

# A REVIEW OF RANGELAND PRIVATISATION AND ITS IMPLICATIONS IN THE TIBETAN PLATEAU, CHINA

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## Abstract

The Tibetan plateau of China is one of the world's major pastoral areas, in which rangeland management underwent fundamental changes in the twentieth century. This article reviews the rangeland privatisation process in the Tibetan plateau over the last ten years, examining cases from Hongyuan, Zoige and Maqu Counties in the eastern part of the plateau, Nyima County in the northwestern part and Dingri County in the southwestern part.

Rangelands have been allocated to individual households or 'the least contracting unit' starting from 1996, but the process of rangeland privatisation was diverse and is still ongoing in the western part of the Tibetan plateau.

Rangeland privatisation has some significant impacts on local people and their environment. First, many rangelands are inequitably allocated due to their highly variable topography, productivity and availability of water resources. Secondly, access to social and economic services has been made more difficult for some, while social conflicts have increased. Thirdly, privatisation of rangeland and sedentarisation of nomads needs matching infrastructure but that is still missing in many places. Meanwhile, privatisation of rangeland has led to increased labour inputs in some places and added more workload onto women and children.

The article concludes that rangeland privatisation was intended to stop further rangeland degradation and to provide nomads with better lives. However, more study is needed on managing rangeland in an appropriate way.

**Keywords:** Changtang Plateau, eastern Tibetan Plateau, Qomolangma Nature Preserve, rangeland management, rangeland privatisation

## Introduction

The Tibetan plateau in China, with rangeland accounting for 70 per cent of the region's land area or about half of China's total rangeland area, is home to two million Tibetan pastoralists plus some three million agropastoralists and supports a livestock population of some ten million yaks and thirty million sheep and goats (Miller 1998 and 2003). Cold-tolerant livestock grazing by Tibetan herders on the plateau has been the dominant and environmentally sustainable land use for thousands of years. In the twentieth century, however, pastoralism on the Tibetan

plateau, like all other pastoral areas, underwent some fundamental changes (Wu 1997, Wu and Richard 1999, Wu and Yan 2002, Yan and Luo 2002).

To sum up the changes, communal tenure and highly nomadic traditional systems of livestock-raising were practised before the organisation of communes by the Chinese government in the 1950s. Between the 1950s and the early 1980s, both rangelands and livestock were ambiguously collectivised into management units of 'people's communes', 'production brigades' and 'production teams'. Starting in 1982, livestock were allocated to individual households (*zhe jia gui hu*), but rangelands were kept for common use until the mid-1990s. About 70 per cent of China's usable rangeland was leased through long-term contract of use till the end of 2003, of which 68 per cent was contracted to individual households and the rest to groups of households or to villages (Yao 2003). This article reveals diversity in the process and details of privatising rangeland throughout the Tibetan plateau of China.

The rationale for privatising rangeland in China is the assumption that open access of privately owned livestock to common rangeland has led to severe rangeland degradation. The assumption has been indeed widely accepted in China; for example even in the geography textbook for middle school students. As a result, it is firmly believed that privatisation of grazing land should definitely make herders more responsible for limiting their herd sizes and investing in rangeland improvements for sustainable rangeland management. However, some researchers at the same time claim that rangeland deterioration in China is becoming more severe than ever before and the causes are mainly due to improper management of rangeland related to privatisation (Wu and Richard 1999, Ho 2001).

Scientific research on rangeland assessment and monitoring will provide evidence relevant to the controversies on the main causes of rangeland degradation in China; this is not debated in the present article. Rather, this article seeks to shed light on the *de facto* rangeland privatising process and current management practices.

## **Methods**

The authors used participatory approaches to conduct research on the process of rangeland privatisation, its implications and *de facto* management status in five study sites. The authors spent about forty days a year in the field conducting both ecological and social studies in the eastern Tibetan plateau from 1999–2002. The leading author gained basic information on rangeland management in Tibetan Autonomous Region (TAR), in the western part of the Tibetan plateau, from a training workshop in 'Participatory Rangeland Management and Cashmere Improvement' led by her in September 2004 in Lhasa, Tibet. The authors then conducted participatory field investigations in northwest TAR Nyima County in October 2004 and southwest TAR Dingri County in April 2005.

## Study Sites

The authors conducted comparative studies in five counties in the Tibetan plateau of China, of which three are located on the eastern fringe, one in northwest Changtang and another in the southwest of the plateau. Hongyuan and Zoige Counties of Sichuan Province, and Maqu County of Gansu Province are all in the Zoige high basin in the eastern Tibetan plateau and have geographic similarities. Nyima County is located in the Changtang plateau of northwestern Tibetan plateau, and Dingri County is in the southwestern mountainous area of the plateau in the Qomolangma (Tibetan name for Mount Everest) Nature Reserve. Therefore, the study sites are introduced in the following paragraphs as the eastern Tibetan plateau, the Changtang plateau in the northwest and the Qomolangma mountainous area in the southwest.

### *The Eastern Tibetan Plateau*

The eastern Tibetan plateau in China – administratively covering eastern Qinghai, southwestern Gansu, and northwestern Sichuan Provinces – is the most productive area of the Tibetan plateau due to its relatively mild climate and topography. The case study sites of Hongyuan, Zoige and Maqu Counties in Sichuan and Gansu Provinces are in the heart of the eastern Tibetan plateau. The average elevation of the eastern Tibetan plateau is 3,500–3,600 m, whereas that of the entire plateau is over 4,000 m. Like other parts of the Tibetan plateau, only a cold season from November to May and a warm season from June to October can be identified. The annual mean temperature is about 1–2 °C with –10.3 °C in January and 10.9 °C in July, and the annual precipitation ranges from 600 mm to 800 mm.

