

NOMADS OF GOLOK, QINGHAI: A REPORT

By

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A. Introduction

In November-December 1996, I visited the European Union's, Qinghai Livestock Development Project (QLDP) to examine a number of issues regarding socio-economic conditions and constraints facing the herders. The QLDP (at the time) was a five year program that seeks to protect and develop the rangeland and livestock on the Qinghai-Tibet Plateau in Qinghai Province. Its objectives were to increase livestock productivity, prevent increasing pasture degradation, and thereby increase the income of the pastoral herders. Two herding counties (Dari¹ and Maqin²) in Goulou³ Prefecture in S.E. Qinghai had been selected as pilot sites.

B. Is the grassland ecosystem in Goulou Prefecture in imminent danger of collapse?

In order to assess the socio-economic situation the herders in Goulou face and examine their views vis-a-vis the approaches of the QLDP, it is necessary first to address the state of the grasslands, in particular claims that recent exponential growth in livestock numbers has pushed the pastoral ecosystem into critical disequilibrium and imminent collapse. This issue is fundamental to the planning and implementation of the QLDP's programs since the QLDP will obviously have to devise different strategies depending on whether it accepts this assessment or, alternatively, a less urgent scenario in which problems of erosion and degradation exist, even serious ones, but there is no imminent danger of ecosystem collapse.

B.1. The case for imminent collapse

¹ I am including in this report the correct Tibetan pronunciation and spellings (in italics) of each township and county. Dari is actually pronounced "Dara" and is spelled *dar lag*.

² "Machen"—*rma chen*.

³ "Golok"—*mgo log*.

The general assumption of a number of the QLDP's short-term technical advisors has been that an exponential explosion of herd size over the past 45 years has led to serious overstocking and environmental degradation. In particular, D. Gates, has argued strongly that the degradation he observed in the field is recent and the ecological collapse of the ecosystem is imminent. The essence of this point of view can be seen in the following quotations from Gate's report:

In extensive areas the ecological collapse of the soil/vegetation complex is imminent or has already happened. This ecological degradation is the result of decades of extensive plant utilization, by too many animals over too long of a period of time. The present rangeland degradation problems were brought about by disruption of the traditional nomadic herding system and central government programs intended to increase livestock numbers and production of livestock products.⁴

The excessive stocking rates were but manifestations of pressure from the central government to increase production of livestock products. The disruption of the traditional nomadic system of grazing and the establishment of permanent villages and townships has contributed to the rangeland degradation problem.⁵

Gates, therefore, argues that the erosion and environmental degradation he observed was the result of an explosion of livestock numbers that followed the dismantling of the traditional pastoral management system in 1952 by the new Chinese government, and by its policy of calling for increased animal husbandry production.

A major part of the logic behind Gate's position is the livestock demographic data presented in the Socio-Economic Baseline Survey. Using government statistics, it reported a 165% increase in livestock numbers (+ 1,705,300 head of livestock) in Goulou Prefecture in the 42 years since its incorporation ("liberation") into the People's Republic of China (PRC) in 1952.⁶ These data reveal an annual increase of roughly 2.5%, i.e., a doubling time of only 28 years, although that report also indicated some slowing of the growth rate since 1989.

A brief comment on the nature of the traditional Tibetan pastoral system is necessary before assessing the validity and reliability of these data.

B.2. The traditional Tibetan pastoral system

It has been argued by Ellis (1988) and others for Africa and Goldstein et al. (1990, 1992) for Tibet and Mongolia, that traditional nomadic pastoral societies like the Goulou operated under a system of non-homeostatic balance—non-equilibrium systems as they are more typically referred to in ecology. Rather than homeostasis being reached between populations and their resources and then maintained over time, these pastoral systems

⁴ Dillard H. Gates, End of Mission Report, p. 1, 1996.

⁵ Ibid., p. 22.

⁶ S. Dideron. Socio-economic baseline survey, p. 23, 1995.

experienced great fluctuations in the number of livestock over time as a result of random, unpredictable and uncontrollable natural calamities that periodically decimated herds. Among Tibetan nomads, these included disease and climate (heavy snows in winter that covered vegetation and prevented grazing, and low rainfall summers which produced insufficient overall vegetation). Typically, herds increased rapidly for some period of time and then declined precipitously as a result of an external disaster, or more usually, a series of bad years. However, although the number of livestock in an area varied widely at different times, over long periods increases in stocking rates in Tibet appear to have been limited or at most moderate. The recurrent episodes of livestock decimation appear to have been frequent enough to create a stable, non-equilibrium system in which the grasslands were not systematically destroyed despite continuous utilization for at least one, and perhaps two or more, millennia.

The unpredictableness of natural disasters over large expanses of territory was replicated at the micro-level in the sense that the areas utilized by individual herders were also subject to random calamities even though the larger territorial unit of which they were a part was not severely affected. Consequently, the rational choice for the individual herder was to maximize the size of his herd at all times since there was no way for him to predict when a natural disaster would decimate his herd, and certainly no way for him to prevent it. If one faces the possible loss of a large proportion of one's herd due to a random event one can neither predict or prevent, it is clearly more advantageous to possess 500 sheep rather than only 50 or 100, since the ultimate danger for any pastoralists is to fall below the minimum number needed to survive a disaster (or a series of bad years) and recoup herd size during the more advantageous years.⁷ To fall below this level in traditional Tibetan society inevitably meant losing one's autonomy and status as an independent herder and being forced to subsist by becoming a laborer for a wealthy herder. Thus, the traditional Tibetan pastoralist's emphasis on maximizing livestock numbers was actually a strategy for minimizing risk in an uncertain, non-equilibrium ecological system, although wealth and prestige were also measured by livestock numbers.

B.3. The case against imminent collapse

The imminent collapse position, as indicated earlier, argues that the change in political systems that occurred in Goulou in 1952 ended the traditional system of herd management and led to rapid increase in livestock numbers—specifically a 165% increase in livestock numbers over the past four decades. However, as we have seen, Tibetan herders traditionally did not utilize a strategy that moderated stocking rates, so the mere change of political systems in 1952 could not have led by itself to higher stocking rates. Herders were trying to rear as many head of livestock as they could before and after liberation.

⁷ A good example of such a random event was the snow generated disaster that struck a segment of the herdsmen of Yushu Prefecture in southwest Qinghai in the winter of 1995-96. It is said to have destroyed roughly 33% of the total livestock and all or most of the livestock of many households.

Moreover, it is obvious that growth rates of 2.5% could not have existed during the traditional era for any length of time, let alone for the one or two millennia that Tibetan pastoralists have presumably utilized the Qinghai-Tibetan Plateau. For example, if we start with a hypothetical animal population of only two (a breeding couple) in 1,000 AD, a 2.5% growth rate would have produced roughly 33 billion head of livestock by now. Therefore, for this rate to be valid, one would have to posit that new technologies/methods were introduced after 1952 that substantially reduced mortality and/ or increased fertility, or both.

