the average stem numbers for that cohort. The stand characteristics of lightly utilized forest figures were used as most intensive logging expansion is occurring in this forest type.

Jisha case study

Study site

This study was based around Jisha Village (centered 27°21′56.56″–27°28′36.86″ N; 99°45′5.99″–99°51′43.86″ E), Shangri-La County, Diqing Prefecture, northwest Yunnan (Fig. 1). Jisha comprises two sub-villages, Upper and Lower Jisha, which contain 83 households with a population of over 400 people. All villagers are Tibetan and dependent upon agriculture and animal husbandry (Li 2003). Only one crop is grown per year; the primary staple is barley, which is intercropped with wheat, potato and brassica. At an altitude of 3,200 m, Jisha lies in a shallow valley of cleared pasture and agricultural land set amid forested hills. The surrounding forest varies, but near to the village at lower elevations, it is dominated by *Pinus densata*. The pine is close to its altitudinal limit here: on the slopes above the village this merges into mixed spruce and oak forest (*Picea likiangenis*, *Quercus* spp.), eventually giving way to fir-dominated forest (*Abies georgei*) at elevations above ~3,600 m. Many areas of these higher forests up to 3,700 m (the limit for commercial logging operations) have been severely degraded by past commercial logging activities and also by insect pest

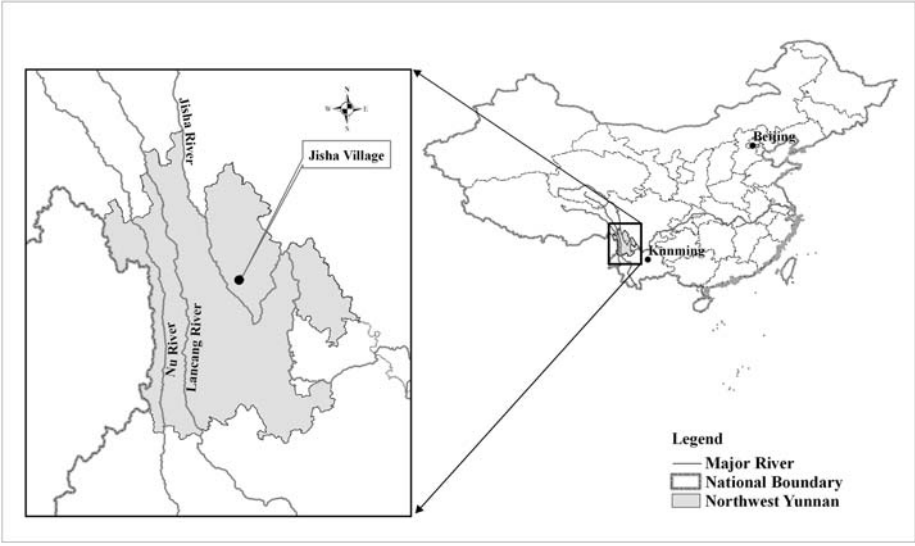

Fig. 1 Location of Jisha village, northwest Yunnan, China

attack. Spruce, and to a lesser degree, fir are prized timber while oak was the first choice for firewood—thus most merchantable timber trees have been removed.

Pinus densata dominates the fuelwood forests that now provide many of the daily requirements of Jisha village. This forest type is common on the lower mountain regions (i.e. below ~3,200 m) in northwest Yunnan and Sichuan. It is difficult to be precise, but villagers commonly use over 100 ha of nearby pine forest—their proximity to the village alone ensures these forests' importance. Although not particularly rich, these forests are a source of wood, animal bedding and fertilizer. Pine is used as a soft carving wood for lintels and feature work, and also, more extensively in recent times, for fencing materials and poor quality firewood. Although centrally dictated timber quotas purportedly exist for these communities, these are not well articulated and certainly there is little evidence of enforcement at a local level. In addition, pine forest can form important NTFP habitats, supporting matsutake, truffles and medicinal plants. Sacred forests at Jisha are dominated by small patches of remnant old growth spruce (seemingly in cold air basins or below katabatic flow gullies), but pine forests also have cultural significance, forming the cemetery forest, which has been long preserved as the place for traditional Tibetan sky burials.