The Yellow River and some of its local branches meander through the area and create one of the largest and most biodiversity-rich, high-altitude marshes in the world (Scott 1993, Yan and Wu 2005). In nearby Qinghai Province are the headwaters of both the Yangtze (Changjiang) and Yellow (Huanghe) Rivers. Because of its location in the transition area between the Tibetan plateau, the highly erosive loess plateau and the eastern China monsoon forests, the eastern Tibetan plateau harbours rich biodiversity and ecosystems of global importance. Its ecosystems are characterised by variety, sensitivity and uncertain successional trends.

Although the eastern Tibetan plateau is relatively more productive than other parts of the plateau, it is one of the most sparsely populated areas in China, with only 125,000 people on over one million ha. It is also one of the most marginalised, remote and poor regions of the country. Approximately 83 per cent of the local people are Tibetan pastoralists who have depended for family survival over thousands of years on water and grassland health to support their vast herds. The annual per capita income of rural people in Hongyuan, Zoige and Maqu Counties was approximately 1,600 RMB Yuan (US \$194) in 2001 (Yan 2003).

### *The Changtang Plateau in the Northwest*

Changtang in the Tibetan language means 'unpopulated land in the north'. Located in the northwest, Changtang covers about two-thirds of the total land area of the Tibetan plateau, which is a vast area with mountains over 6,000 m interspersed on the rugged plateau at an elevation of 4,900 m in the north and 4,500 m in the south. The high altitude and surrounding mountains have shaped Changtang plateau into a unique high-frigid and dry area. The diurnal and annual temperature changes are significant. The mean temperature is about 6–10 °C in July and –10 °C in January. The lowest temperature is from –1 to –18 °C in the warm season and is lower than –40 °C in the cold season. The annual precipitation is about 100–300 mm in Changtang with a decline trend from southeast to northwest. Wind is very strong on the plateau, especially in winter and spring. There are lots of highland lakes throughout Changtang, though many of them are shrinking due to climate change (Yan 2003) and most of the lakes are saline.

There are only about four hundred vegetation species due to the harshness of cold and drought. Alpine steppe is the main vegetation type with *Stipa purpurea* as the key species. Nevertheless, a number of fauna and flora species are endemic only to the unique high and dry environment in the northwest Tibetan plateau. Being sparsely populated, Changtang is still home to wild yaks, Tibetan antelope, wild ass, Tibetan gazelle and other wildlife. A national nature reserve of 298,000 km<sup>2</sup> has been established in Changtang in 2000.

Sheep, goats and yaks are the key and only adaptable livestock species in Changtang. Local rural people are all pure pastoralists dependent on animal husbandry; more than 92 per cent of local people's income comes from animal husbandry in the Changtang plateau. Nyima County, one of the case study sites of this paper, is in the centre of the Changtang plateau, with an area of 150,000 km<sup>2</sup> of which most is in the Changtang Nature Preserve. The total population of Nyima County is about 30,000, and per capita income of rural people in the county in 2004 was only 1,035 RMB Yuan (equivalent to US \$125.50). Since the establishment of the nature reserve, local pastoralists – geographically, economically and socially marginalised, especially those still living in the preserve – are facing acute conflicts between their livelihoods and wildlife conservation.

### *The Qomolangma Mountainous Area in the Southwest*

The southwest area of the Tibetan plateau is represented by a diverse landscape of high mountains such as Mt. Qomolangma (Everest), wide valleys and lots of lakes. There are five mountains with an altitude of above 8,000 m and fourteen mountains higher than 7,000 m in the Qomolangma mountainous area. Deep rivers often cut through the high mountains and this has fostered various ecosystems from deep valleys to high mountains. The average altitude of the area is about 4,800 m above sea level. The annual mean temperature ranges from 0 °C to 16 °C within the area, and annual precipitation ranges from 200 mm to 430 mm. The

southwest Tibetan plateau is also a transnational area that borders Nepal, Bhutan and Sikim, India.

Diverse landscapes and ecosystems in the southwestern Tibetan plateau have formed the highest national nature reserve on earth – the Qomolangma Nature Preserve (QNP). QNP has been established since 1988 and covers an area of 33,800 km<sup>2</sup>. So far, a total of over 270 wildlife species and 2,348 vascular plant species have been found in QNP, which has been listed as a World Biosphere Reserve. Rare and endangered animals in QNP include the wild ass, *Entellus langur* and the snow leopard, which is the symbol of QNP.

Most of the valley areas in QNP are suitable for cereal crop cultivation and productivity is high, while rangeland provides the major livelihood resource for people living in the higher mountains. The per capita income of rural people was 1,840 RMB Yuan (equivalent to US \$224) in 2003, but the average income of pastoralists in QNP is about 40 per cent lower than that of farmers in the valley areas. With increasing international interest in the Himalayas in terms of tourism, mountain climbing and herbal medicinal products, more and more people are coming into the area, bringing changes to local people and the environment.