However, I know of no such innovations. There are no data indicating when veterinary services began to play a significant role in reducing livestock epidemics, but it certainly was not in the early years of the PRC when the bulk of the growth has to have occurred for reasons I will discuss below. Moreover, there are compelling reasons to suggest that the statistics on which the claim for a 165% increase is based are incorrect.

Historically, the Goulou tribes were politically autonomous. Consequently, when the People's Liberation Army (PLA) moved to liberate Goulou after it liberated Xining in late 1949, the Goulou herders opposed them militarily. Serious confrontations ensued with many casualties, and was the area was pacified and liberated only in 1952. Because of this, 1952 is likely to represent an artificially low base year due to the livestock losses one would expect to accompany such fighting and disruptions. Similarly, the chaos and disruptions of collectivization and the Great Leap Forward are likely to have negatively, not positively, affected herd growth. And, in addition to these events, in Goulou there is said to have been a second substantial outbreak of fighting in the 1957-58 period.⁸

These data are also suspect because there was a tendency during the early years of the PRC for local officials to deliberately exaggerate farming and livestock production in reports in order to demonstrate both their socialist zeal and their competence. In some areas, this is said to have artificially precipitated famines when the inflated production numbers led to high government taxes and quotas that left insufficient resources for the population's subsistence. It is also widely believed among China scholars that early PRC officials seriously under-reported production levels at the time of liberation in order to demonstrate to their superiors that liberation led to large increases in productivity.

Another line of reasoning that challenges the livestock statistics cited in the Socio-Economic Baseline Report derives from livestock population data I collected in the QLDP's two pilot counties. Let alone a 2.5% growth rate, it shows that in the recent past there was no growth. Table 1 presents the statistics for Dari County.⁹

Table 1. Total livestock population from 1983-1996 in Dari County

Year	# livestock	human population
1983	548892	244220

⁸ It is interesting to note that the figure of Goulou population growth in the Socio-Economic Baseline Survey (p.2) reveals a sharp decline in population between 1957-58.

⁹ The county was unable to provide any statistics on livestock numbers before 1983.

1984	556534	229698
1985	493924	203265
1986	520088	204879
1987	542100	206444
1988	462125	181227
1989	403309	156341
1990	388303	146600
1991	409125	149754
1992	441839	167468
1993	451164	182819
1994	451758	186262
1995	472801	195000
1996	468778	194307

Table 1 reveals a 14.6% **decrease** in the number of head of livestock in the 13 years since 1983. It also reveals a pattern of growth and decline characteristic of non-equilibrium systems in the sense that livestock numbers suffered a 28.3% decline between 1987 and 1990, and then began a recovery which continued until this year when there was again a slight decline. The current livestock level, however, remains 13.5% below the 1987 level.

Table 2 presents the livestock growth statistics we obtained for Maqin County.

Table 2. Total livestock population from 1958-1995 in Maqin County

Year	# of livestock
1958	227202
1959	208520
1960	239973
1961	271042
1962	283796
1963	340369
1964	402540
1965	462921
1966	542824
1967	636527
1968	675554
1969	723935
1970	625152
1971	659988
1972	594855
1973	677828
1974	747686
1975	646159

1976	712100
1977	792403
1978	827751
1979	781656
1980	749533
1981	724362
1982	625215
1983	607735
1984	600271
1985	620513
1986	629600
1987	586382
1988	543793
1989	538600
1990	563110
1991	589597
1992	601595
1993	573843
1994	600006
1995	600126

Maqin County, like Dari County, experienced a decline in total livestock since 1983, although only 1.3%. More striking, however, is the lack of livestock growth experienced since 1967. The total number of livestock in Maqin County in 1995 was actually 5.7% lower than that of 1967.¹⁰ Consequently, if there really was a 165% increase in the years after 1952, the entire growth spurt would have had to occur in the 15 years between 1952 and 1967, just the time period most subject to political and military disturbances.

Finally, let me present one last piece of evidence. Over the same 4 decades that the alleged 2.5%/annum livestock growth was occurring, a major competing stress on the grassland's vegetation was being eliminated, i.e. wild ungulates. Tibetan herders traditionally shared these grasslands with enormous numbers of antelopes, wild asses, gazelles, blue sheep, Marco Polo sheep, and wild yak. Early visitors to the Qinghai-Tibetan Plateau talk of witnessing herds of thousands of wild asses and antelopes early in this century. These herds were almost totally destroyed in the first decades of the PRC when the need to feed troops/ officials/ workers stationed on or near the Qinghai-Tibetan Plateau was not moderated by any ideology of wildlife conservation. Consequently, the wild herbivore component of the "total stocking rate" (domestic + wild herbivores) may

¹⁰Table 2 also illustrates the operation of non-equilibrium systems. From 1967 to 1978, the livestock population increased 30% (to 827,751). Then it declined and 30 years later it was still slightly less than the 1967 number. The Maqin County statistics also reflect the "reporting problems" in the early years of the PRC previously alluded to. They report a 197% increase in livestock in the 10 year period from 1958-1968. However, I find it is impossible to accept such a figure unless boundaries were shifted during that period resulting in an in-migration of hundreds of thousands of head of livestock. I could not find any evidence, however, for this having occurred.

have actually decreased in some areas during the first decade or so after 1952 as a result of this and the historical disruptions mentioned earlier.¹¹

The argument that massive grassland degradation was precipitated by a rapid and precipitous increase in livestock numbers since 1952, therefore, does not appear consistent with the available data. While it is possible there may have been some growth over the past 4 decades in Goulou Prefecture,¹² the portrait of recent livestock increases rapidly bringing an ecosystem that has supported herdsman for centuries or millennia to the verge of collapse, is not supported by the evidence. It appears more likely that the current evidence of erosion, vegetation degradation and rodent damage on the grasslands of Goulou is the combined product of centuries of constant utilization by herdsman and ungulates and exposure to one of the world's harshest climates, rather than primarily an artifact of disequilibrium over the past 4 decades.

C. Current status of the grasslands.

Notwithstanding this critique, there are clearly numerous areas of the Goulou grasslands that are degraded due to erosion, black beach¹³ and rodent infestation. Regarding this, the following are critical issues for the QLDP to investigate:

1. to what extent is this degradation recent.
2. to what extent is it increasing, and at what rate(s).
3. if it is increasing, to what extent is this a function of overstocking or of climatic variation, and to what extent does it signal that the carrying capacity of the grasslands has already been reached or exceeded.

