

# The myth of community and sustainable grassland management in China

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**Abstract** Within national and international domestic academic circles, there are increasing calls for enhanced involvement of communities in formulating and implementing grassland management arrangements. In contrast to the current national policy of contracting grasslands to households, many scholars call for support for collective grassland use arrangements. Several reasons are given for increased recognition and support for community-based management of grasslands, including lower costs of exclusion and dispute resolution, economies of scale in herding and marketing, mitigation of environmental risk, and ensuring equitable access to grassland resources. One conclusion from this literature is that devolving authority for designing and implementing grassland management systems to communities would lead to more sustainable grassland use, a position that I term as the 'myth of community.' This paper presents the results of a study of grazing systems in two communities in Hongyuan County, Sichuan Province. Each community uses its grasslands collectively. However, the study found evidence of severe overgrazing, especially in winter pastures, suggesting that community-based management of grasslands is not necessarily sustainable. The paper discusses three potential policy innovations required to support sustainable grazing systems in China's grassland areas: overcoming constraints in labor and land markets, and payments for environmental services that reward sustainable stocking levels.

**Keywords** community, grassland management, sustainable development

## 1 Grassland contracting and the myth of community

Following the success of land contracting in agricultural areas of China in the early 1980s, contracting of grasslands has been adopted as part of national law. The rationale for this is that overgrazing is seen to be due to a 'Tragedy of the Commons' situation occurring under conditions of collective grassland tenure (Li C, 2007). Thus, contracting grassland to individual households is intended to provide incentives for households to limit stocking levels, invest in grassland conservation, and enforce exclusion of others. The 1985 Grassland Law states that collectively owned grassland can be contracted to either individual household member of the collective or to groups of households (State Council, 1985). Reportedly, about 60% of all China's grasslands have been contracted, and out of this, 68% has been contracted to individual households (Li C, 2007). Anecdotal evidence suggests that at least some proportion of individually contracted grasslands continues to be used collectively by community members. Contracting to individual households has not been without its problems. Problems have been reported both in relation to the implementation of contracting and to its impacts. For example, Ru (2007) reports a situation where contracting has been impossible due to local topographical features. Li X L (2007) reports that lack of fencing has rendered contracts unenforceable in many areas, while fencing of private parcels has been found to increase the exploitative use of unfenced public grasslands (Williams, 2002; Li X L, 2007). Implementation of the contracting policy has increased social conflict (Yeh, 2003; Zhao and Long, 2007) as well as inequality in access to grassland and water resources (Williams, 2002; Yan et al., 2005). Several studies also report that de facto privatization to the household level has increased the costs of monitoring

and managing herds and that this cost falls mainly on women and children (World Bank, 2001; Yan et al., 2005).

Moreover, Banks et al. (2003) points out that despite more than 20 years of the individual household contracting policy, many communities across the Tibetan Plateau still practice various forms of collective and group tenure and grassland use. This suggests that collective and group tenure has its advantages given specific social and ecological contexts. Within some academic circles, the benefits of group and collective grassland tenure and use have been stressed. These benefits include lowering the cost of excluding others from use (Miller, 2000a; Banks et al., 2003; Richard and Tan, 2004), equality in access to grassland resources (Yan et al., 2005), achieving economies of scale in herding and marketing (Gaduo et al., 2007), mitigation of environmental risk (Banks and Doman, 2001) and adaptation to dynamics of variable grassland resources (Yan, 2007), and lowering costs of dispute resolution (Banks, 1999). Others have argued that China's various pastoral groups have extensive traditional knowledge and traditional practices, most often including collective grassland management arrangements (e.g., Wu, 1997; Wu and Richard, 1999; Ma, 2001), which are in practice rational. The conclusion that follows from this would be that improved grassland management would result from increased devolution of "authority over the assignment, monitoring, and enforcement of grassland use rights to village based institutions or pastoralist groups" (Miller, 2000b; Banks, 1997; Yan et al., 2005; Li et al., 2007).

