China's Rangelands under Stress: A Comparative Study of Pasture Commons in the Ningxia Hui Autonomous Region

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ABSTRACT

China's economic reforms have exacerbated the problems of over-grazing and desertification in the country's pastoral areas. In order to deal with rangeland degradation, the Chinese government has resorted to nationalization, or semi-privatization. Since the implementation of rangeland policy has proved very difficult, however, experiments with alternative rangeland tenure systems merit our attention. In Ningxia, in northwest China, local attempts have been undertaken to establish communal range management systems with the village as the basic unit of use and control. Some of these management regimes are under severe stress, due to large-scale digging for medicinal herbs in the grasslands. This digging has resulted in serious conflicts between Han and Hui Muslim Chinese, during which several farmers have been killed. It is against this backdrop that this article explores the institutional dynamics of range management in two different villages.

RANGELAND DEGRADATION AND LAND TENURE IN CHINA

The problems of rangeland degradation, over-grazing and desertification have become issues of serious concern for the Chinese government since the start of the economic reforms in 1978. The central government has recognized the environmental problems sparked by the economic reforms, as well as the widening rural–urban income gap, which is aggravated by a degraded ecological environment. Dealing with these problems is regarded as essential to solving rural poverty in the long term. Rangeland degradation and desertification occur mainly in the arid, poverty-stricken areas in the northwest of China (Xinjiang, Qinghai, Gansu, Ningxia and Inner Mongolia). To date,

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the Chinese state has attempted to halt the decline of rangeland resources mainly through technical measures, such as aerial sowing (by plane), the construction of man-made ranges, and the sinking of wells. However, due to the difficulties encountered in the implementation of rangeland policies, officials have gradually become aware that technical measures are only part of the solution, and that rangeland management can only be successful if technical, legal, and institutional problems are addressed simultaneously.

One of the pressing issues that awaits a political solution is the unclear tenure system for rangelands — the heritage of a collectivist past. During the reign of Mao Zedong, customary rights structures for rangeland were delegitimized and supplanted by the institutional system of the people's communes. Although ownership rights were formally vested in production teams (an administrative unit below the commune), the pastures were open to all. This practice of uncontrolled grazing persisted after the demise of the communes in the 1980s, and has given way to free-riding as the most natural grazing strategy.

In Chinese political and academic circles it is felt that a mix of population pressure, over-grazing, and a lack of responsibility on the part of pastoralists towards rangeland has led to a 'Tragedy of the Commons' situation. In the process of trying to solve this free-rider problem, or 'eating from the common rice-pot' (*chi da guo fan*) as Chinese say, a heated debate over land tenure structures has emerged.

The Academic Debate on Common Property

How natural resources can be managed without being squandered has been the subject of much academic debate, which touches on questions such as sustainability, the means to evoke and guide collective action, and land tenure arrangements.

One position — that supervision and coercion external to the direct group of users of a natural resource is vital if its destruction is to be avoided — is inextricably linked with the name of Garrett Hardin. The title of his article, 'The Tragedy of the Commons', has become shorthand for the idea that people who make use of a natural resource without external guidance will tend to free-ride. In Hardin's words: 'Freedom in a commons brings ruin to all' (Hardin, 1977: 20). Following this argument, some have deduced that there are only two possible solutions for the management of a natural resource: (1) privatization of the resource by allocating property rights to individuals through a free market (for example, North and Thomas, 1977; Picardi and Siefert, 1976); and (2) nationalization or the establishment of an external agency with full authority for the regulation of the resource (for example, Ehrenfeld, 1972; Ophuls, 1973).

Since the 1980s, however, a rapidly increasing number of scholars has fought for the acknowledgement of a third option: a (spontaneous or

guided) collective action from within the community of resource users. This position, now known under various names such as 'common property regime', or 'common pool resource management', evolved into a widely-held opinion on natural resource management in the 1990s. The literature on common property contests the options of privatization and nationalization on several grounds.

It is necessary at this point to clarify some concepts. A natural resource regulated by a so-called common property regime is frequently confused with a situation of 'nobody's land' or 'open access'. In fact, Hardin was actually not writing about 'common property' as he called it, but about 'open access'. In order to distinguish clearly between the two notions, it is necessary to define the term 'property'. Using Bromley's definition: 'Property is not an object such as land, but rather is a right to a benefit stream that is only as secure as the duty of all others to respect the conditions that protect that stream' (Bromley, 1991: 2). In effect, common property can be regarded as private property for a group — as opposed to those who are excluded from the resource in use and decision making — with all group members having rights as well as duties regarding the resource. A common property *regime*, therefore, is a body of rules that governs the use and management of a resource as a property by a group of users. The road to destruction envisaged by Hardin rests on the proposition that an individual's choices are made independent of the expectation of others: it does not deal in any way with the concept of uncertainty about each others' choices. In a common property setting, it is impossible for one individual to act fully independently of the rest.[1]

Both privatized and state-controlled regimes are very expensive, as they involve high transaction costs (costs other than production costs, needed for information, contracting and enforcement). In the grazing context, for example, these include the expenses for fencing in pasture, the administration of a cadastre, and the need to patrol vast rangelands. Leaving the resource to the regulation of the market through privatization also involves externalities and wealth effects, which will differ considerably as one party buys out the right of another to use the common property (Bromley, 1991: 19).

Those who claim that resources such as rangelands cannot be used sustainably through common property arrangements, disregard the effectiveness and strength of traditional customary rights systems and newly established community-based management systems. Wade, among others, has documented instances in which local communities developed successful systems for managing natural resources (Wade, 1987: 102). The critical question to be answered is: What are the conditions under which successful management

1. The issue of uncertainty has been treated in Game Theory as the 'assurance problem'. The game starts from the principle of co-operation and not conflict. The participants of this game correlate their expectations, which assures that co-operation will be the final outcome.

of a resource as a common property becomes feasible? Institutional analysis provides an important analytical tool for the study of common property (see Kiser and Ostrom, 1982; Nicholson, 1988). Within this field, Oakerson (1992) has developed a conceptual framework which is specifically meant for research on common property: a number of studies have been conducted using this research instrument (Bromley, 1992; PCPRM, 1986). In the village case-studies which follow, I will use Oakerson's framework, mainly employing his notion of the 'decision-making arrangements' between the users of the resource.

These decision-making arrangements consist of the 'operational rules', and the 'rules about rules'. The former regulate the relation between the users of the resource. These rules can be divided into boundary, allocation, membership, input and penalty rules. The 'rules about rules', or meta rules, prescribe the procedures to be followed when any changes in the operational rules are required, and generally pertain to the relation between the users and the appointed leaders of the management system.

The discussion about property rights in China flares up now and then in political and academic circles. The participants in this debate can be divided into three groups: (1) the proponents of rigorous land tenure reform through privatization of rangeland; (2) the champions of outright nationalization; and (3) those who argue for an improvement of the current property rights system under which individual or joint households can lease user rights of state and collective rangeland for a period of thirty years (see Cheng and Tsang, 1995/96: 44–74; Keith, 1994: 121–42; Reisch, 1992: 15–20; Zhang et al., 1996; Zhou, 1993).

Within the last group, some have proposed that collectives or associations of pastoralists should be granted ownership and user rights. Members of the first and second groups argue against this on the grounds that common use and ownership leads to free-riding. At the present stage of a 'socialist market economy with Chinese characteristics' it seems unlikely that the government will opt for anything other than sustaining the current land tenure arrangement. Seen in this light, experimentation with alternative land tenure forms, rather than nationalization or semi-privatization through lease, is essential. Such experiments are particularly important when one considers the sheer impossibility of nationalization, and the present implementation problems with the land lease system for rangelands, the so-called Household Pasture Contract Responsibility System (further referred to as the pasture contract system or, shorter, the contract system).

The Pasture Contract System: Smashing the Common Rice Pot?

During land reform in the late 1950s, rangeland in China was seized from the landlords, Mongol princes, lamaseries and clans, and nationalized, although state ownership of rangeland was not incorporated into law until

the 1982 Constitution. When the communes were established in 1958, rangeland ownership was vested in the production team through the Work Regulations for the Rural People's Communes (popularly known as the Sixty Articles), proclaimed by the Communist Party. Over time, teams which made use of adjacent rangeland came to regard this as collective property, so that a *de facto* situation emerged of state- and collectively-owned rangeland. *De jure*, however, neither of the two ownership forms existed because the Sixty Articles were never adopted by the National People's Congress, and therefore never became law.