Having raised these issues, as a social scientist, I can offer no technical opinion about them. However, it is useful to remember that at one time it was almost universally claimed that African pastoralists were causing rangeland degradation and the rapid desertification of the Sahel due to their maximization strategies and overstocking. Nevertheless, while this seemed obvious to many expert observers, after a decade of meticulous in-depth measurements both on-the-ground and through remote sensing, it was scientifically established that the Sahara desert did not advance at all into the Sahel during that period, this leading to the widespread rejection of the overstocking-desertification position. The QLDP should take care not to assume current erosion and black beach degradation is recent and spreading rapidly without objective evidence.

¹¹ This comment refers to the Qinghai-Tibetan Plateau in general and not the Goulou area in particular, as I was unable to collect any information regarding when the bulk of the ungulate population was eliminated there.

¹² This was verbalized by the herders in Dari, but their perceptions are severely colored by the loss of the portion of their winter pasture to Sichuan.

¹³ This refers to the black soil left after the top layer of sod degrades (moves). It is called "sanag" (*sa nag*) in Tibetan.

Apropos this, it may be relevant to note that the Vice Governor of the Dawu Prefecture¹⁴ stated that his prefecture estimates its grassland carrying capacity could accommodate a livestock increase of 3.7% (100,000 head of livestock in sheep equivalents), and the township head of Xueshan stated that his township could handle an increase of 21,000 Su (+14%).¹⁵ Although I was unable to ascertain how either of these carrying capacities were determined, it suggests that let alone fearing impending collapse, local officials feel the carrying capacity has not yet been fulfilled, despite the erosion and rodents and the black beach.

In any case, an important task for the QLDP is to develop a monitoring strategy (ground truth and remote) that will enable it to make an objective assessment of these issues based on data collected systematically over time. Without this, it will be difficult to develop an optimum, long-term development intervention plan.

D. Decollectivization and the privatization of the grasslands

To discuss the current situation of the herders in Dari and Maqin Counties, the political/legal constraints under which they operate requires comment. The current organization of the herders in Goulou (and Qinghai in general) is the result of the decisions made at the provincial and national levels. The rise of Deng Xiaoping to national leadership at the end of the 1970s led quickly to the national decision to terminate collectives throughout China and redistribute farm land and herder's animals to individuals and families on what is called the "responsibility" system. For herders this meant that a collective's animals were divided among its member and thereafter owned by the herders. The household again became the main unit of production and the main day-to-day management unit. In turn, households were "responsible," in addition to taxes, for providing products to the government at below-market level prices based on quotas set by the government.¹⁶

In the QLDP's pilot counties, decollectivization took place between the years 1983-86. At this time the collective was replaced by "townships," and beneath them, "herders associations"¹⁷ and "cooperatives".¹⁸ Pastureland was divided between herders' associations and then within them between the cooperative units.

In Qinghai Province, the provincial government decided to go one step further than other parts of the Qinghai-Tibetan Plateau (i.e., the Tibet Autonomous Region) by opting to privatize the collective's grasslands as well its animals. Privatization of pastureland occurred first for winter pasture areas, all such pastureland being divided

¹⁴ "Tawu"—*rta bo*.

¹⁵ I will deal with the herders views separately.

¹⁶ These are described more fully in the Socio-Economic Baseline Study, p. 4-5.

¹⁷ In Tibetan, "drogmang uyünlhengang"—*'brog dmangs u yon lhan khang*. Since the QLDP already calls these "Herder's Associations," I will use that term although a better translation would better be Herder's Committees.

¹⁸ In Tibetan, "nyamlegang"—*mnyam las khang*. Rather than being cooperatives in the normal sense of the term, these are simply administrative unit situated between the herding households and the herder's association. These are described more fully in the Socio-Economic Baseline Study, p. 4.

among herding households for a period of 50 years. This land was allocated 60% on the basis of the number of livestock a household held at the time of decollectivization, and 40% based on the number of livestock it held at the time of pasture privatization (in 1986-1993). Thus, a household that had no livestock at the time of privatization still received pastureland based on its share of livestock at the time of decollectivization. Two examples of this distribution are presented in Table 3.

Table 3. Allocation of private winter pastureland to two households in the same cooperative unit in Sangrima¹⁹ Township

household	# mu of winter pasture allocated	# mu of winter pasture considered good land	# of kg. of vegetation that can grow on each mu	# of sheep units (SU) ²⁰ that can be accommodated on that pastureland	# of SU at the time of privatization
1	9494	4219.7	180	904	552
2	5452	2423	180	519	384

Table 3 reveals that the carrying capacity established for the pastureland in that cooperative unit was 4.67 SU/ mu of good pastureland. It also reveals that in both households the amount of "good" land was exactly 44.45% of the total amount of grassland allocated. And it reveals that a potential for future growth was incorporated in the allocation—a 64% animal growth potential in the first household, and a 35% livestock growth potential in the second household. This difference in growth potential is apparently the result of different patterns of growth and decline in the two households between the time of livestock division in 1983 and privatization in 1993.

Discussions with local and county officials revealed a complex process of evaluation ultimately leading to the specific divisions illustrated in Table 3. The functional unit of division was the cooperative (i.e., its households and pastureland). Meetings of the cooperative unit's herders were convened and each pasture area under its jurisdiction was graded by the members with regard to quality, i.e. whether they were all good or contained degraded segments and non-pastureland such as rivers and mountain peaks. Three levels of pastureland were established based on the per cent of degraded land.²¹ In this township, a lottery system was used to allocate households (or groups of households) to specific segments of the grassland.

Despite several lengthy discussions at the township and county levels, I was unable to determine precisely how the carrying capacities recorded in Table 3 were determined, i.e., the source of the column labeled "# of SU that can be accommodated on

¹⁹ In Tibetan, "sangrima"—*gsang ri ma*.

²⁰ "SU" is an abbreviation of "sheep unit." It refers to a system of converting all livestock into sheep equivalents—the basis for this is as follows: 1 yak = 5 SU; 1 horse = 7 SU.

²¹ A township officials gave the following estimate of these three classes: first class pasture is totally good, perhaps only 2% is wasted. Second class grassland had perhaps 25% of degraded land, and third class had perhaps 35%.

that pastureland," and the figure of 180 kg. of vegetation per mu. There was agreement that technicians were trained at the county level and sent to townships to determine the number of mu for individual household by means of maps and regulations established by the Qinghai Provincial Government, but I was unable to interview such a technician to assess how he made his decisions.

In my discussions with herders, only one indicated that he felt there was bias in the distribution process. However, due to translation problems, the nature of his complaint was unascertainable. On the other hand, there was agreement by all herders questioned that the categorization of land quality was done fairly by the herders.

The timing of the privatization of winter pastureland varied in the two pilot counties, occurring in the mid-1980s in Maqin, and in the early 1990s in Dari. We were told that the division of summer pastures is not yet officially finalized, but at the township level these appear to have been ("informally") allocated already in both counties. Consequently, the entire grassland resources of this area has been, or is in the final stages of being, allocated to individual households. For the next 50 years, whether a household's animals increase or decrease, its usufruct rights to that land are fixed and can not be altered (unless, of course, the government changes its policies).²² This exclusive usufruct right can be inherited, but cannot be sold or bought.