Dingri County, the last case study site of this paper, is located at the northern foot of Mt. Qomolangma and all its area of 13,968 km<sup>2</sup> falls within QNP. There were 42,780 people in 7,490 households in 128 villages and 21 townships in Dingri County at the end of 2002. The county was recognised in 1992 as the nation's poorest with an annual per capita income of less than 400 RMB Yuan (US \$50). But this had increased by 2004 to over 2,000 Yuan. Rangeland makes up about 63 per cent of the county's total land territory, while arable land is only about 5 per cent of the total. Dingri County well represents the natural diversity and threats to the ecosystem of QNP and the whole Tibetan plateau.

## **Process of Legal Rangeland Allocation**

### *The Different Timing of Rangeland Allocation*

The process of rangeland privatisation on the Tibetan plateau started in 1995 in the eastern Tibetan plateau and is still ongoing in the southwest mountainous areas such as in Dingri and adjacent counties in QNP. Table 1 shows the different times of rangeland allocation in the various study sites.

### *Standard Area of Rangeland for Allocation*

Rangelands were classified before being allocated in all study sites in the eastern Tibetan plateau in Sichuan and Gansu provinces, though the grades and their standards were different. Rangelands in TAR were not classified for legal allocation, but more careful *in situ* measurement was made of actual areas for partition in this western part of the plateau.

**Table 1: Time of Rangeland Privatisation in Different Study Sites in Tibetan Plateau**

Study Sites	Year of Experimental Rangeland Privatisation	Year of Massive Rangeland Privatisation	Year of Rangeland Allocation to Communities
Hongyuan, Sichuan	1995	1996–1997	
Zoige, Sichuan	1995	1996–1998	
Maqu, Gansu	1995	1996–1998	
Nyima, TAR	2000	2001–2002	1996
Dingri, TAR	2005	Expected in 2006	1996

In the process of rangeland classification, Maqu County Animal Husbandry Bureau (AHB) in Gansu Province required that every township had to rank 3 per cent of its usable rangeland as grade I or one standard *mu* (one *mu* is equivalent to one-fifteenth of a hectare). In Maqu, a standard *mu* is defined as producing 400 kg of green forage annually. In each township, 35 per cent of usable rangeland ranked as grade II, calculating as 90 per cent equivalent of a standard *mu* output. The remaining 62 per cent of the rangeland should be ranked grade III, calculated as 75 per cent equivalent of a standard *mu*. This grading system was based on the results of the rangeland baseline survey conducted in Maqu County in 1982. Other counties in the study areas had different calculations (Table 2).

**Table 2: Rangeland Grades and Their Equivalence in the Different Sites**

Study Sites	No. of Rangeland Grades	Equivalence to Standard <i>mu</i> , Starting with Grade I	Standard <i>mu</i>		
			Grade is one Standard <i>mu</i>	Green Forage per Standard <i>mu</i>	Percentage of Standard <i>mu</i> in the County's Usable Rangeland
Hongyuan, Sichuan	6	1.4, 1.2, 1.0, 0.8, 0.6, 0.4	Grade III	360 kg	67 %
Zoige, Sichuan	4	1.0, 0.85, 0.65, 0.5	Grade I	360 kg	64 %
Maqu, Gansu	3	1.0, 0.9, 0.75	Grade I	400 kg	3 %
Nyima, TAR	No standard <i>mu</i> , all natural rangeland is seen as having similar productivity of 35–65 kg green forage per <i>mu</i> .				
Dingri, TAR	No standard <i>mu</i> , all natural rangeland is seen as having similar productivity but not well known by local technical officials				

**Table 3: Rangeland Carrying Capacity and Average Allocation Sizes**

Study Sites	Carrying Capacity Per Sheep Unit ( <i>mu</i> )	Average Rangeland Area Allocated Per Person ( <i>mu</i> )
Hongyuan, Sichuan	5	270–350
Zoige, Sichuan	5	220–250
Maqu, Gansu	7.6	230–300
Nyima, TAR	21	1,500–3,000
Dingri, TAR	30	1,700–2,200 (estimated)

The officially recommended stocking rates of rangeland in different sites also vary significantly (Table 3). In all case study sites, one adult sheep or goat is equivalent to one sheep unit, while one yak and one horse are equivalent to five and six sheep units, respectively. The area of rangeland allocated to each household/person varies in different sites and even between different villages or townships within one county.

#### *The Procedure of Rangeland Allocation*

The process of rangeland allocation was quite different from one site to another. The process in the eastern Tibetan plateau usually entailed first classifying and calculating village rangelands on a topographic or sketch map, and then calculating how much land should be allocated to each household within the village, according to the method of allocation determined by the village committee. One representative from each household drew a lot to choose the location for his/her household and the area that household should be allocated was demarked from the map. Sometimes, village committee members chose their own rangelands first and allocated the rest to the villagers. When the rangeland location of a family was decided by lottery, the family could usually suggest the shape or boundaries of its rangeland parcel based on the allotted size. Each family's rangeland allocation was marked on the map and then identified by the neighbouring families on the actual site. Drawing a lot first did not necessary mean that one could choose an ideal site. The size of land allocated to the households having good relationships with local authorities, however, could be much larger than they ought to have been. Not one case of *in situ* measuring or demarcating during rangeland allocation was heard of in the eastern Tibetan plateau. In Nyima County in the northwest, however, all rangelands allocated were approximately measured by the allocation team, mainly consisting of the AHB staff and village committee members. Dingri County, according to the director of the county AHB, is going to measure all rangeland for allocation, imitating what has been done in Nyima County.