These and other case studies from across China's pastoral regions show that pastoralists in many areas have a revealed preference for collective and group tenure and/or grassland use arrangements. Many advantages of collective arrangements have been identified. Nevertheless, it is a large step to move from what are mostly very small-scale case studies to a general recommendation to decentralize decisions over choice and design of grassland management system to communities in the hope that these community-based arrangements can lead to better grassland management outcomes. It is notable that most reports of collective or group-based grassland management arrangements do not include assessment of the outcomes of grassland management for sustainability of grassland use. Just as the 'Tragedy of the Commons' scenario has been shown to be a myth when applied to precontracting grassland areas (Miller, 2000b), I term this shift of scales from local studies to a generalized policy recommendation the 'myth of community' because it places a blind faith in the ability of communities to manage grassland resources sustainably in a changing ecological and socio-economic environment. To support this argument, the following section presents results of a study of two communities in Hongyuan County, Sichuan Province. Each community uses its grasslands collectively, but a study of stocking

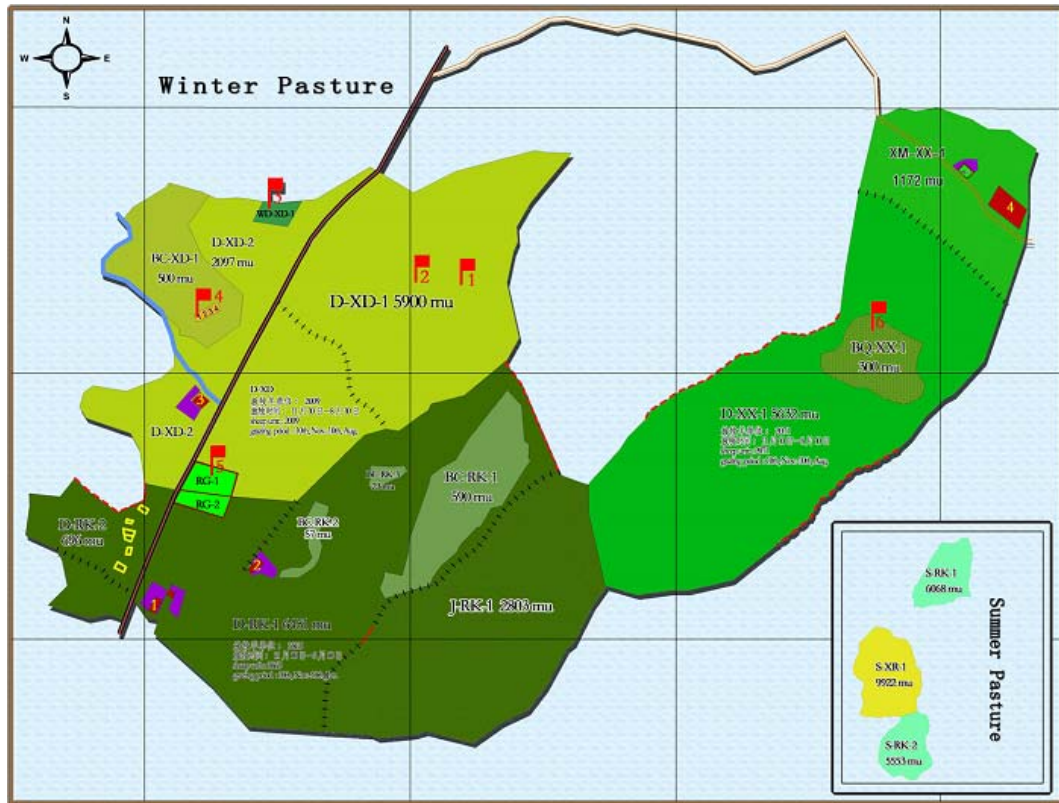
rates and grassland health found evidence of extreme overstocking and resulting grassland degradation.

## 2 Community grassland management case studies

Hongyuan County is a purely pastoral county in Aba prefecture, Sichuan Province, on the eastern extreme of the Tibetan Plateau (average altitude ca. 3500 masl). The county's land area is 8440 square kilometers of which grasslands cover 800000 hectares. Tibetans account for 74% of the county's population of 38000, making their livelihoods mainly from raising yaks, with smaller numbers of sheep and horses. The total population of livestock is officially estimated to be around 400000 heads, but privately, officials admit that the real number is likely to be between 600000 and 800000. Overgrazing is pervasive in the county, and 70% of grasslands are estimated to be degraded (Ze et al., 2007). Grassland contracting was completed in Hongyuan in the late 1990s.