This decision to privatize the pastureland fundamentally changes the traditional nature of Tibetan pastoralism. While there was no single system of pasture organization, both of the major systems about which we know differed fundamentally from the new privatization policy implemented in Qinghai (Goulou). In the most common of the traditional systems, groups of nomads (in Goulou called *'tsho* (or "group")) had delimited pastureland resources, all members of the unit having the right to herd their animals on grazing sites in this territory at their own discretion (although the pasture areas were often seasonally delimited. In the other known system, an animal carrying capacity was established for each pasture area over a large territory, and individual pasture units for summer, winter and fall grazing were allocated to households on the basis of their number of animals. Every three years the total number of animals was recounted and pastures reallocated. Those whose herds had increased obtained more pasture, and those whose herds had decreased lost pastureland.²³ An essential feature of both of these systems was their inherent capacity to allow households that increased their livestock access to more pastureland.

By contrast, the new privatization policy permanently (i.e., for 50 years) fixes pasture territory to households with no mechanism for periodic readjustments on the basis of livestock fluctuations. The only modicum of flexibility in this system is the possibility that a household with too little pastureland can rent the excess pastureland of another household (within the same township). However, such leases can only be made for a term of one year. More will be said of this later.

²² This is an issue that will be dealt with later.

²³ Goldstein and Beall, 1990.

An assumption underlying the decision to privatize pastureland is that it will quickly shift the management strategies of the herders from that of maximization to a more "rancher-like" value on the protection and improvement of their livestock and pastureland. Moreover, it appears clear that if herders do not rapidly change as planned and overstocking of private pastureland arises, the government is ready and prepared to intervene. Consciousness of this potential was high among local, county, and prefecture officials, one of whom specifically indicated that townships had the authority to intervene in such cases and force such a household to sell animals to reduce its herd size. A prefectural official also indicated they will enforce livestock limits if they need to, as well as stating that discussions are in process to establish a regulation that would formally set maximum limits on households, thereby preventing overstocking. My perception of this issue is that the situation is not yet considered serious enough to warrant setting such limits, but that some set of limits and mechanisms are worked out and can be quickly implemented if events change that situation. In the Tibet Autonomous Region, livestock limits are already in place, although privatization has not occurred.

The privatization experiment, as indicated above, assumes that herders will take steps to protect and improve their property. To this end, the Qinghai government has developed a package of new inputs for the herders, and, as we shall see, is investing large amounts of capital (mainly provided by the central government) to make these available to them.

D. 1. The Qinghai Pastoral Development Plan

In the decade since decollectivization, the Qinghai government has launched a four part pastoral development program that complements the privatization program and sets out for herders the innovations recommended to utilize optimally their new "privatized" resources. These innovations are:

1. the fencing-in of roughly 500 mu of the best winter pastureland to provide forage during the lean months of spring (or when livestock appear weak and in need of more food during the senescent period).
2. the construction of animal shelters to be used during the harshest times of winter and spring.
3. the sowing of 5-10 mu of fodder in traditional corrals during the summer when these are not used by livestock. Oats is the recommended crop.²⁴
4. construction of permanent dwellings for the herders at their winter pasture site.²⁵

²⁴ Five mu of oats yields roughly 500-600 jin of hay and requires about 30 jin of seed. Estimates of the cost of this seed varied from 1.5 yuan/ jin to 4.5 yuan per jin.

²⁵ This component has just been dropped from the subsidized program and herders henceforth will have to build houses with their own funds.

A Goulou prefecture official indicated that about 30% of the prefecture's households have obtained all four items, and that by the end of the century this will increase to 70%. The costs of all these innovations has varied markedly depending on the year, but in 1996, these four items could easily cost 30-40,000 yuan per household if they all were done at once. Such a capital expenditure is well beyond the economic capability of rural peasants such as the herders of Goulou, so the Qinghai Plan also includes the provision of funds to assist herders to acquire these inputs, directly as subsidies and indirectly as low interest loans. Earlier survey work (Socio-Economic Baseline Survey) found the level of investments to be modest,²⁶ but over the past few years the scale of this subsidization has escalated to levels involving millions of U.S. dollars (USD) just in the QLDP's pilot areas—in fact, just in Dari County. The Vice Governor of Goulou, for example, stated that 1,800 families in the prefecture are slated to receive fencing and winter animal shelter inputs this year.

There seem to be several intersecting reasons for this unusual allocation of funds to obscure Tibetan herders.

1. Qinghai Province is seeking to increase its economic productivity and catch up, at least to an extent, with the tremendous advances China's east coast provinces have made. Since a large proportion of Qinghai's total territory is high altitude alpine grassland, it is natural for it to invest funds to increase the production and quality of animal products such as meat, skins, and wool.

2. Since the 1980s, China has become more ecologically sensitive, and one of the more visible areas of concern is the future of the Qinghai Tibetan Plateau, i.e., the danger that it is being destroyed. Therefore, it was important to take measures to prevent excessive overstocking and environmental degradation.

3. Chinese scientists and cadre consider the traditional Tibetan pastoral system backward and irrational because of its emphasis on maximum livestock numbers. Consequently, transforming that system was widely seen to be necessary to accomplish the goals of item 2.

4. The central government (at the 3rd Meeting of the Tibetan Working Committee in July 1994), established a new policy regarding the Tibet Autonomous Region and the ethnic Tibetan areas in neighboring provinces like Qinghai. The goal of this policy is to raise the standard of living of all Tibetans, and the central government has committed extensive resources to achieve this end.

This conjunction of priorities and assumptions appears to have persuaded the Qinghai government to develop the privatization plan and to rationalize it by also providing the individual herders funds for implementation. The new national policy for

²⁶ The Socio-Economic Baseline Survey of 1995 reported that in Goulou, available funds are only enough to accommodate for 5-6 households per township per year, and that the cost of all 4 are over 20,000 yuan, the herders having to pay 70%.

Tibetans appears to have provided the financial resources that are allowing Qinghai to escalate its implementation.

The Qinghai program, therefore, implicitly seeks to shift pastoralism from a non-equilibrium to an equilibrium system by bringing population and resources into permanent balance. It seeks to do this by controlling or substantially reducing climatically driven mortality through fodder cropping, winter shelters, enclosed winter pastures and, to a lesser extent, the reconstruction of degraded pasture sites and the reduction of rodents/pikas. It appears to assume a potential for moderate livestock growth (carefully monitored and controlled by the government) and thus increased production. The program, if successful, will convert open-rangeland herders into subsistence ranchers who produce a portion of their output for subsistence (as in the traditional era), and the rest for sale to government and private sources. The herder's perspective on this will be discussed below.