Local socio-economics and politics

There have been very significant socio-economic changes to these communities in recent years—the most dominant of these has been the proscription of commercial logging. The absence of commercial logging has placed greater pressure on villagers to find alternate incomes, resulting in a rise in NTFP collection, attempts to increase livestock, off-farm work, and the collection of wood and timber from community forests, which is often (unofficially) used to supply township firewood and construction needs. In addition, these rising demands on village forests are accompanied by the construction of a new road; Jisha now has a large highway running through it (National Highway No. 214), effectively bisecting Upper and Lower Jisha, and driving straight through the cemetery forest south of the village (Fig. 2). This

Fig. 2 Looking north to upper Jisha along the new highway, which was cut through the cemetery forest. This road has granted easy access to large areas of pine forest to the south

road provides easy access to nearby towns; the trip to Zhongdian for instance has been reduced from an hour and half on rough unsealed roads to about 40 min on sealed highway. The road has improved access and also allowed an expansion of wood timber collection into nearby forests. It has also brought the development of a small village shop and a large externally funded emporium for tourist souvenirs. Development of tourism is the cause of angst within the village, splitting those who want to develop internal eco-tourism options supported by NGOs, against those who favor the government-backed large-scale development (including the proposed construction of a chairlift) (Li 2003). The full ramifications of this dispute will not be known for some time.

Politics in Jisha is through the elected village councils, which in turn sit below administrative village committees. Farmers also elect a natural village head. These are the bodies that directly administer to village needs. The politics are difficult to fathom, but at Jisha farmers are reportedly mistrustful of some village organizations following a lack of transparency during the 15 years of dealing with the government logging company. However, much daily village law is the direct result of long held village rules, taboos and mores (Li 2003).

Results and discussion

Recent forest use trends

The most obvious ecological trend at Jisha over the past few years is the increasingly high utilization of the community pine forests. Satellite imagery from November 2003 shows only about 7 ha of pine forest with clear signs of heavy use (i.e. obvious canopy gaps). Ground surveying shows this has expanded rapidly over the last 18 months. Now, the area of high-use looks to have increased by at least 3- or 4-fold (probably more). Much of this expansion is into the forest south of the village, beyond the cemetery forest, in areas that have been made more accessible by the new road system. Not only has the area of timber use expanded, but also intensity seems to have increased. Within these highly utilized forests, results show that basal areas and canopy covers are reduced by about 50% (Table 1, Fig. 3)—as the average canopy cover has dropped below 20%, technically, this should not be classified as 'forest' in China (Miao and West 2004). While rapid pine regeneration is likely, the structural survey suggested that these will be greatly simplified forests in terms of habitat diversity for many decades (Melick and Yang, unpublished data).

Table 1 The basal area and the average canopy cover (± SEM) for *Pinus densata* in the variously disturbed forest types near Jisha Village

Forest type	Basal area (m^2 ha^{-1})	Canopy cover (%)
Lightly utilized	34.63^a	26.3^a ± 2.5
Heavily utilized	15.99^b	15.3^b ± 3.4

Numbers denoted with different superscripted letters within the same column are significantly different (**$P < 0.01$). Adapted from Melick and Yang (unpublished data)

Fig. 3 The heavily utilized *Pinus densata* forest shows large gaps and the removal of over half basal areas and canopy covers

Estimates of timber needs and rate of tree removal

Estimating firewood use is problematic, nevertheless after examining annual storages and talking to locals we calculated an annual firewood volume of 5.96 m^3 per household. Given an average household of 4.82 people (i.e. population/households) this yields an annual per capita firewood demand of 1.24 m^3. It must be noted, however, that these volumes were for good quality oak. As this become scarcer more birch and pine are used and consumption rates of these are much higher. In addition, it is impossible to quantify the unofficial firewood trade—though, as firewood is sold in truckloads of 6 m^3, it seems likely that this is contributing significantly to wood removal. Although our annual per capita firewood results, are high compared with official figures for Tibetan communities in Litang County, Sichuan (0.5 m^3 per capita) (Winkler 2003), they are remarkably close to the 1.22 m^3 that was estimated for communities in northwest Yunnan's forested high mountain areas (Li 1993, cited in Winkler 2003). Similarly, higher values for Yunnan are also given by Xu and Wilkes (2004) who report a range of household consumption of 10–30 m^3 each year, resulting in an annual total of 600,000 m^3 of fuelwood collected in Diqing Prefecture.