In early 2007, The Mountain Institute, a US-based NGO, began to develop a collaborative project with Sichuan Province Grassland Research Institute and Hongyuan County government aimed at supporting community-based grassland management. Initial surveys found that several townships have mostly contracted grasslands to individual households, and huge investments in wire fencing have divided grasslands between households. However, in Anqu Township, after grasslands were equitably divided on paper, many communities decided to continue to use grasslands collectively. Fencing has been used mainly to delineate the boundaries of winter pastures between communities, while many summer pastures far from the roadside remain unfenced. In Anqu, communities refer to household groups (Chinese: *lianhu*), normally consisting of between 4 and 10 households each. For the community-based grassland management project, two communities were selected in Anqu Village No. 2. One community or household group has nine households, and the other has eight households. Each household group is in turn divided into two residential clusters, and households in each of these clusters can be considered to be a 'grassland user group'. Figure 1 shows the winter and summer rangelands used by the households.

The area shaded in dark green is a valley used by the 'Reku' household group. The nine households are located in two residential clusters, one near the roadside where they moved after the government subsidized building of four breeze-block houses, and the other in the lee of a ridge further up the valley. All households herd their livestock in the valley, moving them from the houses after milking in the morning and the yak return home by themselves in the evening. The areas shaded in lighter green are the grasslands used by the 'Celang' household group. The lighter green area is the winter pasture used by one



**Fig. 1** The winter and summer rangelands used by the households  
 Source: data collected and processed by Mandula (The Mountain Institute)

subgroup (‘Big Celang’), while the other area is the winter pasture used by another sub-group (‘Little Celang’). The box in the lower corner shows three areas of summer grassland about four hours’ distant from the winter grasslands. The pale green areas in the box are used by the ‘Reku’ household group, while the yellow area is used together by both Celang subgroups. Table 1 shows the area of grasslands used by each household group as mapped using GPS. The figure for Reku winter pasture is based on the land area of that pasture, while the figure in brackets is the area when one accounts for a large plot of grassland that has been retired under the Grassland Retirement (*tui mu huancao*) program.

**Table 1** Area of grasslands in the study site unit: mu [15 mu = 1 ha]

	Little Celang	Big Celang	Reku
winter pasture	5632	5990	7147 (4344)
summer pasture		9922	11621

The winter pastures are used between November 10th and either June 10th or August 10th of the following year. Celang household group vacates its winter pastures in August, while Reku vacates in June, renting the pasture of another household group for the months of June and July before moving on to its own summer pastures in August.

That is, winter pastures are used for 7–9 months per year. For the remaining 3–5 months, households move with their yaks to higher altitude summer pastures. Compared to many other areas on the Tibetan Plateau, these household groups move quite late to their summer pastures and use the summer pastures for a relatively short period of time. There are several reasons for this. First, when grasslands were contracted, these household groups were allocated a relatively better quality (Grade II) winter pasture, so they were allocated relatively smaller areas of both winter and summer pasture. Moreover, the summer pastures are located at some distance away from the winter pastures. The summer pasture is a steep valley, with several areas rendered unusable by dense shrubs and trees. The summer pastures are at a higher altitude than the winter pastures (> 4200 masl) and are still covered in snow until July. For this reason, grass begins to grow later in the year there. The summer pastures also attract a lot of mosquitoes that the yaks dislike. Therefore, the summer pastures can only be from August onward. There are three types of winter grassland: marsh land, hilly grassland, and flat grassland area. Monitoring of grassland productivity in all types of grassland in summer 2007 found that the average yield of grasslands in the project area is 284 kg DM per mu, but interannual fluctuations in yields due to rainfall differences are high so this may be a slightly low estimate.

While some Tibetan sheep are raised in other parts of Hongyuan County, all households in these two household groups only raise yaks (and horses for herding). Household surveys enumerated the number and class (sex and age) of all yaks owned in early 2007 as well as horses. Results show that the average household owns 143 heads of yak (minimum 45, maximum 226). Table 2 shows the total number of sheep units owned and the results of a rough calculation of stocking rates based on the surveys of grassland and livestock, as well as household stores of winter fodder. From the table, one can see that summer pastures appear not to be overgrazed, but if one accounts for a higher proportion of unusable grassland in the steeply sloped summer pastures, a reasonable guess might be that the amount of grass used is roughly equal to the amount available. However, winter pastures are severely overstocked. Based on the figures in the table, the gap in supply and demand in winter pastures is equivalent to an excess of almost 5000 sheep units which is 60% of current livestock holdings in the study site. This is reflected in signs of degradation such as low vegetation cover and high proportion of nonedible species in vegetation in many locations in the study site surveyed as part of the grassland monitoring study. These survey results were supported by herders' reports that yields, coverage, and edible composition of vegetation are all declining. Thus, long-term overgrazing of the winter pastures leads to grassland degradation.