Although this sounds like an extremely radical transformation, in another sense, traditional Tibetan pastoralists were actually already a kind of proto-subsistence rancher. Not only did traditional herders engage in extensive trade (e.g., grains and tea and various manufactured items),²⁷ but the technological innovations of the Qinghai program were already incorporated to some degree in their management strategy. Let me elaborate:

1. Fencing—Tibetan pastoralists traditionally identified spring birthing areas that they tried to leave ungrazed until then. There were no fences, but the idea that it was beneficial to set aside an area for use at the time of lambing was part of their traditional system.
2. Animal shelters—In winter, sheep and lambs traditionally were crowded into walled (albeit uncovered) corrals at night to reduce cold stress. In the higher altitudes of Tibet (and in Goulou during the coldest days of the year), newborn lambs were immediately dried off with dirt. In the coldest areas of Tibet, for a few weeks after birth, lambs were placed at night into small boxes constructed from dung or stone or sod bricks that were covered with a skin or woven cloth to provide a warmer environment than the corrals.
3. Cultivation of forage crops—Tibetan nomad groups understood the efficacy of storing some hay for winter/spring, and natural grassland areas appropriate for hay-cutting were often set aside for harvesting in fall when the grasses were at their maximum height.²⁸

D. 2 The herders' general attitude to the privatization and development plans

The herders I talked with about this all were in favor of the 4 development components of the Qinghai Plan, particularly houses and fences. Those who already had a fenced-in area generally wanted another one, and those with none wanted their first one.

²⁷ In the area we studied in the Tibet Autonomous Region, 50% of the herders' diet was derived from grains.

²⁸ Unfortunately, I did not think to ask whether items 1 and 3 were also done in Goulou traditionally, but they were in other areas of the plateau.

The herders also wanted seeds for cultivating fodder in their corrals, and in some cases, also for reseeding degraded parts of their pastureland.

However, not all herders were in favor of privatization. Several individuals specifically indicated they preferred the open pasture system, but they were poor and had none of the fences or other inputs of the Qinghai Plan. Others smiled awkwardly and said they do not know which they prefer, which conveyed to me to mean they preferred common pastures but did not want to criticize the government in front of foreign strangers. One of the poor herders qualified his preference for common pasture saying that if he could get fences he would prefer private pastures. A feeling expressed by several herders was that privatization is fine if you have enough pastureland for your animals but if you do not, it is problematic (section 8 discusses problems inherent in the program). Moreover, I was not able to assess what the herders would have done had they initially been given the choice whether to embark on privatization or retain an open pasture system. Nevertheless, at present, the current development program appears to have the strong support of most herders, and those who have not yet received its inputs, clearly desire them.

E. The pilot counties: Dari and Maqin

Sangrima, Wusai and Jianshe townships (in Dari County) and Xueshan and Lajia townships (in Maqin county) were visited. The three Dari counties and Xueshan seem polar opposites in their wealth, stage of implementation of technological inputs, and the attitudes and aspirations of the herders and officials. Lajia, appeared to fall between them.

E.1. Dari County

The herder development program in Dari.

Dari county is the poorest county in Goulou prefecture and is classified as one of the poorest counties in the PRC. The development program there started late, only in 1990 but calls for 80% of the Dari households to receive fences by the year 2,000. Table 4. reveals the progress that has been made to date and the cost of the innovations.

Table 4. Expenditures for fences in Dari County, 1990-95.

year	# fence sites built	# mu fenced	total investment in yuan	cost of fences (yuan / mu)	government investment in yuan (%)	private investment in yuan
1990	35	20000	168000	8.4	68725 (41%)	99275
1991	8	10000	70000	7	45396 (65)	24604
1992	70	35000	245000	7	210700 (86)	34300
1993	80	40000	1704640	42.6	1278430 (75)	426160
1994	90	33000	1225350	37.1	1041548 (85)	183802

1995	114	32500	1396500	43	1187025 (85)	209475
total	397	170000 ²⁹	4809490	24.2	3831824 (80)	977616

Table 4 reveals that the government has invested almost 4 million yuan (\$473,000 USD) in fencing since 1990 as direct subsidy. This accounted for 80% of the total cost.

Table 5 presents the statistics for the construction of animal shelters.

Table 5. Expenditures for animal shelters in Dari County, 1990-95.

year	# shelters built	total investment in yuan	cost per shelter in yuan	government investment in yuan (%)	private investment in yuan
1990	0				
1991	8	44640	5580	29016 (65%)	15624
1992	52	290160	5580	189604 (65)	101566
1993	80	446400	5580	334800 (75)	111600
1994	90	362700	4030	308295 (85)	54405
1995	113	420360	3720	312975 (75)	107385
total	343	1564260	4560	1174690 (75)	389570

The number of shelters reported in Table 5 is somewhat misleading since most of the ones built in the earlier years were converted into homes. Nonetheless, the government's share of the cost of these was over 1 million yuan. When this is added to the fence expenditures, the total spent by the government on the program in Dari over the past 5 years totals just over 5 million yuan (roughly \$618,000 USD).

Table 6 presents data on reseeding areas of black beach during the 1990-1995 time period.

Table 6. Government sponsored reseeding activities in Dari County, 1990-95.

year	# sites planted	# mu cultivated
1990	0	0
1991	8	40
1992	52	260
1993	30	400
1994	90	450
1995	72	360
total	364	1870

The total investment for reseeding during the five year period was 69,000 yuan, and the government's share of this was 55,200 yuan.³⁰

²⁹ An official in the county Animal Husbandry Bureau said that 225,800 mu have been fenced and that this represented 1.07% of the total area.

³⁰ These tables were compiled from Dari County records.

In addition to these expenditures, county records show that 2.5 million mu have been treated to eradicate rodents at a cost of 192,000 yuan.

The plan for this year calls for new style shelters³¹ whose roofs are 1/2 polyurethane together with 250 mu of winter pasture fencing for a total of 400 households. These will be divided equally between Sangrima and Jianshe townships because neither had been targeted for development inputs in prior years. The total cost of this plan is 6,340,000 yuan and the government's share is 3,760,000 yuan (60%). According to the tentative plan, the cost per household (or household group) will be 15,850 yuan, although the funds for this have not been finalized and these amounts could change. Adding this future expenditure to the previous ones, the total amount spent by the government in its herder development program in Dari County over the past six years is almost 9 million yuan or \$1.1 million (USD).

As impressive as this outlay is, Dari County contained 3,889 households in 1996, so the total fencing and shelters (let alone houses) is nowhere near completed. If we assume that a number of shelters and fences are really for 3 or 4 households herding together, there are still roughly 1,000 (households or household units) in need of fencing and animal shelters, so the government will have to invest another 9+ million yuan, not counting inflation. That is over \$1 million USD, and this generally would still provide only half of the recommended fenced-in land.