With the introduction of rural reforms in the early 1980s, China broke with its collectivist past and set off on the long and winding journey from a centrally-planned to a free-market economy. The communes — the institutional basis of agriculture under Chairman Mao — were disbanded and the user rights of communal land were redistributed to individual farming families. The communes were replaced by a family-based contract system, the Household Contract Responsibility System, which offered farmers more managerial freedom by linking rewards directly to production and efficiency. Farm households could lease a certain plot of land, while land use rights could also be sub-contracted or inherited. Initially, the contract period was for five years, later extended to twenty-five. In 1993, after years of trial and error, the contracts were extended by an additional thirty years.

With the successes of the early rural reforms (rising grain production, and a bumper harvest in 1984), the contract system became the orthodox form of land tenure for agriculture, and was also transferred to forestry and the pastoral sector. The Rangeland Law proclaimed in 1985 represents the official incorporation of the pasture contract system into law. It states that the user right of state or collective rangeland may be leased to households or collectives for a 'long term'.[2] After decollectivization, however, there was a legal gap in the definition of land ownership rights (including the rights to rangeland and forestland), as these had not been officially transferred from the production teams to their successors, the natural village. The 1982 Constitution referred to collective and state rangeland, without defining the term 'collective', which covered three administrative levels: the township, the administrative village, and the natural village.[3] Was rangeland to be owned by the township (the former commune), or the administrative village? Or perhaps by the natural village (the former team)? The legal basis of the pasture contract system was thus unclear.[4]

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2. The Rangeland Law does not specify the contract period, but in practice the maximum period is presently thirty years.
3. The three former administrative levels had been replaced as follows: the commune by the township, the production brigade by the administrative village, and the production team by the natural village.
4. For a detailed overview of the shift in legal rules of grazing from the collectivist period to the reform period, see Ho (2000: 231–6).

The Chinese Ministry of Agriculture had envisioned four different stages in putting the pasture contract system into effect (CSCPRC, 1992: 33): (1) the distribution of animals that were formerly owned by the collective to individual households; (2) the assessment, or in some cases re-assessment, of rangeland boundaries between collectives and the consequent allocation of rangeland user rights to collectives and households; (3) the appraisal of pastures in terms of carrying capacities or stocking rates; and (4) the implementation of a legal system of incentives and penalties to ensure that producers abide by the carrying capacities of the plots of land assigned to them, and the establishment of a supervisory institutional structure (the Department of Animal Husbandry and the rangeland police force) to enforce the legal rules and regulations.

In theory, the majority of China's grasslands have been contracted out with assigned carrying capacities, and the time is ripe for the Department of Animal Husbandry and its rangeland police force to enforce the allocated quota of stocking rates.[5] In reality, however, the official claim that the contract system for rangelands is firmly in place is questionable. In their extensive study of animal husbandry in Inner Mongolia, Gansu and Xinjiang, Longworth and Williamson note: 'At central government level certain policies are in place and provincial, prefectural, county and even township officials will describe (. . .) how the policy is working. However, at the village and household level, the policy does not exist' (Longworth and Williamson, 1993: 321). This seems to be supported by the claim of the former vice-head of the Ningxia Provincial Department of Animal Husbandry that: 'The figures of contracted rangeland have no importance at all. They are administrative figures, which the central government has required us to report, and exist on paper only'.

Longworth and Williamson also highlight 'another serious source of uncertainty surrounding pasture use contracts in some areas': 'while the contract specifies the area assigned to the household, it does not designate the precise location of this pasture land. These "partial" contracts obviously encourage grazing-in-common practices and discourage investments in pasture conservation and improvement by individual households' (Longworth and Williamson, 1993: 321).

THE YANCHI EXPERIMENTS

In the Ningxia Muslim Hui Autonomous Region, in the northwest of China, local attempts have been made to establish corporate management systems

5. Li (1994: 101) gives the following figures for contracted-out rangeland in China: 90 per cent for Gansu, 80 per cent for Sichuan, 70 per cent for Inner Mongolia, 79 per cent for Qinghai, 69 per cent for Ningxia, 26 per cent for Heilongjiang, 30 per cent for Xinjiang, 37 per cent for Jilin and 30 per cent for Liaoning.

with the village as the basic unit of use and control. Most of these attempts have been undertaken in Yanchi County, located in the steppe-desert area in the northeast of the autonomous region (see Figure 1). Due to increasing problems of desertification, Yanchi has frequently experimented with new grazing practices, sometimes based on principles of traditional Mongol range management. The experiments began in the early 1960s, in an attempt to solve over-grazing and stimulate a more sustainable rangeland use (Lei et al., 1964; Yang, 1964); they were seriously interrupted by the socio-political upheaval of the Cultural Revolution, but were resumed as the economic reforms gained momentum in the early 1980s.

There are two particularly interesting aspects to the Yanchi experiments. Firstly, they are a local initiative aimed at introducing a new management form in a sedentary livestock farming system quite unlike that of nomadic Mongol herders. Secondly, the system was uniformly introduced in the entire county, in rich and poor regions alike. Together, these factors make Yanchi a challenging region to conduct a comparative study of the viability and the institutional dynamics of such village range management systems.

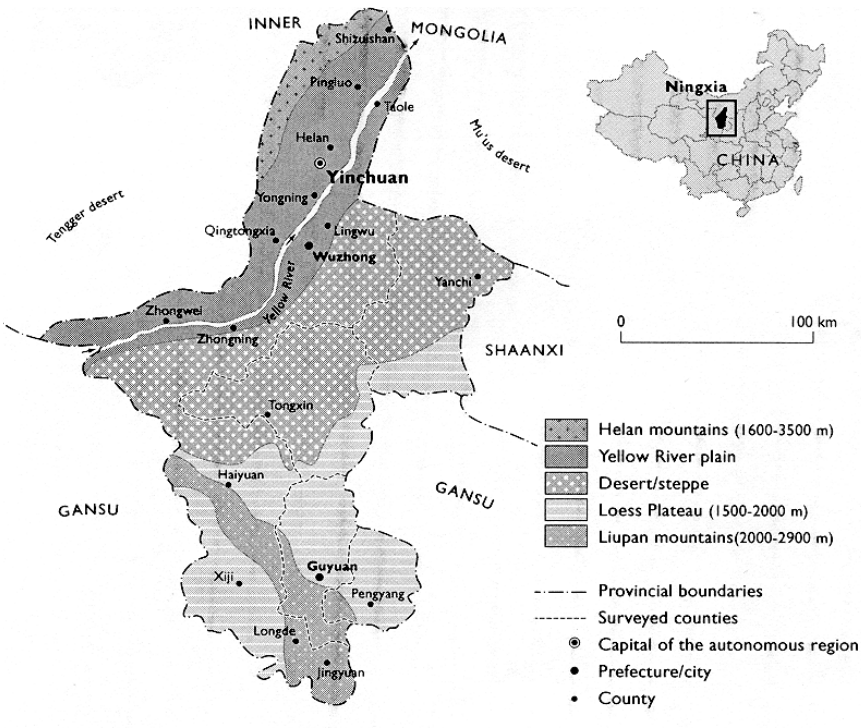

Figure 1. Map of Ecological Regions of Ningxia

Using concepts from theories of common property resource management and collective action (see Oakerson, 1992; Ostrom, 1990; Wade, 1987), I will attempt to answer a series of questions focusing on the impact on existing grazing practices of the newly introduced institutional structure for range management. How did the sedentary livestock farming system react to the imposition of a new institutional management structure encouraging rotational grazing, as opposed to free-for-all grazing? Did the system offer sufficient incentives for collective action by the pastoralists, thus stimulating sustainable livestock farming? Were the outcomes of these methods of range management the same for the various regions in Yanchi? How valuable are the Yanchi experiences for the rest of China?

Research Methods and Site

This article is based on research conducted in Ningxia in the spring and summer of 1996. Besides qualitative in-depth interviews, a quantitative survey was carried out, covering a total of 284 farm households in ten natural villages in four counties (Yanchi, Tongxin, Guyuan and Pengyang). The villages studied in Yanchi County were Xiawangzhuang and Shangwangzhuang villages in Chengjiao Township, and Shangjijuan and Ma'erzhuang village in Ma'erzhuang Township. Fifty farm households were studied in Chengjiao, and forty-eight in Ma'erzhuang.