The original intention of the community-based grassland management project was to develop and demonstrate a model for rotational grazing the study sites. Monitoring regrowth of grasslands during summer 2007 suggests that regrowth after grazing can account for up to 50% of the total yield of grasslands. This suggests that rotational grazing may be an effective way to manage grasslands. Ideally, a rotational grazing system would involve partitioning winter pastures into smaller parcels to be used in rotation and include at least one plot that remains

ungrazed each year. However, considering the current high levels of overgrazing in winter pastures, each parcel would become even more densely grazed than at present. Current herding methods basically involve putting yaks out to graze in the morning and then returning them in the late afternoon. However, effective rotation between plots would either require a total change in the way herding is managed and the allocation of labor or investment in fencing for partitioning the pastures that would be prohibitively large. Another option might be to change the seasonal timing of movement between winter and summer pastures. However, because the summer pastures can only be accessed in July and because mosquito infestation is particularly severe in July, it is not possible to move earlier to the summer pastures. Another option would be to rent the pastures of other household groups, as Reku already does for June and July. However, this itself is no way to ensure that grasslands are used sustainably and may just shift the location of degradation elsewhere. A further option might be to increase the yield of existing pastures. Reseeding is one option currently encouraged and subsidized by local government. A study of the impact of reseeded in 2007 found that it increases yields by about 24 kg DM per mu, which is far too little to effectively address the problem of overstocking as a single measure.

This section has provided an example of two communities who own, manage, and use grasslands collectively but who engage in overstocking that in the long-run is causing degradation of their grasslands. The household surveys found that livestock mortality was prevalent in the winter-spring months, with the average household losing more than 20 head of livestock each year (equivalent to a loss of more than 10% of total stocks each year) due to a combination of starvation, cold, and disease. This, of course, impacts on household incomes, and in order to cope with unpredictable annual losses, herders readily state that they raise as many yaks as they can as an insurance policy.

**Table 2** Stocking rate estimates for pastures in study site

	Little Celang	Big Celang	Reku
total sheep units	2071	2009	3865
total yield of natural grasslands (estimated at 300 DM per mu)/kg	2224530	2135445	4960500
total annual demand/kg	3779575	3666425	5894125
gap in supply and demand/kg	-1555045	-1530980	-933625
winter fodder stores/kg	1900	8700	17000
total yield of winter pastures/kg	1182720	1168050	1031940
demand in winter months/kg	2847625	2762375	4154875
gap in supply and demand in winter/kg	-1158025	-1594325	-3122935
total yield of summer pastures/kg	1041810	1041810	2440410
demand in summer months/kg	931950	904050	1739250
gap in supply and demand in summer/kg	109860	137760	701160

### 3 Pastoral livelihoods and sustainable grassland management

Household surveys found that all households in the study site earn more than 95% of their household income from yak products, including sale of live and dead animals, butter, cheese, and yak dung. (The only non-yak-based income was the sale of dogs and horses.) Average household incomes were between 15000 to 20000 RMB. Average household size is more than six people, suggesting a per capita cash income of 2300–3200 RMB per year, i.e., equivalent to about one Dollar per day (2007 exchange rate). The majority of this income (> 60%) came from sale of live yaks. Herders aim to sell 6–7 year old male yaks. In 2006, a mature (6–7 years) yak bull sold for around 1000 RMB, while in 2007, the price was closer to 2000 RMB. To finance consumption and expenditure needs, herders estimate that they need to sell 2–4 yaks per person each year. Because they sell 6–7 year old yaks, they need to concurrently raise 2–4 for this year, as well as 2–4 for each succeeding year, or a total of about 20 yaks per household member at any one time. In addition, some yaks may die each winter, so an extra number must be raised as ‘insurance’. Hence, we find that the average household raises 143 head of yak.

Population has been increasing over time, but very gradual, and herders’ expectations of living standards are also rising, with many households purchasing grain foods, instant noodles, and other processed foodstuffs. Also, they are paying for children’s education in the county town, purchasing clothes instead of producing them at home as was the norm before, and owning consumer durables, such as TVs and DVD machines. With increasing reliance on cash income for maintaining basic living standards, it is necessary for households to increase the number of yaks they raise.

In terms of household incomes, there are, in theory, other options including developing alternative incomes and increasing the value of the products currently sold. Alternative income opportunities are few and far between, and those non-yak-based income sources that exist in Hongyuan, such as seasonal mushroom growing, are not compatible with seasonal transhumance and are mostly engaged in by migrants from outside the county. Product sale prices could be increased either by herders making direct sales to customers further up the value chain or by enhancing value added and marketing skills of processing enterprises. Both of these options will not be realized on a large scale in a short amount of time.