Meanwhile, the amount the herders have paid out for these innovations over the past six years is also staggering—4,037,186 yuan. These expenditures were mainly generated through low interest (2.8-3%) five-year loans, although it was not clear how much individuals families had to put up themselves in cash as a down payment. It appears, little to none, although I could obtain no figures on that. In the 1996 plan, all of the herders' share will be generated through five-year loans from the Agricultural Development Bank, the loans being guaranteed by the Dari Meat Slaughtering Factory (and indirectly the Township and its Herder's Associations).

E.1.2 Dari herder perceptions of the state of the grasslands and their livelihood

A striking feature of virtually all of the interviews I conducted in Dari with officials and with herder families, was that when asked what they see as their main problems, virtually all said that there was not enough pastureland and/or that there was too much back beach and rodent degradation.³² The overwhelming impression these interviews conveyed was that the herders were concerned about their future because of the shortage of good grassland. The herders feel that the high animal mortality they are experiencing is caused by this. The herders in Dari, therefore, appear pessimistic and worried about the future.

³¹ The new-style winter shelters in Dari are slated to be 60 sq. meters (smaller than the ones in Maqin county) and are estimated to cost about 7800 yuan and hold about 100 ewes or 50 ewes and their lambs.

³² One old man who had lived his whole life in his current valley, however, thought there had been very little change.

Although these herders expressed a strong desire to acquire winter pasture fencing, there was frustration regarding reseeding black beach areas and trying to eradicate rodents. Most herders who had participated in reseeding or eradicating attempts felt that these had been futile or of only minor use. Nevertheless, they understood that improving the quality and productivity of their pastureland was essential for their future livelihood, and supported the concept in principle. My impression is that herders would welcome and support QLDP initiatives in these areas. The head of Jianshe Township conveyed his desire for grassland reconstruction as follows:

The biggest problem we face is grassland—it is too few, and the areas of black beach are too big. ... The main way to solve the problem is to make the people have more good pastureland. All work here should be to focused on making the grassland better. ...

These pessimistic views appear to support the imminent collapse position, but actually have a special historical origin. Dari county is unique in Goulou Prefecture in that it experienced a major loss of 1,067,000 mu of its winter pasture to Sichuan somewhere around 1976.³³

The history of this incident dates back to the first decades of the 20th century when the nomad chief of the adjacent Sichuan border area gave these 1 million mu as a dowry to the Goulou (the Machenbum tsho³⁴) who were living in what is now the townships of Pöngor döma and Pöngor mema.³⁵ In 1975-76, a fierce shooting battle occurred over who had rights to this pasture area, the Sichuan herders apparently moving into these areas to reclaim the pastureland. The end result was that around 20 Sichuan nomads were killed or wounded by the Goulou herders. The Goulou apparently had one fatality. Beijing intervened in the dispute, and in 1976 decided the case in favor of the Sichuan nomads, ceding the land to them.

That left the two Dari townships that had lost land without enough winter pasture, so the Qinghai government decided that the rest of Dari County would have to readjust their pastures to assist those townships, in essence ceding parts of their pastureland to the two townships. Dari County apparently argued that they could not afford to absorb such a loss alone, proposing that the readjustment should be distributed throughout all of Goulou Prefecture, not just their county. This failed and overnight, Dari County lost 4.8% of its total pasture area and 6% of its functional pastureland (i.e. pastureland excluding degraded areas).³⁶

This historically unique event appears to be the main reason Dari herders today feel they do not have enough pastureland and their pastureland is rapidly becoming

³³ One township leader gave a figure of 8 million mu of lost pastureland, but both prefectural and county level officials reported the same figure of 1,067,000 mu so I have used it.

³⁴ Tib. *rma chen 'bum 'tsho*.

³⁵ Tib. *dpon skor stod ma* and *dpon skor smad ma*.

³⁶ These percents are based on a 1986 survey of the county that recorded 21,022,800 mu for the entire county and 16,750,000 for the non-degraded pasture. I added the lost area to calculate the percent of the loss.

degraded. Similarly, the 14.6% decline in livestock reported in Table 1 is likely to be a reflection of the loss of this winter pasture, rather than a reflection of the imminent collapse of the entire ecosystem.

E.2 Maqin County

The herder development project in Xueshan Township³⁷

If Dari County reflects an ecosystem with too little pastureland, too much (or increasing pasture degradation), and too few development inputs, Xueshan reflects the opposite—a township where the inputs are widely in place and the herders confident and economically doing well. Xueshan's per capita income in 1995 was 2,736 yuan, the highest among the Goulou prefecture's 51 townships.³⁸ Whereas Jianshe's township head said that 73% of his households were classified as poor, in Xueshan the township leader said there were no households who were classified as poor. Virtually every household has a dwelling and fencing in their winter camp site, and 47% of the total useful pastureland is fenced (66599 mu of 141,400 mu). Roughly half of the households have winter animal shelters. The number of head of livestock per person was 55, and the number of SU per person was 113. Corral planting of oats is the norm and there were 330 corrals at the end of 1994 for the township's 228 households.

One of the reasons for the high income in the area, and the main reason its development is so far ahead of townships like Sangrima and Jianshe in Dari County, is that it derives an extremely lucrative income from caterpillar fungus.³⁹ According to township officials, each year about 3,000 outsiders come to the township to dig the fungus, each of whom pays a fee of 700 yuan. The annual income from that enterprise is, therefore, about 2.1 million yuan. The township takes 5% of these fees, the rest going to the different Herder's Associations' "Common Fund" that is used to help pay for, among other things, development projects. For example, of the 730,800 yuan invested in new fences in 1995, only 32.3% (236,000 yuan) was a grant from the government. The remainder came from the herders (41.3 %—302,000 yuan) in lump sums rather than as low interest loans, and from the Common Funds (26.4% —192,800 yuan).

E2.1 Xueshan herder perceptions of the state of the grasslands and their livelihood

In contrast to the fear and uncertainty that was expressed by herders in Dari County, herders and officials in Xueshan were confident and secure. Their normal initial answer to my question of what are the main problems you face was "none." Nevertheless, township officials expressed concern that several parts of their summer pasture area were deteriorating due to extensive rodent and grasshopper⁴⁰ damage. In general, however, the grassland situation is seen as good and herders are engaged in fencing in more of their

³⁷ The Tibetan name for Xueshan is "gangrima"—*gangs ri ma* (snow mountain).

³⁸ Since the average household size was 5.1 in Xueshan, the average household income was 13,593 yuan per year. By comparison, a middle school teacher earned roughly 8400 yuan per year.

³⁹ Tib. "yartsa günbu"—*dbyar rtswa dgun 'bu*.

⁴⁰ Tib. "bu jagja"—*'bu jag jag*.

land to be able to better manage and use it to control winter/spring mortality. The investment in large, concrete/polyurethane shelters is part of this same approach.