### *Results of Rangeland Allocation*

By 2000, 54.36 million *mu*, or 94 per cent of the total usable rangelands in Aba Prefecture (including Hongyuan, Zoige and some adjacent counties in Sichuan Province), was contracted. Of this, 29.90 million *mu* was winter and spring pasture, and 24.46 million *mu* was summer and autumn pasture. A total of 57 per cent of contracted pasture, or 31.00 million *mu*, went to 31,000 households; 20 per cent, or 10.77 million *mu*, went to 674 household groups; 22 per cent, or 11.70 million *mu*, went to 1,500 villages; and the rest was kept for emergency use or was used by work units (Sichuan AHB 2001). These figures show that 29.90 out of 31.00 million *mu* of rangeland contracted to individual households was winter or spring pasture, and this indicates that most pastures for summer and autumn use were allocated to household groups or villages. About 390 households, or one twentieth of the rural households in Aba County, Sichuan Province, have been allocated one plot of rangeland each for year-round grazing. Classification of winter/spring and summer/autumn pasture is another difficult issue and will be discussed in the following section.

Comparatively, by the end of 2003 338.9 million *mu* of usable rangeland had been allocated to 40,356 households in Nakchu Prefecture through signed lease contracts, which took up 66 per cent of the total rangeland area and 51 per cent of the total households in the prefecture. Nyima County is one of eleven counties of Nakchu Prefecture in the northwestern Tibetan plateau of Changtang. A meeting organised by the TAR government in 2004 encouraged all the other areas in TAR to follow the example of Nakchu Prefecture by allocating rangeland to leased contract units rather than to villages as had been done previously. Therefore, many counties in the southwest, including Dingri County, started experimental rangeland allocation in some selected townships. All rangeland for winter grazing is supposed to be allocated to individual households over the next two to three years while summer pastures will be allocated to villages or groups of households.

The actual calculation of how much rangeland should be allocated in all the case study sites was complicated and diverse. Most townships or villages chosen for rangeland allocation experiments in Hongyuan and Zoige Counties of Sichuan Province had allocated their rangelands based on the number of people in one household in that year or by the end of latest year of rangeland allocation, as well as the number of livestock in 1982 when the livestock were allocated to individual households. The ratio of the number of people and livestock, however, varies from one site to another (see Table 4). Ratios of the weight ranged from using only number of people to using only livestock numbers and included many variations between those two extremes. In the extreme case of Maqu County, Gansu Province, rangeland was allocated evenly to each household within one village. In Nyima County, the county AHB required allocation of rangeland by using the ratio of 50:50 based on the number of people and livestock in the year of rangeland allocation. In Dingri County, the ratio required by the AHB is supposed to be 65:40:5, with 5 per cent as adjustment to benefit those households that do not have many livestock or whose family size has increased a lot in the previous decade.

**Table 4: Ratio of the Number of People and Livestock in Rangeland Allocation**

Site	No. of Household Members		No. of livestock in sheep Units		Adjustment	
	Weight in Rangeland Allocation (%)	Year of Calculation	Weight in Rangeland Allocation (%)	Year of Calculation	Weight in Rangeland Allocation (%)	Year of Calculation
Hongyuan, Sichuan	40–70 %	Year-end prior to rangeland allocation	36–60 %	1982		
Zoige, Sichuan	0–100 %	Year-end prior to rangeland allocation	0–100 %	1982		
Maqu, Gansu	40–80 %	Year of rangeland allocation	20–60 %	Year of rangeland allocation		
Nyima, TAR	50 %	Year of rangeland allocation	50 %	Year of rangeland allocation		
Dingri, TAR	65 %	1996	40 %	1996	5 %	Year of rangeland allocation

## Impacts of Rangeland Privatisation

### *Uneven Distribution of Rangeland Resources*

Before rangelands were allocated in the counties of the eastern Tibetan plateau, winter and spring pastures comprised less than 30 per cent of the usable rangeland (Wu 1997, Wu 1998, Li et al. 2000). However, as green fodder can only support livestock for about five months from June to October, people in western Sichuan were strongly encouraged to enlarge winter and spring pastures to at least 60 per cent of their total rangeland. It was suggested by Hongyuan County AHB staff that winter and spring pasture comprise 70 per cent of the usable land in order to mitigate the shortage of winter feed, and this decision seemed somewhat successful in experimental rangeland allocation in Amu and Longri Townships. Every household of Amu Township was allocated one parcel of rangeland for year-round grazing, whereas many other households in western Sichuan were allocated one patch of rangeland as winter pasture and shared summer pasture with the rest of their household group or (natural) village. However, problems began when this policy was extended to the whole county. In Waqie Township,

Hongyuan County, for example, nearly 70 per cent of usable land is composed of marshes not suitable for winter pasture, though some very wet marshes can only be grazed in winter when they are frozen.

The result of enlarging winter and spring pastures regardless of traditional grazing patterns was that no-one knew the actual ratio of winter to summer pasture after rangeland allocation. Worse, many pieces of land in traditional high summer and autumn pasture areas that were allocated as winter and spring or year-round pastures to be were soon found unsuitable for winter grazing because of severe cold and heavy snowfall. Three households in Longrang Township, Hongyuan County, for example, have their allocated year-round pastures on the mountain at elevations above 3,800 m and have had to rent low pastures every year since rangeland allocation in 1997. Rangeland above 3,800 m was calculated as unusable in Maqu County, Gansu Province because it is too high, windy and snow-covered in winter. Poor families who have experienced unlucky winter pasture site allocation have inevitably become poorer but have little say, as they are usually a weak group in the society. Some AHB staff and village leaders acknowledge that rangeland allocation has not always been equitable, but few say anything in support of the poor.