Ningxia is situated in the central Asian steppe and desert region with a continental, temperate climate increasing in aridity from the south (subhumid) to the north (arid). In the north, Ningxia is enclosed by the Tengger and Mu'us deserts (northwest and northeast respectively). Ningxia borders on Shaanxi Province to the east, Inner Mongolia to the north and west, and Gansu Province to the south. Rather than being administered as a province, Ningxia was established as an autonomous region for the Hui Muslim minority in 1958. The total land surface is 51,800 km^2 and the total population in 1993 was 4.95 million people, of which 1.64 million (33 per cent) belonged to the Hui.[6] The Hui are a religious and ethnic minority who lag behind the majority of the Han Chinese in socio-economic terms. For example, 64 per cent of the Hui live in the seven poorest counties[7] in the autonomous region (Tongxin, Guyuan, Haiyuan, Xiji, Longde, Jingyuan and Pengyang), in contrast to only 29 per cent of the Han Chinese. Further-

6. Official statistics give a total surface area of 66,400 km^2 but recent surveys have shown that the actual surface is much smaller. The Hui are the predominant ethnic minority in Ningxia, other minorities like the Mongols and Uyghur only account for 0.45 per cent of the population.
7. The rural net annual income per capita has been taken as the indicator for poverty of the counties.

more, 60 per cent of the Hui, and 78 per cent of the women, are defined as illiterate, against 36 per cent of the Han, including 49 per cent of the women (Gao, 1995: 57; Ningxia Statistical Yearbook, 1994: 65). In some regions in Yanchi, the struggle for scarce natural resources — in particular the digging for medicinal herbs — has led to extreme violent clashes between Hui Muslim and Han Chinese farmers.

This article draws on material from two sample villages (Xiawangzhuang and Shangjijuan), which are both located in the arid, desert-steppe region of Yanchi County (200–250 mm annual precipitation). The population in Yanchi is predominantly Han, only 3 per cent belonging to the Hui. Some 84 per cent of the county is rangeland (of which 85 per cent, or 473,400 ha, is ranked as usable pasture); 13 per cent of the total area of pasture in Ningxia is located in Yanchi county. Animal husbandry is the main agricultural activity in Yanchi, representing 55 per cent of the total agricultural output (Ningxia Statistical Yearbook, 1994: 84, 265; NCZZD, 1985: 132; ZZZCBW, 1995: 205).

Leasing Ningxia's Pastures: Theory and Practice

In Ningxia, the pasture contract system was established in the middle of the 1980s. As in other regions, the implementation of the contract system has been characterized by a large discrepancy between the intention and the actual practice. In theory, the implementation of the contract system took place in three phases: (1) the assessment of township and village boundaries of rangeland, through official written agreements; (2) the issuance of pasture use contracts to the natural village by the county government (no carrying capacities were specified in the contracts); and (3) the issuance of pasture contracts to individual or joint (two or more) farm households by the administrative village. These pasture contracts were to be issued in triplicate: one to be kept by the Township Rural Economic Office, one by the administrative village, and one by the contractant himself.

In practice, the stage-1 agreements between townships (which generally date back to boundary agreements made between communes in the late 1970s) were not always signed, especially when boundaries were still disputed. Of the stage-3 pasture contracts issued to the farm households, there is little awareness among farmers. From my survey of 284 households in four counties in Ningxia, only 7 per cent of the farmers indicated that they had contracted rangeland, while 62 per cent said they had never heard of any pasture contracts at all.[8] There are two reasons for this. In some counties, the third phase of the pasture contract system was never implemented. In other counties, such as Yanchi, the contracts were allegedly

8. N = 284, response rate is 98 per cent.

issued to the contractants, but in reality were kept by the Village Committee of the administrative village, or the village leader of the natural village. Here we also touch on the legal notion of a contract. In the western legal tradition, a contract is a voluntary agreement between two parties. The pasture contract seems a far cry from this, and more of a duty imposed by the state on the village and the farmers.

In the ten natural villages where the survey was conducted the pattern of resource use was, with a few exceptions, open access. Regardless of whether pasture had *de jure* been contracted to villages, individual farmers, or joint households (sometimes rangeland was contracted to a group of households without their knowing), rangeland was viewed as a resource that should be open to everybody and for which nobody within the village was responsible in terms of management. This is not to say that natural villages did not lay any ownership claims to rangeland — in most cases, it was quite clear to the herders which tracts of rangeland belonged to which natural village — but the exclusion from pasture use for people outside the village had never been considered an option for herders.

The evaluation of the pasture contract system by bureaucrats, as well as by farmers, is generally negative. In the words of one village leader in Yanchi:

> The pasture contract system has not been invented by us. All these problems and boundary conflicts, because it is just another whim of the Communist Party. The Kuomintang[9] would never have done such a thing. In fact, during the Kuomintang we managed our range in such a way that no conflicts could arise. Times were much better when the land had not been allocated to the individual users, when there was overlapped grazing and the boundaries were still vague.

I have argued elsewhere (Ho, 1998) that the present open-access situation, or 'eating from the common rice pot' in Ningxia is the outcome of the establishment of collectivist institutions (the people's communes) that delegitimatized customary rights structures over the regulation of grassland usage. These customary rights existed from the last century of the Qing dynasty (1644–1911) well into the republican era (1911–49). This customary grazing consisted of a common use of the pasture by means of overlapped grazing (*chuanmu*), whereby clan heads or leaders of the traditional household land tax registration system (*baojia*) decided where grazing was allowed.[10]

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9. The Kuomintang or KMT is the Chinese Nationalist Party established by Dr Sun Yat-sen.
10. Before land reform, rangeland in China was in general owned by princes, lamaseries, temples and tribes, but was commonly used by herdsmen and livestock farmers. In Yanchi, rangeland was owned by landlords or clans, but commonly used. The end to the traditional property rights system in China overall was heralded with land reform in the early 1950s, but the timing of land reform for grazing lands differed for the various pastoral regions. Ningxia belonged to one of the 'old revolutionary base areas' where land reform began relatively early, starting in 1936. For a detailed description of customary grazing practices in Ningxia during the end of the Qing dynasty and the republican era, see Ho (1998).

However, the organization of the communes failed to provide the necessary socio-economic and regulatory conditions that would allow individual users to pursue their own well-being without destroying the livelihood of future generations. This failure coincided with an increasing scarcity of grasslands due to expanding livestock herds and the loss of arable land induced by political campaigns, such as the Great Leap Forward and the Great Proletarian Cultural Revolution. These external changes could not be adequately offset within the institutional structure of rangeland management during the time of the people's communes. Instead, a pattern of resource use developed which bore all the traits of an open-access regime, leading to the squandering of pastureland. Similarly, the present-day moves towards privatization and parcelling of rangeland under the pasture contract system has failed to ensure the co-operation of rangeland users. The way grasslands were used in collectivist times has persisted to the present, and the problem of free-riding remains unsolved.

Current Chinese government policy rests on the idea that squandering of the resource can only be avoided by strengthening the pasture contract system (seen in terms of increasing and broadening the powers of the costly supervisory system that enforces the carrying capacities — the rangeland police force) or, in some exceptional cases, by establishing national nature reserves guarded by special police forces. As the contract system has already become the orthodox form of land tenure in China, it will not be easy to argue for the establishment of common property instead. Indeed, the concepts underlying common property theories are contrary to the principles of the pasture contract system.

In the first place, a common property regime is based on resource use and control by a community of users that can effectively exclude non-community members from using that particular resource. The current pasture contract system relies on an external agency of control (the state) to ensure that the individual users do not free-ride and do not exceed the carrying capacities of the plots of rangeland. Furthermore, whereas common property usage implies flexible limits of pasture (that is, rotational grazing or even nomadic pastoralism), thus making optimum use of the variability in range production over time and space, the pasture contract system employs fixed boundaries (for example, through fencing) based on a 'proper use factor' or maximum carrying capacity of the rangeland.

This is not to say that, at least in theory, a more privatized form of land tenure, such as the contract system, could not co-exist with nomadic pastoralism. But there are two main issues at stake here. Firstly, the practice of the pasture contract system in China has proven that privatization is not a viable option for the scarcely-populated arid and semi-arid regions where extensive livestock raising prevails, both because of the high transaction costs involved to make it effective, and because of the necessity for mobility in order to cope with risks such as drought and blizzard. Such a system might, however, work in regions with a different ecological setting that

allows for sedentary livestock farming. Secondly, China is pursuing a policy of sedentarization of nomads, which has led to a rapid decline of nomadic pastoralism and has concentrated land degradation around herders' settlements. In the Chinese political context, nomadic pastoralism cannot co-exist with the pasture contract system, as the former is vanishing under the pressure of the latter's dogmas.