Thus, the case study concludes that overgrazing is inevitable in the study site given the herders’ economic incentives and income generating opportunities, irrespective of whether grasslands are contracted to individual households or to household groups. Compared to other

forms of tenure, such as individual tenure with fencing or rotational grazing with fencing of grazing zones (Richard and Tan, 2004), collective use of grasslands can be understood as the least cost method of overgrazing and degrading grasslands. This paper, then, provides a case study of collective grassland management that is not sustainable, challenging the ‘myth of community’ that maintains that devolving authority for grassland management to communities would result in better outcomes for sustainable grassland use.

### 4 Potential policy options

Many options for policy interventions that might abate the pressure of overgrazing on natural grasslands are widely discussed in China. Here, we briefly discuss four of these: improving value-chains, labor markets, land markets, and payments for environmental services.

#### 4.1 Improving value chains

Following the successes of a number of dairy enterprises in Inner Mongolia, as well as some less well known enterprises in other pastoral areas, there is considerable interest in increasing value-added processing of yak and sheep products in pastoral areas, such as Hongyuan. The basic idea behind such initiatives is that a locally based processing enterprise could increase demand for specific products, raising both herders’ incomes and local tax revenues. Rising incomes from specialized product sales might also provide incentives for herders to improve the efficiency of livestock management practices, for example, by decreasing the age of yaks at offtake from 6–7 years to a recommended 3.5 years when yaks have already reached 80%–90% of their potential body weight (Xie et al., 2006).

However, the experience of current yak product processing enterprises in Hongyuan suggests that such regions are at a disadvantage compared to other livestock producing regions of China. First, due to climate constraints and the rapid loss of livestock body weight in winter, yak product purchasing and processing is constrained to the short growing season (June–October). With high fixed costs in enterprise establishment and half the year without income generating operations, the profitability of operation in these areas is limited. Second, analysis of consumer preferences in the nearby metropolis of Chengdu<sup>1)</sup> finds that yak meat is not a preferred type of meat for the vast majority of urban consumers, and consequently, demand is limited and willingness to pay is low. Market surveys identified small niche markets in specialized products, but the total potential volume of demand is too small to drive a transformation of production and processing systems. Analysis of yak product value

1) The Mountain Institute (2008). Market survey of yak product niches in Chengdu. unpublished report (in Chinese)

chains extending from Hongyuan (Wilkes and Tan, 2008) suggests that there may be potential to increase the price per head of live yak sold by about 10% if herders were able to organize into cooperatives to make direct sales to urban slaughterhouses. However, the transaction costs of organizing effective sales cooperatives may be prohibitively high. Furthermore, there is no assurance that higher per head prices would provide sufficient incentives for herders to reduce stocking levels.

#### 4.2 Improving labor markets

As with improvements to value chains, there is interest in increasing opportunities for higher returns to labor in pastoral areas, most notably by increasing access to wage labor opportunities. Local governments throughout pastoral areas of China have been devoting considerable efforts to supporting this, for example, providing training in technical skills in off-farm trades, facilitating linkages with labor markets in regions with strong labor demand, and providing policy support for credit access for small firms<sup>1)</sup>. Research in Sichuan shows that inhabitants of many ethnic minority areas participate much less than non-minorities in off-farm labor, especially outside their immediate locale. Figures for wage labor participation rates in areas more remote than alpine areas of Sichuan are likely to be even lower. Hongyuan County government has also invested efforts in supporting labor force participation<sup>2)</sup>, but the successes achieved, 1172 individuals participating in off-farm labor, will make small contributions to increasing incomes in a county of more than 38000 people. Systematic constraints to extra-local labor force participation exist for ethnic minorities with low average formal education levels and limited exposure to skills in demand outside the pastoral areas.

#### 4.3 Improving land markets

It might be argued that the study community's current predicament is mainly because the government allocated insufficiently large plots of pasture to the household groups. Indeed, Reku has begun to address this problem by renting grassland for two months each year. Existing guidelines for grassland contracting do not contain detailed prescriptions on rental of contracted grassland, but in response to demand, an informal rental market has arisen. From a policy perspective, one concern is whether renters would conserve grassland resources in the same way as owners of grassland user rights. There is concern, therefore, to improve the formal grassland rental system so that the property rights of renters are also clear, on the assumption that this would promote long-term renting

and therefore increase incentives for conservation of rented grassland resources. Several provinces are in the process of developing supplementary regulations to govern grassland leasing and renting. In the case of Reku and Celang herder groups, winter overgrazing could be alleviated if they rented an area of winter pasture almost as large as their current contracted area, an unlikely possibility if one assumes that all other nearby communities also face the same constraints.