#### *More Difficult Access to Water Resources*

The most significant site differences accounting for rangeland heterogeneity are induced by interactions between topography and water. Like rangeland in other parts of the world, water resources on the Tibetan plateau are unevenly distributed due to topographic diversity. Rangeland privatisation has made the situation even worse than before. Partitioning rangelands into small private parcels and fencing them individually leads not only to a lack of water availability on many private individual lands, but also to difficulties in obtaining water from or through others' lands. An estimated 60–70 per cent of pastoralists in Zoige County are facing drinking water problems, three times the number that were facing problems before rangeland allocation. The following is transcribed from an interview with Zoige County Water Hydrology Bureau.

19,300 people and 1.12 million livestock had drinking water problems in Zoige County, in 2000. Five to six households used to share one water source, but that became hardly possible after rangeland privatisation. The biggest problem in the centre of the million-hectare Zoige Basin is water scarcity, where the water table is generally at a depth of 40–70 m with a maximum of 90 m. Where one machinery-pumped well used to satisfy hundreds of households, people now dig wells by themselves, but it is very difficult because of the deep water table and the sediment-based soil in Zoige Basin, which always falls into the wells.

On average, nomadic interviewees in Zoige County said they took two or three hours a day to fetch drinking water. In some extreme cases in Xiaman Township, Zoige County, livestock only got enough water to drink when rain had

accumulated on the ground, and people had to spend long hours every day fetching water from their wells. In another example, seven households from three household groups shared one valley – a previous summer pasture – for winter grazing in Anqu Farm, Hongyuan County; the only stream is at the bottom of the valley. These people had to spend three or four hours each day carrying drinking water for their livestock during the harsh winter and spring, while no snow accumulates. The animals were not taken to the water, because they had already lost too much weight. There is a saying that livestock are full in summer, fat in autumn, hungry in winter, and starved in spring. Adult animals on the Tibetan plateau lose 30–40 per cent of their body weight every year during winter and spring or the so-called cold season. Nomads lose their livestock every cold season also due to lack of water. No compensation was given for inequitable rangeland allocation and no change can be seen in the near future.

### *Difficulty in Access to Socio-economic Services*

It has been deemed by decision makers and reported that settlement of pastoralists can give them better access to human and livestock health services, education, markets and other socio-economic services, and thus improve their living standards (Richard 2000, Yan and Luo 2002). However, these participatory case studies have shown that there is poor understanding of the existing pastoral system.

Nomadic people and their lifestyle are considered backward by development decision-makers and implementers, due mainly to their increasing populations under poor health and educational conditions; their large herds of livestock, from which they lose many animals during every cold season rather than sell them for income; and their lack of knowledge about modern techniques. Settlement of nomadic people, many officials believe, would afford them easier access to and better socio-economic services. Currently, every pastoral household has been allocated one plot of winter pasture – either separate from or joined to summer pasture – and asked to build a house, a barn, a shed and fences on that winter pasture. When traditional winter pasture areas were doubled and people were dispersed to their own private lands, some houses in previously concentrated winter settlements were virtually abandoned. At the same time, some people have no choice but to live far away from roads or neighbours. Some nomadic people, for example, now have to spend eight to ten hours on horseback, or more hours walking, to travel from their new winter settlements to the township government site or county town in Hongyuan County, to which they must transport livestock for sale and from which they must haul purchased goods using horses or yaks. It is impossible for these nomads to sell fresh yak milk and they usually only sell livestock products when traders come to them or they need money urgently, and thus do not receive good prices. It is much more difficult for them to gain access to health and veterinary services, or even timely help from neighbours during emergencies such as difficult deliveries of humans or livestock, than it was before rangeland allocation.

It is widely acknowledged that nomadic people, especially the younger generation, need education to improve their production techniques or to find better alternative livelihoods and lighten the pressure on the land. One of the stated reasons for settling the nomads is to offer better education services. In fact, after settlement, neither many school-aged children nor their parents were willing to use boarding schools when families lived far away from other people and did not have relatives near the schools. This was due to transportation of young children being perceived as unsafe and relatively expensive. Increased child labour requirements on private lands, due mainly to the need to guard herds and boundaries, also prevent children from going to school. This outcome is contrary to the original intentions of improving the nomads' education level.

### *Increased Boundary Conflicts*

When we first conducted participatory investigations with the demonstration families in Hongyuan County, whom we thought were representative of all settled nomads in the region, we saw reduced conflicts among households who had fenced their pasture boundaries as a result of rangeland privatisation. In fact, those demonstration households had received government subsidies and the county governor had guaranteed them loans for fencing their pastures, as well as for constructing their houses, barns and sheds. The actual situation throughout the plateau, however, is much more complicated for the ordinary nomads over vast areas.