A TALE OF TWO VILLAGES

If an official of the Ningxia Provincial Department of Animal Husbandry is asked how rangelands are managed and used, he will invariably talk about the merits of the pasture contract system. Two administrative levels lower in the bureaucracy, in the Yanchi County Bureau of Animal Husbandry, the same question will evoke quite a different response. Not only is the latter official likely to be more critical of the pasture contract system — at times even cynical — but he will also talk about village-based range management. All villages in Yanchi have one or more range guards, employed and paid by the village community, who watch over plots of pasture closed off during certain times of the year. Different plots are closed off at different times depending on the condition of the rangeland vegetation, the plot in the worst condition being closed off first. This management system is seen by the county officials — often with a tinge of pride — as an alternative to the pasture contracts.

Yanchi has been involved in rangeland management experiments since the early 1960s. Early experiments with rotational grazing by fencing and appointing range guards were not very successful, as it proved difficult to manage and supervise the extensive fenced area (1300 ha in total). Barbed wire was frequently stolen, or the fence pushed over, so that sheep and goats could still be pastured in the restricted area. Given their low salary, the appointed guards may not always have been too conscientious in patrolling the area.

With the support of the Yanchi Party Committee and the Ningxia Science and Technology Commission, a new project was established in 1987. This was a largely technical project, including research such as the grazing behaviour of sheep, water-saving techniques, and agroforestry practices, but a spin-off was the establishment of an institutional structure for rotational grazing. The project started in Sidunzi Natural Village: taking account of the failures of the earlier experiments, a much smaller area of only 25 ha was fenced in. This was divided into four smaller areas, three of which were kept in alternating use over a period of four months each, while one was improved and closed off from pasturing for the entire year. The traditional, more mobile practice of overlapped grazing between villages (which was delegitimized during the period of the communes and had developed into a situation of free-riding) was no longer allowed on the fenced pasture,

and each farm household received a grazing permit which included a map showing the area open for pasturing. Sheep numbers per household were restricted on the basis of stocking rates determined for the fenced-in rangeland. In principle, the number of sheep and goats per person was limited to three, calculated for a total of the whole village, but there were no sanctions if the village raised more ruminants than stipulated and the quota did not seem to have very much effect. For supervision of the rangeland, a range guard was appointed from amongst the villagers, and was paid by the natural village itself (YCNXYK, 1992: 8–9, 55–6).

Soon after the project had been established in Sidunzi village, demonstration meetings were held for leaders of neighbouring villages. The new range management system was gradually adopted by other townships in Yanchi, but as it spread, it lost much of the initial scientific rigour employed in Sidunzi village. The range management system that evolved has many of the characteristics of what is referred to in academic literature as a 'common property regime'. But is the Yanchi model a true common property regime? Does it offer more incentives to livestock farmers to co-operate rather than free-ride, as compared to the earlier open-access situation? Examining the Yanchi model in more detail for two different villages provides some answers to these questions.

The Old Project Area: Xiawangzhuang Village

Village Introduction

Xiawangzhuang village is one of the six natural villages belonging to Sidunzi Administrative Village, which in part falls under the jurisdiction of Chengjiao Township. Xiawangzhuang is located about 1 km south of Sidunzi village, where the project started. Thanks to irrigation, this is one of the richest regions of Yanchi County; in 1996, the village had an average annual net income per capita of 1365 Rmb, compared to the county average of 669 Rmb.[11] The village has over 500 inhabitants (all Han Chinese); at the end of the 1980s it was divided into three smaller administrative clusters (*zu*): a northern, a middle and a southern cluster, each headed by a cluster leader. The head of the middle cluster is also the village leader.

The village has about 125 ha agricultural land, of which approximately 70 ha is irrigated land. The availability of irrigation (twenty-one wells) has enabled the village to cultivate cashcrops, such as linseed, sunflower, aubergine and other vegetables. In this township, income from livestock products (mutton, hides and cashmere)[12] accounts for approximately 19 per cent of the

11. Rmb stands for Renminbi; in 1996, 8 Rmb = US$ 1.
12. In Ningxia, sheep and goats are not kept for milk production.

total agricultural income, the greater bulk coming from agricultural products (69 per cent) and the rest from sidelines (11 per cent).[13] Agricultural products are generally sold in the county seat, 12 km away, which can be easily reached by a local 'taxi-brousse'.

The total number of sheep and goats in the village is around 1800, an average of twenty-one sheep per household.[14] The greater part of the village rangelands (650 ha in total) lie at the southern side of the village, with a smaller portion in the north. The southern village pasture is enclosed by hills, in front of which lies a pocket of desert. To the east of the village pasture is the rangeland belonging to Sidunzi village; to the west, that of Shangwangzhuang village. The average amount of pasture per person is about 1.3 ha (0.4 ha per animal). There are fodder bases covering over 120 ha, planted with alfalfa (*Medicago sativa*, or *zihua muxu*).

The main problems of this village as voiced by the peasants are, in descending order of importance: (1) falling grain production, due to the high price of fertilizer; (2) a receding ground water level, as a result of excessive irrigation; (3) desertification, causing a decrease in livestock productivity. On the basis of this ranking, it is clear that animal husbandry in this village is perceived as less important than agriculture.

The Common Property Regime

The management and control of the village pasture rests with the three cluster leaders. Depending on the condition of a certain plot of pasture, they decide when it should be closed for grazing, and when it may be used again. The villagers are normally not consulted. Matters such as which plots were assigned for closure, and which would be improved through additional and aerial sowing of grass seeds, were formerly discussed by the grassland management station with the cluster leaders. However, budgetary constraints of the grassland stations have forced them to give up these activities entirely, and the condition of the pasture has deteriorated.

The three cluster leaders have the right to appoint and dismiss range guards, who are responsible for watching the closed pasture. If the guard does not live up to his tasks, part of his salary is withheld; in some cases he may even be fined, although this had not occurred in the five years prior to the research. Smaller decisions, pertaining to the kind of penalty imposed on offenders against the rangeland regulations, are usually decided by the range guard himself. In Xiawangzhuang there are two range guards: one to watch over the closed pasture, the other to guard the alfalfa fodder bases at the

13. All figures for Chengjiao Township are derived from a survey of 413 farm households in 43 natural villages, carried out by the Ningxia Academy of Social Sciences in 1995.
14. N = 81, mean is 21.8 and standard deviation is 11.5.

northern side of the village. Farmers have to pay 3 Rmb per sheep or goat to a fund, from which the guards are paid. Guarding the rangeland yields a salary of 120 Rmb per month; watching the fodder bases pays 80 Rmb a month. For this money the guards are expected to work from 8 am to 8 pm, every day of the week. The person guarding the range at the time of research was a former team leader in the 1970s: he had been a range guard for over five years.

The Boundaries of the Rangeland

The villagers of Xiawangzhuang started to close off rangeland after the village leader had seen the promising results of rotational grazing at a demonstration meeting in Sidunzi village. Farmers initially opposed this, saying that rangeland was 'common property' (but they meant 'open access') and 'pasture should be open to all'. However, as farmers faced increasing difficulties in finding good grazing areas for their flock, a favourable climate was created for a stricter regulation of rangeland use. Pennarz (1996) offers similar findings: based on research in Sichuan Province and pastoral areas in Qinghai, she observed a more even distribution of resources, stricter land-use regulation and a stronger commitment to strive for common interests in land-scarce regions (with high population pressure) than in land-abundant ones (Pennarz, 1996: 6 and footnote 13). On the relationship between demand for a resource and the dynamics of the management regime, Wade (1987: 104) wrote: 'the greater the demands (up to a limit) and the more vital the resource for survival, the greater the chances of success'. However, this is by no means the only factor influencing the viability of a common property regime.

According to the village leader of Xiawangzhuang, rotational grazing started to work well by the beginning of the 1990s. From 1994 onwards, four plots of rangeland (approximately 300 ha) have been closed off from use for most of the year. The boundaries of the pastures are quite clear. Hedges of Siberian pea trees (*Caragana korshinskii*, or *ningtiao*) demarcate the village pastures from those of neighbouring villages. The pea tree is a drought-resistant thorn-bush, whose roots consolidate the soil and whose leaves can be used as feed for the animals. The boundaries of closed pasture are not marked by fences but by low earth mounds spaced at approximately 300 metres from each other.

The area is easy to oversee, although the closed plots are very dispersed (2 to 3 km apart). Standing on a hill, one can see if someone is entering a restricted area. Offenders are generally people from outside the village, as herders from the village itself feel it is in their own interest to stay away from the closed pastures. The alfalfa fodder bases are even easier to watch, as the area is very limited. The fodder area is contracted to farm households, each individual plot delimited by means of small earth banks.

Rules of Allocation: Who gets What and When?