#### 4.4 Payments for environmental services

In 2007, Central Government Document No 1 mentioned the need for a Payment for Environmental Services scheme for grassland areas (State Council, 2007) and Ministry of Agriculture agencies have begun to develop the outlines of a possible scheme (Liu, 2007). In short, whereas the current stocking rate regulations only include provisions for punishing those who overgraze (Li C, 2007), the proposed system would provide economic incentives for households to reduce the number of livestock raised. Liu (2007) suggests that the level of payment be determined by the area of grassland contracted by each household and the average number of sheep units reduced in the program area. Based on figures provided in Liu (2007) and calculating on the basis of average household holdings of grassland, each household in the case study site in Hongyuan would receive an annual payment of 6156 RMB, which is equivalent to roughly one third of their current household income. From this point of view, the notion of social payments to herder households for improving grassland management appears to be an avenue worth exploring. In return, they would be expected to reduce herd size, but this is where a whole series of questions of feasibility of implementation arise. Which households should reduce their herds the most? If households with larger herds reduced more, then would they be paid more compensation? If so, then this would go against the 'polluter pays' principle that the government intends to implement, and at what administrative level would the scheme be implemented? Any scheme that is based on surveys of assets and calculations at the household level will be extremely costly to implement. However, if the unit of calculation is the village or the township, then how can inequality between households or communities be addressed? Above all, how should the scheme be designed to account for the variation in average incomes across pastoral areas, so as to ensure that it does not lead to a decrease in household income as has been seen with some PES schemes in the forestry sector in China (Xu et al., 2004)? Clearly, the design of an effective, conditional, and equitable PES scheme in China's grasslands is an issue

1) [http://202.123.110.5/gzdt/2009-02/13/content\\_1230072.htm](http://202.123.110.5/gzdt/2009-02/13/content_1230072.htm) on Qinghai; <http://www.northnews.cn/news/2008/200807/2008-07-13/152973> on Inner Mongolia

2) [http://www.sc.gov.cn/scgk1/scgk/abz/hyx/200801/t20080124\\_246303.shtml](http://www.sc.gov.cn/scgk1/scgk/abz/hyx/200801/t20080124_246303.shtml)

that further natural and social sciences research can contribute to.

## 5 Discussion

The analysis of China's Sloped Farmland Conversion Programme (Groom et al., 2008), which provides payments over a five- or eight-year period for conversion of marginal arable land to forest, suggests that the long-term success of the program depends on the access of participating households to alternative, off-farm income sources. Groom et al. (2008) concludes that in order to achieve long-term sustainability, the program should not target households with large land endowments but should target households with higher potential for accessing off-farm income opportunities. Other policy interventions that could support the achievement of SLCP goals include improvements in land markets, tenure security, and access to credit (*ibid.*).

These conclusions are clearly relevant also to the grassland PES scheme. The scheme aims to provide incentives to reduce stocking levels that will impose considerable opportunity costs on households. Presumably, the scheme would be designed to compensate households (or at least the average household) for these losses. Reduced stocking may also increase surplus labor, and the returns to labor will only increase with improved access to higher paying off-farm income generating opportunities. Creating these opportunities by government intervention in labor markets or by supporting local enterprise development is likely to be crucial to the longer term success of this program. As alternatives, herding households may choose to invest in increased fodder supply so as to reduce their rates of overstocking and to seek to lease extra grassland from other households. Improvements in institutions governing these markets will therefore also be important. Without such supporting interventions, there appears to be a high probability that an involuntary payment for reduced stocking may decrease household welfare in pastoral areas where access to alternative income sources are more limited than in agricultural areas.

These discussions on the PES scheme are ongoing, which indicate the beginning of a new approach to sustainable grassland management in China. Compared to community-based approaches, such a system would also have the advantage that its implementation could be less costly than the time-consuming participatory approaches often required supporting community-based grassland management. Nevertheless, once herd sizes are reduced, the sustainable management of grasslands will still remain a challenge, and community-based approaches to grassland management may then have a key role to play in the new economic and institutional environment provided by the PES scheme.

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