Households that have fenced their privatized rangeland are only a minority after all. In 2002, households that had fenced their pastures comprised approximately 12 per cent of total households in Hongyuan County and an estimated 25 per cent and 7 per cent in Zoige and Maqu counties, respectively. Fencing is an expensive investment – it costs an average of about 20,000 RMB Yuan (US \$2,424) to fence the outside boundary of one family's winter pasture – and it does not bring significant increases in income to nomadic people or improvement to pasture. Therefore, only a small percentage of households are willing to fence their boundaries. In the western part of the plateau, rangeland is usually fenced to conserve winter pasture, to prevent wildlife damage, and/or to harvest hay by collectives instead of individual households.

The official statistics are that large areas of rangelands have been fenced, but the purpose of the fences can be questioned. When fencing is intended to establish boundaries between individual households' contracted land, some fenced areas are shared by several households or just separate seasonal pastures used by the entire village; we have seen this in all case study counties. Some fences are, interestingly, only installed by 'visualisation projects'. These projects use local government (AHB) funds to fence rangelands along main roads just to make fences visible but have little actual function. Fences are significantly fewer in western Sichuan counties adjacent to the case study sites in more remote areas.

Fencing causes conflicts over routes for mobile grazing. Some places no longer have such routes for livestock migration after rangeland allocation, while other

places have only five-metre-wide tracks that are generally not suitable for livestock to graze, having very poor vegetation cover and increasingly poor condition after two or three years of extensive livestock transportation. This is a major problem, as yaks and sheep require grazing when they take hours or days to move from one pasture to another. There are also conflicts over water resources that become hard to access when they are located on individual fenced rangelands.

### *Increased Security Concerns*

In addition to the increased boundary conflicts, livestock theft and robbery incidents have also increased rapidly in many areas of the eastern Tibetan plateau, where more rangeland is managed by individual households and market access is easier. There are thieves and robbers from outside, but most are young nomadic boys, who admire the outside world and desperately want to enjoy it. Most of these young boys have been to urban areas and long for clean beds and food but lack the appropriate guidance to achieve a better livelihood. They want to improve their living standard through alternative livelihoods but feel disappointed by the immense constraints of language, skills and education.

Living and moving together provided effective security when people were in groups and helped defend each other. Now that each household lives far apart, they must guard their herds constantly. Most households even set up a small tent near their herd and watch it all night, as flocks of yaks and sheep are commonly stolen, especially in transboundary areas or areas with good transportation. One extreme case from Zoige County was a mother of three in her thirties, named Xueke, whose husband had left some years ago and whose mother in poor health stayed with the family. This family has separate winter and summer pastures, but even those with year-round pastures must move their tents in summer, because it is infeasible for a family to stay in a 100-hectare winter settlement all year. Xueke must make three trips every time the family moves their tent. She once had a very good pack yak that greatly helped the weak family, but that was stolen one day with some of their other yaks while Xueke was on one of her moving trips. She knew of this theft, but nobody helped her recover her yaks. She can read a few words but cannot write, and she cannot seek justice from the county government 90 km away. If Xueke and her family had been living and moving with others in a group, such a thing would not have happened to them.

### *Infrastructure and Facilities*

The 'pastoral three self-containing construction' (*san peitao jianshe*) was required in the eastern Tibetan plateau after rangeland allocation. This entailed construction of houses for nomadic people, sheds and barns for livestock, and fences for pasture. It was required in Hongyuan County that each household fence 500 *mu* of pasture and build a 70 m<sup>2</sup> house, a 20 m<sup>2</sup> hay repository, and an 80 m<sup>2</sup> shed. The government offered each household 2,000 RMB Yuan (US \$242) as a premium after finishing the self-contained constructions, which cost on average 52,000

RMB Yuan (US \$6,300). About five million RMB Yuan (US \$606,060) was given to 3,854 of the total 4,697 rural households in Hongyuan County by the year 2000, but that did not necessarily mean that every household had built the required constructions. Some households have not yet built the facilities on their winter pastures, because these allocated pastures are poor and are not suitable for winter grazing.

Ironically, when the 'three self-contained construction' programme was finishing in western Sichuan, the provincial governor visited the pastoral areas and said, 'We could indeed build an internationally advanced new pastoral village here!' Therefore, 145 advanced houses were built as the first new pastoral village in Waqie Township, Hongyuan County. The building of each house in the new village cost 90,000–200,000 RMB Yuan (US \$11,000 to 24,200) depending on size, and each of those families had just built their self-contained constructions on their winter pastures.

In Zoige County, Sichuan, almost every village had a centralised winter site with houses for each family/household and more than half of those village settlements had electricity before rangeland privatisation. Now, however, as a result of the 'three self-contained construction' requirement, people are distributed onto their own lands to graze their livestock and guard their boundaries. These nomads are also losing their easy access to the facilities. Most villages in Zoige County that once had electricity had collected money from each household to string a wire into the village, but we did not hear of any plans for supplying wires to each of the widely separated pastoral houses in the foreseeable future. Five relatively large projects were conducted in the last five years in Maqu County, with a total investment of 32 million RMB Yuan, to restore degraded rangelands and build water facilities, but the situation is not much better than in western Sichuan.

Many local officials and nomads say that the 'three self-contained construction' programme is not nearly enough to meet the rangeland privatisation needs in pastoral areas; there must also be construction of facilities for water, electricity, and roads. Under the current system, local people are being artificially put into inequitable situations and the lives of some families are becoming very difficult.