Controlled grazing plots are open for grazing during the period of gestation and birth of lambs (winter and spring). They are generally closed off in March. Depending on the vegetational situation (variety and density of palatable plants), the three cluster leaders decide which plot will be restricted for grazing. The present-day plots have a relatively abundant vegetation, as a result of aerial sowing by the Department of Animal Husbandry and the county grassland management station. In principle, every household is entitled to use the controlled grazing plots as intensively as necessary, regardless of the number of animals owned. The pasture which is not closed off can be used at will by the herders of the village and of neighbouring villages. Overlapped grazing with other villages takes place only occasionally, and has diminished since rotational grazing was established as a management system over the county. It is important to note that there are two land tenure systems operating simultaneously: the common property regime, with restricted grazing rights on the controlled grazing plots, and a system of open-access rights for herders within and outside the village on all other rangeland. This is quite different from the ideal typical common property regime as discussed in the literature (for example, Bromley, 1992; Oakerson, 1992; Ostrom, 1990).

The fodder bases are opened for use twice a year, during the traditional 'Arrival of Summer' (*xiazhi*, the 10th solar term around June) and the 'White Dew' (*bailu*, the 15th solar term around September). Every person in the village has an average fodder area of 0.08 ha. After each household has cut the alfalfa in its contract plot, the area is closed again.

Only those who are born within the village are entitled to use the village pastures. The smallest social unit to which the villagers feel themselves attached in terms of the common property regime is the natural village. The community of Xiawangzhuang does not easily accept immigrants from other villages. In the whole of the twentieth century, there have been only three instances of people migrating to the village of Xiawangzhuang: the first was a family from Hebei that moved to Xiawangzhuang during the Second World War; the second was a family that fled at the time of the Cultural Revolution, but was allowed to return and allotted a new plot of land. The most recent migrants were a couple of families who obtained permission to settle in the 1980s, because they could bring in girls at a time when marriageable women were scarce.

Rules on Input

Up to 1991, the township forestry station gave a subsidy of 6 Rmb for each *mu* (1/15 ha) that was planted with pea tree. Together with the financial contribution of 3 Rmb per animal per household, this was channelled into a fund out of which the salary of the range guard was paid. The seeds of the Siberian pea trees were collected annually, partly resown, and partly sold at

a price of 3 Rmb per kg to the forestry station. These revenues were also put into a collective rangeland fund. For the planting of pea tree, the village hired farmers with sowing-machines and tractors who were paid a rate of 4 Rmb per *mu* sown rangeland, this payment also coming from the rangeland fund. At present, pea tree is no longer planted collectively by the village. The peasants say it is no longer necessary as the plants have survived quite well, but another reason may be that the forestry station no longer provides additional seeds.

Similarly, the county grassland management station used to provide farmers with seeds of palatable shrubs such as milkvetch (*Astralagus adsurgens*, or *shadawang*) and cock's head (*Hedysarum scoparium*, or *huabang*). However, since 1993 the grassland management station has stopped the provision of plant seeds due to financial constraints, which has led to a gradual deterioration of the quality of the restricted plots of rangeland.

The fodder bases were established in the late 1980s, and need to be resown once every two or three years. The alfalfa seeds are still provided free of charge by the Yanchi Science and Technology Commission and the township grassland management station. After the alfalfa has sprouted, members of these two organizations inspect to see whether it has been planted according to their specifications: if the area is approved, the farmers do not have to pay for the seeds, but if the fodder base does not meet requirements, farmers have to pay 6 Rmb per kg of seed. As one farmer remarked drily, this makes it 'more expensive than grain'.

Punishing the Offender

The village has stipulated that anyone who ventures into restricted pasture can be fined between 50 and 100 Rmb by the range guard. In more serious cases, the range guard can confiscate a few sheep, which will only be returned once the offender pays his fine. In the case of minor offences, the transgressor is generally given a scolding. People from the village itself are rarely fined, but the village leader will always be informed. The village leader can decide to make an offence known to the entire village if it is really serious, but this rarely happens.

In addition to his salary, the guard keeps the money from any fines. In the eyes of the villagers the guard has 'contracted' the task of guarding the rangeland. In the village of Xiawangzhuang there are no more than ten herders: of these, only two had dared to pasture in the closed area in 1995. In the same year, by contrast, herders from other villages had grazed their flocks in the restricted area on five or six occasions.

An Assessment

According to the majority of the peasants in the village, there are insufficient good grazing areas, and degradation due to over-grazing is still increasing.

A shift in grazing pressure from the restricted grazing area to the open-access rangeland has been observed. On the open-access rangeland, the vegetation of grass and bushes has virtually vanished and been replaced by the unpalatable dog's bone (*Cynanchum komarovii*, or *laoguatou*).

In spite of this, the overall evaluation of the common property regime by the peasants is undoubtedly positive. Compared to the period before the common property regime was established, free-riding within the village is rare. The willingness of peasants to abide by the rules is striking compared, for example, to the situation in the Yunwushan nature reserve in Guyuan County (Loess Plateau in south Ningxia, see Figure 1). There, rangeland has been fenced in, and is open only during certain periods of the year when farmers are allowed to gather forage. There has been no attempt to devolve responsibility for the management of the reserve to village communities. The sole method of control is a full-fledged police force to guard the area of approximately 2300 ha. Free-riding is the dominant grazing strategy of the farmers in the Yunwushan nature reserve.[15]

In spite of this positive assessment, however, the rangelands in Xiawangzhuang are still very much under stress. This begs the question of how long the common property regime in Xiawangzhuang can last under the pressure of continuing rangeland degradation. Another village just 45 km to the southwest offers a glimpse of a potentially gloomy future.

Shangjijuan Village: Living on the Edge

Village Introduction

Shangjijuan village, 1 km northeast of Ma'erzhuang Township, is a hamlet comprising twenty or so mud houses. The total population of 125 Han Chinese developed from the settlement of the Shang family, who moved to this remote area in the early 1920s in search of suitable pasture. At the time, the founder of the village raised over a thousand sheep and claimed several hundred hectares of pasture as his own.

Shangjijuan village (literally: Pen of the Shang Clan) has undergone frequent name changes: during the 1950s it was called Shangjijuan Brigade and encompassed five villages; at the height of the Cultural Revolution, the name Shangjijuan was considered too feudal and was changed to Yuqiang village (Wall of Rain). Today, the village has entered the registers under the double name of Yuqiang Administrative Village, Shangjijuan Natural Village.

Although the ecological conditions are comparable with Xiawangzhuang, the contrast in every other way could not be greater. With an average annual net income of 498 Rmb per capita (figure derived from the township

15. For more details see Ho (1998).

statistics), Shangjijuan is much poorer. With no irrigation, it is completely dependent on rainfed, subsistence agriculture; the crops cultivated include corn, common millet, and buckwheat. The main source of revenue for farmers is extensive livestock farming, which accounts for 57 per cent of total income, while agriculture accounts for only 25 per cent. The average sheep equivalents[16] per household are almost three times higher than for Xiawangzhuang, and pasture per person is more than eight times higher (10.5 ha as opposed to 1.3 ha in Xiawangzhuang). The total number of sheep and goats is around 1500. Wool and cashmere are no longer sold to the township supply and marketing co-operative, but collected by itinerant merchants.

The greatest problem of the village is the destruction of rangeland through the digging of liquorice root, mostly by farmers from outside the township. Ma'erzhuang Township is one of the areas in Yanchi County where liquorice root (*Glycyrrhiza uralensis* or *gancao*) grows in abundance. This herb is both a blessing and a curse for the village. Liquorice not only makes good fodder, but is also used in traditional Chinese medicine. Collecting liquorice root can provide a considerable amount of extra cash — as much as 800 to 900 Rmb in one season.[17] Unfortunately, it is not easy to collect: liquorice has very long roots, requiring deep holes to be dug in the rangeland which assists wind erosion. Over the past few years, farmers in regions where liquorice root grows have seen their homes and fields gradually covered by sand-dunes that literally 'move into their villages'.

Violent clashes, in which a number of farmers have been killed, have taken place between those digging for liquorice root, and those trying to protect their rangelands from the diggers. Such conflicts have escalated in recent years, as hundreds of diggers pour into Yanchi in search of the precious roots. As the diggers are often poor Muslim Hui farmers from neighbouring counties, the conflicts have acquired an unmistakably ethnic and religious undertone, which has severely limited the authorities' scope for political manoeuvring. The government of the autonomous region has to move very cautiously in order to avoid offending either the Hui population it is supposed to represent, or the Han, who might easily feel 'sacrificed' for the image of religious and political autonomy of the Hui.