Fencing needs were calculated from observations that split pine logs (in the size class 10–20 cm diameter) are the most common material. By contrast to pine, bamboo fencing uses only uprights and requires little or no cross bracing (Fig. 4). We recorded a total fence line of about 8,000 m at Jisha, so results show that on average each meter of pine or bamboo fence requires 0.067 m^3 and 0.004 m^3 of pine, respectively (Table 2). Given that pine fences need replacing every 4–5 years and bamboo every 10 years, this translates to a 35-fold increase in annual wood demand if all fences are converted to timber.

The removal of wood for building material is likely to be significant, but is notoriously difficult to quantify as local uses fluctuate. In their assessment of northwest Yunnan, Xu and Wilkes (2004) state that in Diqing Prefecture each year 1

Fig. 4 Traditional bamboo fencing is being replaced by less durable pine fences—this requires up to 35 times more wood

Table 2 The estimates for the comparative volume (m^3) of pine wood required for pine and bamboo fencing at Jisha

Type of fence	Requirement/m	Total used	Annual requirement
Pine	0.067	533.1	118.5
Bamboo	0.004	31.8	3.4

in 30 households is allocated a quota for constructing a new house. The quota is 120 m^3 per house in the highlands (though in fact, on average one house consumes a total of 150 m^3, and exceptionally as much as 300 m^3). Diqing Prefecture thus approves an annual total of 960,000 m^3 of timber for local consumption. It is also difficult to trace where this timber is acquired—some is taken from nearby forest, but most is high quality large lumber, some of which is imported regionally.

In terms of tree removal from the Jisha village fuel forests, the most pertinent information is for fence construction—it uses pine wood and is clearly used regularly. Assuming similar tree densities and size classes as for the lightly utilized forest, it is apparent that almost a hectare of trees is removed per annum for fencing alone (Table 3). This is an underestimate, as total wood is not used and many trees with excessive side branch development are discarded. Moreover, this figure takes no account of the truckloads of low-grade firewood being sold to townships and road crews. Household firewood is also neglected as this is assumed to be oak; but blending

Table 3 Calculated wood volumes (m^3) for usable *Pinus densata* in the lightly utilized forest at Jisha

Diameter cohort (dbh)	Average tree volume	Volume (ha^{-1})
10–20 cm	0.088	86.2
20–30 cm	0.217	43.3
Total		129.5

with pine and birch is now rapidly impinging on the *Pinus densata* forests. Also the fence line measurement is conservative as we only recorded fences clearly evident from imagery—even though some obscured areas were likely to contain fences.

Causes of increased community forest exploitation

The causes of recent increased demands on fuelwood forest can be broadly divided into two areas: ecological and economic. Ecologically, past commercial logging has removed high quality timber (*Quercus*, *Picea*), simplifying the upper forests to such an extent that traditional management and forest use was effectively destroyed. A further factor is the demise of the bamboo understorey, due to the destruction of its shaded mountainside habitat. As a versatile and durable fencing material, bamboo is now being replaced by pine fencing, which, as explained earlier, requires an estimated 35 times more pine wood.

Economically, several drivers are behind increased forest use. Until recently, barter systems were a significant part of trade in many of these rural towns; now cash economies dominate (Li 2003; Winkler 2003; Xu and Wilkes 2004). This is due to the general opening of external markets (NTFP for example are sold to outside interests), but also to the literal exposure of the village to the new road, township firewood market, and new shops. In short, all these factors have increased the need to generate cash. The new road has also allowed greater access to forest. This is clear beyond the cemetery forest, where forest is accessed for timber cutting from the new highway and trails fan out from the road quarry. There now seems to be an unofficial firewood industry supplying surrounding townships and construction crews—the price for a truckload of pine and birch firewood is 500 RMB (USD 60).

Cascading problems

One of the most concerning aspects of the situation at Jisha is the self-perpetuating nature of the environmental problems. As outlined above, the loss of bamboo forest necessitates use of less durable pine fencing. Timber fencing is more expensive in terms of labor and wood: bamboo fences last about 10 years, moreover, the woven fences are sturdier have no cross bracing, use smaller supports and require less maintenance. In addition, the government-supported moves to increase livestock herds have seen even greater need for fencing; new fences were observed within the 18 months since the acquisition of the satellite image.