#### *Increased Labour Inputs and Gender Bias*

As noted above, increased boundary conflicts and livestock insecurity are currently problems in the eastern Tibetan plateau and lead to increased labour requirements in the pastoral production system compared to before rangeland privatisation. Families who own fewer livestock and do not fence their pastures must guard their boundaries constantly, sometimes by setting up a guard tent near the border, and must not leave their family tents near their boundaries. At least one person must stay awake every night to guard the herd, so men and women stay awake in turns, usually with the men watching at night and sleeping during the day.

These increased labour needs are compounded by water scarcity on many private lands. When water levels are high enough, households dig new wells on

their lands every time they move their tents, but when water levels are too low to be reached with a hand-dug well, people must fetch drinking water for themselves and their livestock at the nearest stream or river. However, it is not always possible to take livestock to a water source every day. Problems with this include long distances to water, negotiating a way through others' lands, and availability of forage for livestock along the way. Even in cases in which nomads dig wells on their private lands, water infiltrates slowly; people must tip water out into a container every hour and even that is not always enough for the livestock to drink.

According to our investigation, Tibetan nomad women work an average of sixteen hours per day in the eastern part of the plateau, not including time spent guarding. The necessity of guarding boundaries and livestock and fetching water requires even more labour and time and also puts more psychological pressure on these already overworked women, for they must be ready for any unknown situation. Therefore, some of their workload is transferred to children, some of whom must leave school to devote their time to pastoral production.

There are also situations – where private pastures are fenced, social security is relatively good, and water resources are not too far away – in which labour inputs have decreased since rangeland allocation. However, even in these situations, the gender gap in labour inputs to pastoral production is being widened, because men no longer graze their herds over long distances and tend to transfer their workloads to women and children (Richard 2000, Yan and Luo 2002).

## ***De Facto Rangeland Management Status after Rangeland Allocation***

### *Individual Household Management*

The intention of rangeland allocation in China as mentioned earlier was to increase herders' responsibility for sustainable use of rangeland. Although evidence of individual household management of its own allocated rangeland exists everywhere throughout the Tibetan plateau in all case study sites, this only includes less than 10 per cent of total households in the northwest, up to about 30–40 per cent in the eastern Tibetan plateau.

Rangeland management by individual households requires a big investment in fencing pastures, digging wells if surface water is not available or is insufficient, harvesting hay for winter supplementary feed, and good access to social and economic services. Many households managing their rangeland individually have been allocated rangeland in good condition with plentiful water resources, or they receive a lot of subsidies from local government or pastoral development projects.

### *Group of Households Managing Together*

Based on the authors' rough estimation, at least half the allocated rangeland is now managed collectively by groups of households. There are three categories of such

groups: the first are kinship groups, e.g. brothers and sisters or cousins; the second type are groups legally sharing the same summer pasture and the third and most common type is that several households allocated rangeland in adjacent areas spontaneously organize themselves to manage their livestock and rangeland together.

In such cases, formal regulations are not agreed or written down within the groups. Therefore, conflicts can easily emerge regarding different household herd sizes, labour contribution, relatives' entrusted livestock of some households and so on. Many such groups in Hongyuan and Zoige Counties in the eastern Tibetan plateau were dissolved and reformed, especially in the first three or four years after the rangeland was allocated. The lack of internal regulation also equates with a lack of equal appropriation, but people do see the need to manage rangeland together.

### *Community-based Management of Rangeland Resources*

Rangelands are by nature extensive, of low productivity per unit of area, and spatially and temporally variable in productivity. Yet local pastoralists need to move together in groups for security. For thousands of years, Tibetan pastoralists had stayed in groups, managing their livestock through mobile grazing systems until the fundamental changes continuously made in the last century. There are still three major types of community-based practices for managing rangeland resources in the Tibetan plateau after rangeland has been legally allocated.

In the first type, a community manages rangeland collectively due to great difficulties of allocating rangeland equally to individual households, for example, in Re'er Villages in Zoige County mentioned above. People managing rangeland in this manner may not be fully aware of the rangeland ecosystem characteristics and equity of access to resources. The agreements formed are mainly about grazing routes, camping sites and timing, though there are also agreements to adjust resource sharing between rich and poor.

The second type of community based rangeland management derives from project or outsiders' support, an example of which is the case of Maqu County, Gansu Province. An Oxfam (Hong Kong) project initiated equitable rangeland management aimed at sustainable pastoralism by helping local communities to calculate each piece of rangeland allocated by a household and its carrying capacity; then detailed regulations were created on how to adjust equitable sharing of the resources accordingly. Local people in Maqu County were all very happy with the project and the way of managing their rangeland and livestock, according to the first two authors' field investigations conducted in 2001 and 2002.

Outside support, however, is not always available or to be relied on in the vast Tibetan plateau. Therefore, the third type of community-based rangeland management, taking Nyima County in the TAR as an example, is an illustration of local people managing their resources wisely. Many villagers in Nyima County are practising joint-stock livestock production at their village base. In such cases, households pool their resources to share stock by calculating their area of rangeland, number of livestock and other means of production. All pastoral

production activities are arranged collectively and equitably. Local county and township governments also encouraged such practices, according to the leading author's field survey in Nyima County in October 2004.

Community-based rangeland management seems to have more advantages for managing resources and leading to sustainable and equitable use. Organisation of community based management of rangeland resources, nevertheless, is rather a process of learning-by-doing in the new context after rangeland privatisation. Further study of this process is needed.