Attempts have been made to cultivate liquorice, but the cultivated plants have a much lower percentage of the active healing property than the wild plants. Scientific experiments with genetic engineering have also been carried out, but the results have not been encouraging. For the moment at least, there seems to be no alternative to the digging of liquorice root in rangeland.

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16. For this article I employ the conversion coefficients to standardize livestock numbers as used by Longworth and Williamson (1993: 24) of 1.00 for sheep and 0.82 for goats. Figures for the structure of rural income and sheep equivalents were derived from my own survey of 98 farm households in Yanchi County (48 in Ma'erzhuang Township).
17. Figure from the survey of 98 farm households in Yanchi.

The Common Property Regime

As in Xiawangzhuang, a common property regime has been established in Shangjijuan at the instigation of local authorities. The management structure is very similar to that of Xiawangzhuang, with a certain part of the village pasture closed off for use, and a range guard hired by the village to watch over it. This particular village was fortunate since as much as 400 ha of rangeland, located close to the village, was fenced in 1992 with the financial support of a Hong Kong based NGO.[18] The practice of rotational grazing started in the 1980s as a small area (30 ha) marked with earth mounds. The area used to be heavily desertified, and pasturing was strictly prohibited from 1980 until 1990. After the vegetation had recovered, the village leader decided to open the area for use to all farmers on an equal basis during specific periods. Many farmers were initially opposed to rotational grazing, accepting the project only because the restricted area was small. The area was gradually expanded as acceptance of the system grew. Now, the restricted pasture is open for use twice a year, in spring and winter (see Figure 2):[19] during these periods farmers are allowed to pasture their flock for around forty-five days.

The range guard in this village is hired in the same way as in Xiawangzhuang with every farmer contributing a share to his salary on the basis of the number of sheep and goats owned.[20] According to the range guard, the most frequent offences include: (1) the digging of liquorice root; (2) the cutting of fodder outside the stipulated periods, for which fines are imposed ranging from 100 to 500 Rmb; and (3) illegal pasturing in the fenced area. In general, farmers are quite satisfied with the system of rotational grazing. The practice of illegal pasturing in restricted areas is not very common, either by villagers or by farmers from outside the village. As in Xiawangzhuang village, farmers state that overlapped grazing has greatly diminished. Arrangements have been made for the digging of liquorice by the villagers themselves, and are enforced by the range guard: farmers are only allowed to dig for liquorice in the fenced area for eight to ten days in March and October.

The Battle over Resources: Digging for Herbs

As noted above, the liquorice which grows in abundance in Shangjijuan village attracts farmers from far and wide, leading to serious desertification.

18. The World People's Promotion Committee (*shijie xuanmin weiyuanhui*).
19. Official map from Ma'erzhuang Township. Unfortunately, a similar map could not be obtained for Xiawangzhuang village due to the unwillingness of the township authorities.
20. In neighbouring villages a different system is used; the task of guarding rangeland is rotated among the farmers, the time spent on duty depending on how many animals the farmer owns. The standard has been set at one day patrolling for every ten sheep/goats in the household.

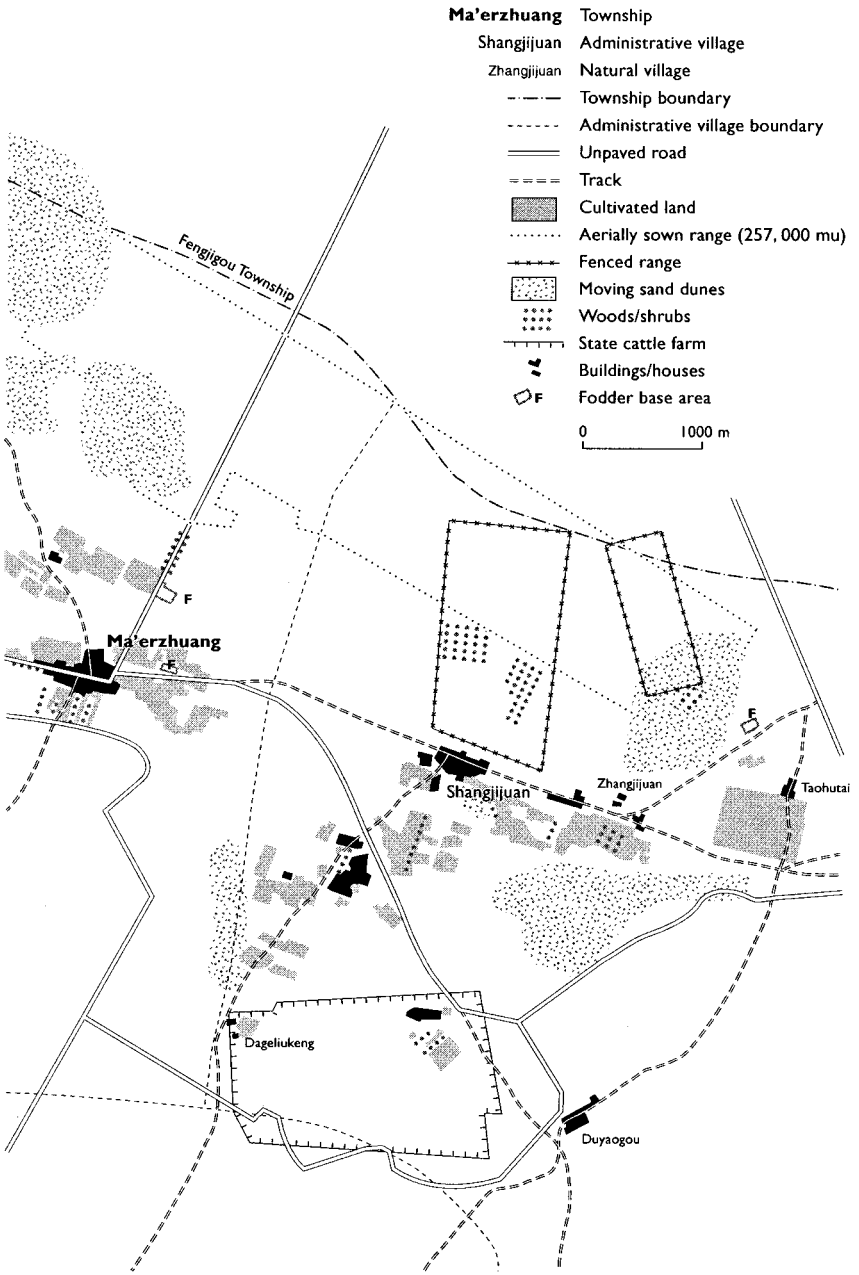

Figure 2. Map of the Rangeland around Shangjijuan Village

In 1996, the harvest of millet and sorghum in Shangjijuan was completely destroyed by moving sand-dunes. The village is surrounded by pockets of desert, while a large sand-dune has moved into the main street.[21]

Each year, during the agricultural slack season, feelings run high as farmers from neighbouring townships and counties begin digging for liquorice root on the pastures of Ma'erzhuang Township. For Shangjijuan village, relations with adjoining Fengjigou Township are especially bad, aggravated by a lingering boundary dispute (see also Figure 2).[22] Since 1992, several serious conflicts have occurred in Ma'erzhuang township.[23] After skirmishes over the digging of liquorice root in early 1995, the prefectural police arrested almost a hundred people, including all local-level cadres at the village and township level of Ma'erzhuang and Fengjigou. Among those arrested, seventeen were released on bail, one is still under house arrest and three were convicted, while two escaped and have gone underground. The accused included the township party secretary of Ma'erzhuang, several members of village party branches, cadres of the village committees, and other lower-level officials (MXCW, 1996).

In May 1996, there was another outburst of violence when over 500 Hui Muslims from Tongxin County forced their way into the pastures of Ye'erzhuang village (7 km west of Shangjijuan). The digging of liquorice root ended in a raid on Ye'erzhuang. As one eye-witness recounted: 'Armed with cudgels and sticks we marched forward to stop them. But there were too many of them. In the meantime, they had surrounded our village with tractors. Hundreds of Hui rushed into the village, beat up anyone who dared to come near them, smashed our furniture, stole our TV-sets and then escaped from the scene'.

The police and the grassland police[24] are completely powerless when conflicts arise on such a scale. Most villages have therefore organized their own militia to patrol the village pastures. According to the village leader, Shangjijuan village does not need a vigilante patrol: 'If I find anyone digging illegally, all I have to do is to yell, and all the villagers will rush to protect their land. That is how the situation is: farmers have become so worked up that they are ready to fight'.