The drive to increase livestock also leads to overgrazing resulting in increased weed problems and pasture degradation. These problems are compounded by government banning of traditional burning (a policy introduced to reduce forest fires). In addition, villagers say there is now more grazing in forests—particularly the heavily disturbed forest. This will inevitably lead to poorer regeneration and loss of forest quality. Moreover, it has negative impacts on wider replanting efforts as there is little incentive for grazers to protect plantation that will eventually reduce grazing habitat. Winkler (2003) reports a very similar scenario in Sichuan. This decreasing forest quality has ramifications for NTFP collection. The high value mushrooms are notoriously sensitive to habitat disturbance; villagers at Jisha no longer waste time collecting in heavily utilized forest, as the yields are so poor. Therefore, even should

immediate firewood demands decrease (i.e. with the completion of road building and perhaps with alternate fencing materials), the legacy of depleted forest habitat and reduction of NTFP will take decades to recover.

A similar vicious cycle has developed with new roads and enhanced vehicular access. The roads not only facilitate transport, making transfer of timber easier, but also allow access to more remote places. Naturally, the ample supply of transport and power tools (in part a legacy from past logging activities), further mitigates more widespread timber removal from community forests. Increasing use of vehicles increases running expenses. Thus as firewood collection becomes more far flung, villagers need to cut more to recoup costs. In addition, the road generates a market of its own, not only to townships who buy firewood (scarcer since the logging ban), but to road crews who use the pine wood to fuel bitumen melting. Villagers also say that road access makes traditional enforcement more difficult and ''outsiders are known to remove wood''. This was evident in the cemetery forest where some logging activity was apparent at the roadside edges of the site (despite community erected signs requesting respect for this forest).

Concerns with deepening wealth differentials in markets newly exposed to cash economies are well documented, but in Tibetan regions many successful villagers choose to invest in new and larger houses (Winkler 2003). At Jisha, new building activity is apparent, some spurred by the new attempts to attract and develop tourism. All of this activity is placing new demands on village wood resources (Xu and Wilkes 2004).

Institutional problems with conservation policy and research in China

It is important to note that while we have outlined specific problems for Upper and Lower Jisha, this case is likely to have widespread applicability to rural communities throughout mountainous regions of southwest China: most of these communities were dealt a financial blow by the logging ban and all have been targeted by the new policies to develop transport access and free market opportunities (Winkler 2003; Hillman 2003; Xu and Wilkes 2004). Moreover, concerns at Jisha epitomize how the expansion of village rights and the autonomy of forest users in China has been paradoxically accompanied by increased forest regulation at a central level. Generally, it seems, central policy overrides local concerns (e.g. the NFPP), however, the situation on the ground remains unclear in terms of the status of the tenure, usufruct rights and mutual obligations of community forestlands. In fact from a perusal of the relevant literature, the only thing clear about community forest rights is the state of confusion; a definition of community forest remains elusive (see for example, Miao and West 2004; Xu and Ribot 2004; Weyerhaeuser et al. 2006). Since a faculty of academics cannot pin down the details of community rights and obligations, it is unsurprising that villagers are generally non-plussed. At Jisha, villagers consider fuel forest to be their own resource for management as they see fit. It is clear that other forest areas are still utilized, but the relationship between village users and official government policies remains opaque to outsiders (and, we suspect, to many villagers).

At the local level, confusion towards forest use and timber rights stems not only from lack of codification of the rules, but also from an insecurity about tenure rights, because of recent fluctuations in forest policy. An uncertainty about the future is

unlikely to foster responsible, far-sighted resource management. Moreover, any policing of levies, timber quotas and local regulations must be enforced by government, or, within villages, by designated forest guards. This system has been shown to be inefficient at best. In areas in Yunnan and Sichuan, reports comment on the compromised role of locally employed forest guards, who suffer from the absence of clear guidelines and a lack of incentive to enforce rules (Winkler 2003; Taveau and Wang 2005).

Clearly, individual cases of village resource management have unique aspects but poor communication and lack of information flows are often evident in northwest Yunnan. Forest bureaus and government departments, which have been severely disrupted by the logging ban, struggle with their new roles and sense of identity. New development projects with which they are involved often lack continuity and are frequently abandoned, having been placed unsuitably and/or suffering from a lack of support and maintenance materials. For example, in villages neighboring Jisha, the locals remain wryly amused by the poor quality concrete fence post that have failed after only a few years and which they claim, were never correctly located in the first place. Similarly, our field observations in Nuijiang show that *Animal Husbandry* or *Animal Fodder Bureau* personnel have little incentive to go to the field and, when they do, often lack set objectives.