These heavy investments, moreover, appear to be having an impact as offspring survival is much higher in Xueshan than in Dari county, and somewhat higher than the overall prefecture average. For example, in Xueshan in 1995 (the end of 1995), 47% of the female adult yak gave birth and 94.2% of these survived. For sheep, 68.9% of the ewe gave birth and 91.2% of these survived. The previous year in Xueshan, 96% of the yak calves survived and 91.6% of the sheep.

By contrast, over the entire prefecture, only 87% of the yak calves survived and 69% of the lambs survived in 1995, and in 1994, 91.3% of the calves and 80.4% of the lambs survived. In Dari County, the comparable figures for 1995 were still lower—74.3% of the calves and 52.2% of the lambs survived.⁴¹

Table 7 presents survivorship data for Sangrima township. As one of the better townships in Dari County, the very low lamb survivorship in comparison to Xueshan is striking.

Table 7. Fertility and mortality data for Sangrima township, 1993-96⁴²

year	species	# females	# births (%)	# offspring survive (%)
1996	yak	9909	4478 (45.2)	3542 (79.1)
	sheep	15014	11581 (77.1)	4999 (43.2)
	horse	208	39 (18.8)	34 (87)
1995	yak	9665	4683 (48.4)	4085 (87.2)
	sheep	15433	10222 (66.2)	4605 (45)
	horse	176	46 (26.1)	46 (100)
1993	yak	8671	3976 (45.9)	3587 (90.2)
	sheep	—	10658	6176 (57.9)
	horse	—	—	—

Sangrima Township records also included statistics on causes of mortality for these same years that may be of use to the QLDP so I am including them in Table 8.

Table 8. Causes of offspring mortality in Sangrima Township, 1995 and 1996.

year	species	# births died	# died from disease	# died from snow	# killed by wolves	# died from famine	# missing	other
1996	yak	939	386	302	56	178	2	11
	sheep	6582	642	5315	288	262	25	50
1995	yak	598	276	260	27	9	12	14
	sheep	5617	472	4771	169	95	62	48

⁴¹ These figures were collected from prefectural, county and township official records.

⁴² Data are from Sangrima township records. Statistics for 1994 were missing.

In sum, Xueshan on the whole represents the epitome of the new Goulou subsistence rancher. Committed to modernizing their production by putting in more fences and shelters and planting oats/barley for supplementary fodder, they appear to have reduced livestock mortality. They are in the process of making the full transition to an equilibrium system where herd composition and size will be consciously balanced against their private grassland resources.

E.2.2 Lajia⁴³ Township

Lajia township, while prosperous, appeared far less developed than Xueshan. However, because senior township officials were not present when we arrived there, their records could not be obtained. Nevertheless, my general impression is that it falls between Xueshan and the Dari County townships in development and wealth.

Comparative data on livestock increases in Xueshan and Lajia were, however, obtained from the county seat, and these reveal higher growth in Lajia than in Xueshan (see Table 9).

Table 9. Livestock and human population statistics for Xueshan and Lajia, 1989-1995.

township	year	total # livestock	# horse	# yak	# sheep	# people
Xueshan	1989	54185	835	14151	38736	1031
	1990	58803	851	14838	42654	1065
	1991	60903	883	15098	44508	1029
	1992	60492	884	15247	43981	1031
	1993	60006	909	14016	43787	1056
	1994	61066	942	15154	44667	1076
	1995	60465	916	14593	44956	1119
% change, 1989-95		+11	+8.8	+3.1	+16.1	+8.5
Lajia	1989	98888	3426	49863	45537	3986
	1990	107314	3286	52157	51794	4029
	1991	109568	3099	50425	55980	3974
	1992	112159	3032	51935	57153	3984
	1993	115454	2847	53043	59530	4009
	1994	118564	2844	54295	61425	4043
	1995	122590	2769	57338	62483	4209
% change, 1989-95		+24	-19.2	+15	+37.2	+5.6

This table reveals that Xueshan, despite its greater advancement along the path of pastoral development and its higher offspring survival rates, experienced less than half of the livestock growth of Lajia over the six year period. This appears to reflect the need of

⁴³ Tib. "Ragya"—*Rwa rgya*.

Xueshan herders to sell more animals in order to pay for the innovations they have implemented.

F. Conclusions

The desire of herders in the two pilot counties is for fencing, fodder production, grassland restoration, the elimination of rodents/pikas, and the improvement of winter offspring survival rates. I suggest that more emphasis be placed on identifying and remedying the grassland and rodent problems in Dari County since it is clearly struggling as a result of the loss of winter pasture to Sichuan and sorely needs to increase the productive of its remaining pastureland.

The overall herder development plan being implemented in Goulou Prefecture is a modification of the standard "Western ranching" model, the goal of which is to privatize communal rangeland, fence pastures, increase commercial meat production and establish optimum stocking rates so as to preserve the viability of the grasslands and enhance the standard of living of the herders. Although the success of this program is impressive in areas like Xueshan, there are a number of serious problems that make its long-term viability problematic.

Incomplete implementation

If all winter pastureland is not enclosed because the high cost of fencing places it out of the reach of poor households, there is a danger that herders with fences will (illegally) use parts of other herders' unfenced pastureland for grazing their own livestock. If this became widespread, it could increase the per animal pressure on the unfenced pastures and precipitate new pasture degradation.

Human Population Growth

Local herders and officials were not concerned with human population growth in Goulou Prefecture. However, the size and growth dynamics of the human population is a critical component of any ecosystem, and there is reason to raise concerns about this in Goulou.

Goulou officials indicated that the official rule on human reproduction in Goulou is that herders can have three children. However, this rule is not being enforced since there is a general belief that the very harsh climate of the area produces high rates of infant and adult mortality and that this is inhibiting high population growth rates.

Data collected by the Socio-Economic Baseline Study reported that the population of Goulou Prefecture has increased at an average rate of 1.5%/ annum between 1952 and 1994. That represents a doubling time of 47 years.

The Socio-Economic Baseline Study also reprinted a graph of Goulou Prefecture's population evolution from a Chinese journal. It indicated that population doubled between the years 1962 and 1986 (although there is some question whether the graph is

reproduced to scale and the original source of the data was not available to me). These data reflect a very high growth rate of 2.5%/annum.

On the other hand, statistics collected during my field trip indicated much lower growth rates. For example, the human population in Dari County increased only 7.6% over the past 12 years (from 17,355 in 1983 to 18,677 in 1996). That is only a 0.5%/annum increase. Other data from Xueshan and Lajia Townships revealed increases of 8.5% and 5.6% respectively for the 6 years from 1989-1995. That is roughly a 1.4%/annum increase for Xueshan and a 0.9%/annum increase for Lajia.⁴⁴

None of these statistics, it should be indicated, allow us to identify the net gain or loss due to migration (for example, brides going to another township at marriage), and the county statistics do not differentiate herders from townfolk.