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21. The large dune in the main street is not always seen in a negative way, however. As one farmer said: 'When we are tired after having tilled the land, we like to sit on the dune, enjoying the cool breeze in the evenings'.
22. This dispute was finally settled in court, in favour of Shangjijuan village (document 1992/124 of the Yanchi County Government).
23. Disputes over the exploitation of medicinal herbs have also occurred in regions other than Ningxia. In Alashan Left Banner, Inner Mongolia, a herb known as sea grape (*Ephedra distachya*, or *mahuang*) is frequently the cause of conflict (Shi, 1996: 198–9).
24. A task force specifically charged with the management and control of rangelands in China.

SUMMARY AND CONCLUSIONS

The evidence suggests that the common property regimes in both Shangjijuan and Xiawangzhuang provide enough incentives for collective action by the villagers. The good performance of these management systems is also reflected in the villagers' assessment of the effects of fencing. From the survey sample of ninety-eight households covering four natural villages in Yanchi County, the majority of the respondents (58 per cent) stated that fencing had an obvious positive effect on pasturing. The most-cited problem as regards fencing was its high costs (66 per cent of respondents). Other problems and criticisms revealed by the survey included the idea that rangeland belongs to everybody and should be open to all (31 per cent); and the problem of illegal grazing by others (22 per cent). Difficulties in obtaining barbed wire (18 per cent), or fear of conflicts with neighbours (12 per cent) were least mentioned. Most farmers (91 per cent) would partly or fully fence in rangeland if they had the means.[25]

Desertification forms an integral part of life in these villages. According to farmers in Xiawangzhuang and Shangjijuan, neither over-grazing nor illegal cutting of fodder, but the digging of liquorice root by people from outside the township is the real cause of desertification in the area. Many farmers feel that because the rangeland is not theirs, but state owned, it is common property and thus open to everyone (86 per cent of respondents). Apart from the area that is fenced in, it is very difficult to exclude outsiders from digging liquorice root in village pastures. The majority of farmers (57 per cent) also think that the boundaries of the village pastures may not be very clear for people from neighbouring villages.[26]

The common property regime of these two villages seems to work remarkably well. One might have expected significant differences in the institutional dynamics of the common property regime between a relatively prosperous settlement such as Xiawangzhuang, and the much poorer Shangjijuan village. Also, since Xiawangzhuang belongs to the early project area where rotational grazing was introduced as an experiment, this village received more care and attention from the local authorities in building up the common property regime than was the case in Shangjijuan village. Furthermore, as rangeland degradation in Shangjijuan has reached such alarming proportions because of the digging of liquorice root by farmers from outside the township, it would not have been surprising if farmers there were less committed to the common property regime than those of Xiawangzhuang. However, there are no indications that farmers in Shangjijuan are less dedicated to the regime because of external socio-economic pressure. Neither has this had a significant impact on the way the system works in the two villages.

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25. Of the sample of ninety-eight farm households, all respondents answered this question.
26. For all these questions: n = 98, response rate is 100%.

There are several reasons for the success of the experiments with common property management in Xiawangzhuang and Shangjijuan. First of all, the closed rangeland used for rotational grazing in the villages in Yanchi County is small (generally 300 to 400 ha), and is located in the vicinity of the village. This proximity allows range guards to be present at the range, and thus exert control over the resource, for the greater part of the day. Boundaries are clear, either through fences, hedges or the use of earth mounds. These factors facilitate the detection of rule-breaking free-riders, which in turn increases villagers' trust in the system and their willingness to abide by the rules. Farmers' recognition of the need for collective action is enhanced by the relatively high demand put on the resource by the users, which has already led to a certain degree of desertification.

Secondly, the group of users is small, which limits the transaction costs of communication and decision making. In the majority of villages in Yanchi, herding is done jointly, several families hiring one person to herd collective flocks of as many as 200 animals.[27] Herders are paid about 18 Rmb per year per animal. The number of herdsmen per village is low, which allows behaviour to be easily supervised through social control within the village community. Regulations as to permissable behaviour are prescribed through sets of social rules pertaining to the delimitation of the resource, allocation of resource use, membership, input and punishment, as elaborated above for Xiawangzhuang.

Thirdly, county and township authorities took great pains to establish and spread a corporate range management system. They supported and nurtured a management system which runs counter to the privatization aimed at by the pasture contracts. Moreover, there was no attempt to set up a new institutional structure to guide common property management: instead, local authorities relied on the existing village institutions to effectuate the range management system.

Finally, the village leaders play an important role in the management of the common property regime. They effectively counterbalance the power of the local authorities, with whom they maintain good relations allowing them to secure funds and services for the farmers.[28] They have proven themselves capable managers of the common property regime with sufficient authority and confidence to speak out and act on behalf of the villagers.

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27. Larger herds are easier to manage. Sheep 'are not happy in small groups, they spread and wander and join larger herds: they will not move predictably, in a body' (Dahl and Hjort, 1976: 255). There is also a maximum size for sheep and goats herds. Research among the Kababish Arabs in Sudan suggests a maximum flock size for mixed herds, or flocks of only sheep, of 200 heads. The maximum herd size for only goats is just 25 heads (Asad cited in Dahl and Hjort, 1976: 255).
28. There have been many studies of the intermediary role of village-level cadres in China between the local state and the village. See for example Croll (1994: 112–13), Chan et al. (1992: 32–3).

It is important to remember that the situation of livestock farming in Ningxia is quite different from that of traditional pastoral areas such as Inner Mongolia and Xinjiang. Livestock farming in Ningxia is settled and not (semi) nomadic. Moreover, the grazing areas in Ningxia are smaller and located closer to the user groups than in the traditional pastoral regions. None the less, the Yanchi experiments have proven that rangeland can be successfully managed by a village community on the basis of a common property arrangement at low transaction costs.

In China, as in much of Africa, rangeland management on the basis of carrying capacities is often not viable, as it involves very high enforcement costs.[29] Given the implementation difficulties of the pasture contract system, which is based on the concept of carrying capacity, some scholars and officials within the Chinese Ministry of Agriculture have proposed that the responsibility for management and control of rangelands should be vested in the collective, be it the administrative or the natural village, smaller traditional social groups, such as the Mongolian *khot ail*, or even shareholding co-operatives. The Yanchi experiments are a valuable example of how this could be achieved.

However, the success of the experiments with village-based range management in Yanchi County has its limitations. It is increasingly difficult for farmers to find good pastures; agriculture is being affected by desertification. Despite the fact that villagers generally abide by the rules of the common property regime, rangeland degradation still persists. The main cause of the degradation of grassland resources comes not from within, but from outside the village. It is the exploitation of liquorice root by poor farmers from outside the township that causes such large-scale desertification. Poverty drives these farmers to look for additional and uncontrolled sources of revenue: the digging of liquorice root can provide most farmers with an illegal, and thus non-taxed, extra income.

The experiences in Yanchi demonstrate the limits of common property arrangements. The quality of rangeland in Yanchi is still deteriorating, not because of a failure of village-based management systems, but due to a different valuation of the natural resource by other users. In fact, it is likely that the degradation of rangeland will continue regardless of the land tenure regime, since the diggers of liquorice root will defy any law in their search for short-term gains. A common property regime is not a panacea. Maybe this is one of the main lessons to be learnt from the Yanchi experiments: where the power of the common property regime stops, the space is opened up for macro-economic policies of poverty alleviation, such as the development of alternative income-generating activities, and the physical and social infrastructure necessary to alleviate the pressure on rangelands.

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29. There is considerable criticism in academic circles of carrying capacity as a leading principle in rangeland management. See, for example, Bartels (1990, 1993); Behnke (1993); Leeuw (1993); Scoones (1995).

REFERENCES

Bartels, G. B., B. E. Norton and G. K. Perrier (1990) 'The Applicability of the Carrying Capacity Concept to Africa: Comment on PDN Paper 29b by de Leeuw and Tothill'. Pastoral Development Network Paper No 30. London: Overseas Development Institute.

Bartels, G. B., B. E. Norton and G. K. Perrier (1993) 'An Examination of the Carrying Capacity Concept', in R. H. Behnke (Jr.), I. Scoones and C. Kerven (eds) *Range Ecology at Disequilibrium: New Models of Natural Variability and Pastoral Adaptation in African Savannas*, pp. 89–103. London: Overseas Development Institute.

Behnke, Roy H. (Jr.), Ian Scoones and Carol Kerven (eds) (1993) *Range Ecology at Disequilibrium: New Models of Natural Variability and Pastoral Adaptation in African Savannas*. London: Overseas Development Institute.

Bromley, Daniel W. (1991) *Environment and Economy: Property Rights and Public Policy*. Oxford: Blackwell.