## Future Perspectives

### *Raising Awareness of Responsibility*

To seek improvements, we must first look at the situation from both positive and negative perspectives. Rangeland privatisation has had some positive impacts. It has been based on the prediction that the establishment of individual household tenure would give incentives to pastoralists to stock pastures within their carrying capacity and to invest in pasture improvement. To some extent, rangeland privatisation has increased the nomads' awareness of responsibility.

Rangelands in the Tibetan plateau are rich not only in biodiversity but also in resources for Chinese and Tibetan traditional medicines. The root of *peimu* (*Fritillaria*), for example, is used as a herbal medicine for coughs and grows well in the eastern Tibetan plateau. Plant diggers from outside the region usually destroy the sod layer of the range by digging and trampling, which is harmful to vegetation and wildlife habitat. In Hongyuan County in 1998, there were over sixty thousand diggers, quite a large number relative to Hongyuan County's total population of 37,000 people. Large-scale, unorganised digging was finally ended when all rangeland was allocated to individuals. Mining of good-quality peat (of which there are tens of billions of tons in the eastern Tibetan plateau) and sand was also constrained by rangeland privatisation. Vehicles that used to drive everywhere on the rangelands now need permission to cross many private lands. Nomadic people's awareness of fire control has also been greatly increased in all three case study sites in the eastern Tibetan plateau. All of this protection of private lands is actually good for rangeland sustainability, although gold mining still remains a big problem that destroys commonly-managed rangeland in the western part of the plateau.

There have been, nevertheless, few rangeland improvement actions since privatisation, except among the selected households of a few demonstration projects. Nomads did not traditionally manage rangelands individually and aside from storing grasses in open sheds for haymaking while livestock are taken to summer pastures, do not have much knowledge about rangeland improvement. Technicians have tried to teach demonstration families to reseed grass for hay on their contracted lands, but the usual result has been that the nomads come to the technicians and say, 'You should come for your planted grass; it is time to make hay.'

### *More Effective Institutional Rangeland Management*

The official purpose of rangeland privatisation is to maintain rangeland health and promote livestock production through assigning long-term rangeland use rights to individual households. We acknowledge that privatisation has had some positive effects in raising nomads' protective responsibility for the rangelands. One should never forget, however, that unlike arable land, rangelands were traditionally managed not by individual households, but by collectives, due to their inherent spatial and use characteristics. Therefore, the success of China's cropland reform of the late 1970s was not mirrored in the pastoral production system. To achieve sustainable rangeland management, we must look at rangeland itself and the traditional ways in which it is used by the local people.

From the authors' investigation and observation, it is more effective to manage rangelands collectively. However, each member of a collective must be given the responsibility to protect the land through land tenure rights, while strong institutional arrangements are essential to maintaining equitable collective management and achieving environmental sustainability.

Many rangeland ecologists have indicated that the reasons for rangeland degradation in China are too often explained as due to technical and demographic factors, while the institutional environment is ignored. Indeed, technical considerations about deferred and rotational grazing, carrying capacities and stocking rates have little meaning if they do not adequately incorporate institutional arrangements that provide incentives for collective action (Ho 1996 and 2000, Richard 2000, Banks 2001). Co-management of rangelands is increasingly recommended by pastoral development researchers (Mearns 1997, Sneath 1998, Banks et al 2003, Yan and Wu 2005). In co-management, the state plays a critical role in governing institutional arrangements at a macro level and thus determining the general institutional environment and the institutional arrangements available for resource users to adopt. Simultaneously, rural communities offer knowledge about local ecological, social and economic conditions, which is instrumental in the design of appropriate institutional arrangements. Rural communities may also provide low-cost options for quick resolution of disputes and the most effective mechanisms for monitoring and enforcing rules.

### *Nomadic People Must Be the Major Concern of Decision-Makers*

The public will and should be an important player in management decision-making on tomorrow's rangelands (Heady and Child 1994). Rangeland decision-makers at any level must keep this in mind, rather than making arbitrary decisions by themselves and considering that local people are backward. Indeed, nomadic people have inhabited these environs for hundreds or thousands of years, adapting to their specific environment, developed and operated under their own indigenous knowledge systems. Indigenous knowledge is not only of value for the cultures from which they evolve, but also for scientists and planners striving to improve

conditions in rural societies. Such systems should therefore be carefully studied, assessed and incorporated into development and conservation projects (Wu 1997). Pastoral development, likewise, can be only successful in the long term if designs are economically, socially, politically and ecologically sustainable and if appropriate strong institutional management regimes are formed to implement those designs. Otherwise, it is doomed to failure before it starts.

To ensure that nomadic people are the major concern of rangeland decision-makers, we need national rangeland laws for more flexible management. But the most immediate issue on the eastern Tibetan plateau is to implement national rangeland regulations that are adaptable to local situations. Some interviewees at our case study sites complained that there are no rangeland regulations for them, because the Rangeland Law itself is too ambiguous for specific county, township or village situations. They wished that local technical officials could make their own regulations according to local situations. To create locally-adaptable rangeland management regulations requires a good understanding of both national regulations and local situations, as well as respect for nomadic people. According to our participatory experiences in the eastern Tibetan plateau, very few local technical officials were able (whether or not they were willing) to create local regulations due to their limited knowledge, experience and facilities. Implementing regulations after they are created also requires large amounts of funding and strong institutions, both currently in very short supply in the eastern Tibetan plateau.

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