Although I did not conduct a systematic fertility survey, the households I visited all had large numbers of children. For women 30-39, the average number of children living in their household was 2.7, for women 40-49, the average was 3.9, for women 50-59 it was 2.7. Moreover, from our conversations, it was clear that some of these women had other children who had already married and separated. Based on these data, a growth rate that increases the population by 50% every generation seems plausible—but also a problematic source of instability (as will be discussed in 8.3).

Pasture as a fixed resource: a prescription for catastrophe?

The Goulou privatization program has replaced the flexibility of the open pasture system not with the alternative flexibility of private pastures that can be bought and sold as a commodity according to a western ranch management strategy, but rather with private pastures that are a permanently fixed resource that can not be augmented. The glaring absence of a mechanism for transgenerational reallocation of privatized pastureland appears a serious flaw in the program that is likely to undermine its long-term effectiveness. Let me illustrate the inherent contradiction this lack of flexibility creates by means of a simplified hypothetical example. Since the local demographic data suggests that most households have at least three children residing with them, I will use a conservative hypothetical household with 5 members—2 parents and three children.

In the natural developmental cycle of Goulou families, one of the three offspring will marry and remain with the parents while the other two will set up their own households. This means that the pastureland initially awarded to the household will have to be divided into three portions.⁴⁵ Let us assume that this household before fission was a

⁴⁴ Because of the negative impact high human population growth causes in an ecosystem, such inconsistencies should be resolved, either through a more intensive investigation of local records, or by conducting a population survey of Goulou herder women. Such a survey could establish levels of fertility and mortality, assess attitudes toward family planning and family size, and determine the extent to which women are experiencing unwanted pregnancies.

⁴⁵ Chinese privatization law specifically prohibits the alienation of land from the household to which it was given. However, informal internal division is permitted, and the new households may opt to manage their own livestock independent of the main household.

middle class family with 100 yaks and 3,000 mu of land, and that this was the maximum number of yak that amount of pasture could support.⁴⁶ When partition first occurs, this has no effect on the pastureland stocking rate since the three new households will have divided the pastureland as well as the animals in consistent proportions. Thus, with equal division, there would be three households each with 33 yak and 1,000 mu. That number of yak, of course, would also be the maximum each pastureland unit could sustain.

In the original household, there were five members so the number of yak per person was 20. In the two new households, there were 2 members (the couple) so each had only 16 yak per person. Over the next five years, however, if we assume that the women in each of the two new households will give birth to 2 children, the per capita number of yaks drops to just a little over 8. And if we further assume that after 10 years there are 3 children (5 household members), the average drops further to just a little over 6 yak per person. For households with 4 or 5 children, the problem of transgenerational fission becomes truly daunting.

If the new household adhered to the carrying capacity limit, as indicated above, it would quickly relegate itself to the subsistence level socio-economic stratum and would have little or no ability to save and invest. If, on the other hand, it sought to restore the economic status of its original household (i.e., 20 yak per person or 100 yak for their household), as its herd increased and reached 100, the stocking rate on their land would be 150% greater than that on the original household's land. Thus, the absence of a mechanism for pastureland redistribution creates a situation where overstocking is a likely outcome, or if the government does not permit such overstocking, poverty.

Are there alternatives scenarios that would mitigate either of these hypothetical outcomes?

A loosening of the restrictions on leasing pastureland would be one such possibility. If households that are able to increase their herd size could lease pastureland for long periods, this would provide some needed flexibility. Leasing is being used to an extent in Wusai, but there is a one year limit on such agreements, and this gives the successful household no motivation for improving the leased land. As it stands now, the leasing regulations are unlikely to solve the problem.

Alternatively, the structural inflexibility could be compensated for by sharp increases in the price of meat and other animal products. If prices increased 150%, the fewer yak per capita in the new households would be functionally equivalent to those of original household. This kind of projection, however, seems totally unrealistic.

A different kind of alternative would be for parents to adopt a rule of primogeniture, allowing only one son to inherit the entire estate while the others leave the

⁴⁶ The idea of a fixed "carrying capacity" for pastoral systems like this is rather arbitrary since the carrying capacity actually varies each year depending on the amount and timing of rainfall in summer. In the nomad regions of the Tibet Autonomous Region, a different carrying capacity is established each year based on the amount of vegetation.

pastoral economy and seek their livelihood in the county and prefectural towns. However, it is illegal to prevent children from acquiring a share of their parents estate (so long as they stay in the same township) and new legislation would be required for it to become institutionalized. Moreover, it is unrealistic to think that there will be jobs for the excess herders in the adjacent towns. Such jobs are not available now, and unless a major development effort is launched in the coming years to rectify this, there is no likelihood that they will be created over the next decade. An effort should be made to develop such alternative sources of livelihood, but even if they are created, Tibetan nomads will have difficulty competing for these jobs with Hui and Han unless affirmative action is utilized and training programs mandated.

Alternatively, the government could shift its spending priorities from shelters and fencing to restoring and enhancing pastureland. As the process of household fission occurs, herders will inevitably strive to improve the quality of their fixed pastureland so as to be able to stock more livestock per unit. Large-scale grassland enhancement programs focused on restoring black beach areas, developing and testing higher yielding fodder crops, utilizing cross fencing techniques and eliminating rodents/pikas will be critical to the future success of the herders given their inability to buy and sell pastureland.

However, past government efforts in this arena have not proved highly successful as the following answer of a high official to my question "wouldn't it be better to spend all this money on improving the grasslands rather than fences and shelters" illustrates:

Yes, the program is expensive, but it is realistic. It can be accomplished whereas the grassland experiments are unrealistic. Scientists have tried to plant grass on black beach several times but even if it grew for three years, the end result was that the soil itself was lost and we ended up with bedrock. Also the attempts to eliminate the rodents failed, so these programs are too unrealistic. It is not appropriate to spend scarce funds on these. It is better to fence.

The problem of transgenerational household division is clear to herders and officials alike. Officials all agreed that this is a very serious issue with no obvious answer. Two said that new regulations are being considered, but they had no solutions as to how this could be accomplished given the firm prohibition against buying and selling pasture. Another said it was a difficult issue to be sure, but it was the problem of the herders not the officials. All herders agreed it was a terrible problem, and some indicated that they have urged the government to develop a system with greater flexibility with regards to pasture exchange. Some said they preferred a common pasture system because of this.

There are no easy answers to this contradiction, and it seems likely that the current system will have to be modified to allow more flexibility. However, the dilemma posed by human population growth and generational household fission highlights the need for an approach to the Goulou grasslands that integrates social, economic and scientific/technical interactions. Simply advocating fencing and shelters will not create a stable equilibrium ecosystem without simultaneously addressing the problems of high

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fertility, lack of alternative employment opportunities and the restoration of degraded pastureland.