Bromley, Daniel W. (ed.) (1992) *Making the Commons Work: Theory, Practice and Policy*. San Francisco: ICS Press.

Chan, Anita, Richard Madsen and Jonathan Unger (1992) *Chen Village under Mao and Deng* (rev edn). Berkeley, CA: University of California Press.

Cheng, Yuk-shing and Shu-ki Tsang (1995/96) 'Agricultural Land Reform in a Mixed System: The Chinese Experience of 1984–1994', *China Information* X(3/4) Winter/Spring: 44–74.

Committee on Scholarly Communication with the People's Republic of China (CSCPRC) (1992) *Grasslands and Grassland Sciences in Northern China*. Washington, DC: National Academy Press.

Croll, Elisabeth (1994) *From Heaven to Earth: Images and Experiences of Development in China*. London: Routledge.

Dahl, Gudrun and Anders Hjort (1976) *Having Herds: Pastoral Herd Growth and Household Economy*. Stockholm Studies in Social Anthropology, No 2. Stockholm: Liber Tryck.

Ehrenfeld, D. (1972) *Conserving Life on Earth*. New York: Oxford University Press.

Gao, Guiying (1995) 'The Problem of the Ningxia Women and Islam', *Huizu Yanjiu* (Research on the Hui) 1995/2: 54–62.

Hardin, Garrett (1968/1977) 'The Tragedy of the Commons', *Science* 162: 1243–8. Reprinted in Garrett Hardin and John Baden (eds) *Managing the Commons*. Washington, DC: Freeman and Co.

Ho, Peter P. S. (1998) 'Ownership and Control in Chinese Rangeland Management: A Case Study of the Free-rider Problem in Pastoral Areas in Ningxia, China', in F. Pieke, E. B. Vermeer and W. L. Chong (eds) *Cooperative and Collective in China's Rural Development: Between State and Private Interests*, pp. 196–235. New York: M. E. Sharpe.

Ho, Peter P. S. (2000) 'The Clash over State and Collective Property: The Making of the Rangeland Law', *China Quarterly* 161: 227–50.

Keith, Ronald C. (1994) *China's Struggle for the Rule of Law*. New York: St Martin's Press.

Kiser, Larry L. and Elinor Ostrom (1982) 'The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches', in Elinor Ostrom (ed.) *Strategies of Political Inquiry*, pp. 179–222. London: Sage Publications.

Leeuw, Peder N. and John C. Tothill (1993) 'The Concept of Rangeland Carrying Capacity in Sub-Saharan Africa — Myth or Reality', in R. H. Behnke (Jr.), I. Scoones and C. Kerven (eds) *Range Ecology at Disequilibrium: New Models of Natural Variability and Pastoral Adaptation in African Savannas*, pp. 77–88. London: Overseas Development Institute.

Lei, Zhizhong, Guo Gang, Yang Hongchun and Mo Dayan (1964) 'Ningxia Huizu Zizhiqu Yanchixian Caoyuan Diqu Mumin Liyong Caodi Fangfa de Diaocha Yanjiu' (Research of Methods of Grassland Utilization of Nomads of Grazing Areas in Ningxia Hui Autonomous Region) in 'Ningxia Huizu Zizhiqu 1963 Caoyuan Yanjiu Baogao Xuanbian' (A Selection of Grassland Research Reports of Ningxia Hui Autonomous Region), pp. 32–151. Internal Document. Ningxia Huizu Zizhiqu Nongyeting Xumuju.

Li, Yutang (1994) *Caoye: Fuguo Qiangmin de Xinxing Chanye* (Pastoralism: The Newly Established Industry to Strengthen the People and Enrich the Country). Yinchuan: Ningxia Renmin Chubanshe.

Longworth, John W. and Gregory J. Williamson (1993) *China's Pastoral Region: Sheep and Wool, Minority Nationalities, Rangeland Degradation and Sustainable Development*. Wallingford: CAB International.

Ma'erzhuang Xiang Cunmin Weiyuanhui (MXCW) (1996) *Guanyu Ma'erzhuang Xiang Shehui Zhi'an Jushi E'hua de Qingkuang Fanying* (A Reflection of the Decline of Public Order in Ma'erzhuang Township), Part I and II. Unpublished Leaflet, Ma'erzhuang (13 May).

Nicholson, Norman (1988) 'The State of the Art', in Vincent Ostrom, David Feeny and Hartmut Picht (eds) *Rethinking Institutional Analysis and Development: Issues, Alternatives and Choices*, pp. 3–39. San Francisco: ICS Press.

Ningxia Caochang Zhibei Ziyuan Diaochadui (NCZZD) (1985) *Ningxia Caochang Ziyuan Diaocha Baogao*, Neibu Ziliao (Research Report of Rangeland Resources in Ningxia, Restricted). Yinchuan: Xumuju.

Ningxia Huizu Zizhiqu Nongyeting (ed.) (1988) *Ningxia Nongye Hezuo Jingji Shiliao* (Historical Material of the Cooperative Economy of Ningxia). Yinchuan: Ningxia Renmin Chubanshe.

Ningxia Huizu Zizhiqu Tongjiju (ed.) (1994) *Ningxia Statistical Yearbook*. Yinchuan: Zhongguo Tongji Chubanshe.

North, D. and R. Thomas (1977) 'The First Economic Revolution', *Economic History Review* 30(2): 229–41.

Oakerson, Ronald J. (1992) 'Analyzing the Commons: A Framework', in D. Bromley (ed.) *Making the Commons Work: Theory, Practice and Policy*, pp. 41-59. San Francisco: ICS Press.

Ophuls, W. (1973) 'Oblivion or Leviathan', in H. Daley (ed.) *Toward a Steady State Economy*, pp. 215–30. San Francisco: W. H. Freeman.

Ostrom, Elinor (1990) *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

Panel on Common Property Resource Management (PCPRM) (1986) *Proceedings of a Conference prepared by the Panel on Common Property Resource Management*. Washington, DC: National Academy Press.

Pennarz, Johanna (1996) 'Collective Land Ownership and Sustainable Agriculture: Perspectives on the Diversity of Land User Rights in China'. Room Document No 2, Workshop on Agricultural Policies in China, OECD Headquarters (12–13 December).

Picardi, A. and W. Siefert (1976) 'A Tragedy of the Commons in the Sahel', *Technology Review* 78.

Reisch, Erwin (1992) 'Land Reform Policy in China: Political Guidelines and Tendencies', in E. B. Vermeer (ed.) *From Peasant to Entrepreneur: Growth and Change in Rural China*, pp. 15–20. Wageningen: Pudoc.

Scoones, Ian C. (1995) *Living with Uncertainty: New Directions for Pastoral Development in Africa*. London: IT Publications.

Shi, Wenzheng (1996) *Caoyuan yu Caoye de Fazhi Jianshe Yanjiu* (Research of the Establishment of a Legal System for Rangeland and Pastoralism). Hohhot: Neimenggu Daxue Chubanshe.

Wade, Robert (1987) 'The Management of Common Property Resources: Collective Action as an Alternative to Privatisation or State Regulation', *Cambridge Journal of Economics* 11: 95–106.

Yanchi Caodi Nongye Xitong Yanjiu Ketizu (YCNXYK) (ed.) (1992) *Ningxia Yanchi Caodi Nongye Xitong Yanjiu* (Research on Grassland Agricultural Systems of Yanchi, Ningxia). Lanzhou: Gansu Kexue Jishu Chubanshe.

Yang, Hongchun (1964) 'Ningxia Huizu Zizhiqu Caodi Ruogan Tedian Ji Qi Liyong' (Some Special Traits of Grassland in Ningxia Hui Autonomous Region and Its Utilization), in Xumu Shouyi Xuehui (ed.) *1963 Huilun Wenji* (Abstracts of the Discussion Meeting of 1963), pp. 97–107. Internal Document, Xumu Shouyi Xuehui.

Zhang, Linxiu, Jikun Huang and Scott Rozelle (1996) 'Land Management, Tenure and Ownership Policies: Land Policy and Land Use in China', Workshop on Agricultural Policies in China, OECD Headquarters (12–13 December), Restricted.

Zhongguo Ziran Ziyuan Congshu Bianyi Weiyuanhui (ZZZCBW) (ed.) (1995) *Zhongguo Ziran Ziyuan Congshu: Ningxia Juan*. Beijing: Zhongguo Huanjing Kexue Chubanshe.

Zhou, Qiren (1993) *Zhongguo he Suoyouquan Guanxi de Bianhua* (Changes of the Relationship between the State and Ownership), Nos 1 and 2. Beijing: Rural Institutions Research Group of the State Council Rural Development Research Center.

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