As pointed out earlier, there are also apparent contradictions between—and within—conservation and resource policy. On the broad ideological scale recent reforms of village rights (i.e. Village Organic Law) have granted village committees greater land-use autonomy, while conservation policies such as NFPP, SLCP and fire proscriptions are nationally imposed and seemingly override these same community rights. Conflicting policy is exemplified in many villages where tree planting and fire restrictions clearly work against grazing interests, yet increasing livestock management is a stated aim of the new rural development program (Winkler 2003; Xu et al. 2004). Tracing the causes of such inconsistencies is difficult, but it is impossible for such sweeping conservation reforms to cater to local needs. Resource management is based on large-scale statistics and remote-sensed data—certainly to a farmer at Jisha this information can appear remote in every sense of the word. However, these technical limitations are further challenged by systemic problems or attitudes within Chinese institutions. Several authors have commented on the lack of information flow through various levels of government hierarchy, and while Chinese research has advanced quickly in terms of technical data collection, exchange and cooperation, it still generally lacks inclusive ecosystem analyses and stops short of involvement with social policy issues (Ruiz Pérez et al. 2004; Wu et al. 2004).

However, criticism of communication failures and lack of policy feedback can extend beyond Chinese institutions. Many projects involving international NGOs and scientists struggle to overcome similar obstacles. Generally, to an outsider there seems to be some replication and lack of communication in NGO projects. At Jisha, for instance, villagers had no knowledge of NGO programs being run in a neighboring village to try to establish thorn bush hedges to replace fences. On a broader level, the authors have seen overseas academics withhold relevant research from conservation planners, as they put their personal publishing ambitions ahead of greater needs. Similarly, global conservation organizations sometimes seem keener on appearance than substance, requesting immediate action plans with nebulous ‘‘demonstrable biodiversity outputs’’—such plans no doubt read well in fundraising brochures, but, without meaningful population biology studies and a continuity of

baseline data, they are hollow. Highlighting these problems and trying to bring information out of the gray literature by presenting relevant examples and case studies is a good step towards developing some continuity and consistency for policy development.

Towards inclusive conservation policy at Jisha

With hindsight, it is easy to criticize Chinese conservation policy. In some ways, however, ours is not a criticism of conservation policies per se but rather an acknowledgement that minority communities are now paying the price for the past over-exploitation of natural resources. While township revenues were large, these community problems could be disguised—now they are becoming apparent. Government must act swiftly to grant exemptions to allow these communities to access their high value resources. This sort of inclusive policy will not be straightforward; even for western governments with long experience of resource management the goal of balanced, socially inclusive conservation has long been advocated (e.g. Henning 1970), but remains largely unattained.

In line with the aim of promoting local community needs, it is up to researchers and NGOs to continue to press for policy changes. It is the role of researchers to take some responsibility to articulate specific policy options. Pragmatically, this can probably only be done on a case by case basis, since local situations vary, and, moreover, because local governments are most closely conscious of community attitudes. In the case of Jisha, our research suggests the following recommendations:

- greater village access to areas of higher-value forest for sustainable collection of firewood and timber, perhaps with acknowledgement of the supply market to townships;
- implementation of fencing alternatives;
- reintroduction of controlled pasture enrichment and rangeland burning, with cooperation of the *Forest Fire Bureau*;
- monitor the link between grazing and plantation success;
- definitive population biology and ecological studies to enable preparation of scientifically sound sustainable harvesting plans for NTFP.

Despite the challenges facing these rural communities some authors are optimistic and see the current situation in China as the opportunity to turn away from previous rapacious behavior and develop long-term ecologically sustainable industries (Winkler 2003; Xu et al. 2004). That the government is aware and attempting to respond to these challenges is clear—a key plank of the SLCP, for example, is an integration of environmental goals with those of agricultural restructuring and poverty reduction. It is the role of independent researchers to highlight the problems and inconsistencies that inevitably arise—such as the problems confronting Jisha. Equally important is our responsibility to outline practical solutions before the loss of community resources and cultures is irreversible.

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