

Changes of Nomadic Patterns and Steppe Grassland Ecosystem in Inner Mongolia¹

In general, the grassland ecosystem is affected by four dimensions of factors: geography and climate, vegetation, domestic and wild animals, human activities. There are complicated interactions among these four dimensions. Up to now, most studies of grasslands in China have focused on climate, botany, vegetation, animals and ecology; few studies have focused on the impact of human activities; and above all little attention has been given to policy implications and their impact on pasture use and grassland environment. Studies of migration, one of the important human activities affecting natural resource distribution, are also very limited in this region.

The system reform and policy implications are the most important factors in understanding the societal, economic, demographic, and environmental changes in contemporary China. Therefore, the Institute of Sociology and Anthropology at Peking University organized a series of field surveys in several locations in Inner Mongolia to study the social dimensions of the environment changes and the relations between population and environment. Hurqige Gaca is one of the research sites chosen for this project.

Based on a case study of Hurqige Gaca (a former brigade), this article focuses on the impact of the recent system reform on ownership of animals, on the right of using pastures, on management of animal husbandry, on migration patterns, and through these intermediate factors on environment in grasslands. It hopes to provide some insights in understanding the human dimension of the grassland ecosystem in the Mongolian steppe.

Introduction

Degradation and desertification in grassland areas are one of the most serious environmental problems in today's China. The total area of grassland in China is about 4 million square kilometers, 41.7% of China's territory. For centuries, the major ethnic group living on grassland areas in northern China has been the Mongolians, whose economic and cultural traditions are different from the Han majority group.

The Inner Mongolia Autonomous Region is located in northern China, and the area of this Region is 1.18 million square kilometers. According to the 1990 national Census, the total population of Inner Mongolia is 21.5 million, with ethnic Mongolians 15.7% of the total. Grasslands in Inner Mongolia comprise 0.9 million square kilometers, over one fourth of the total area of grasslands in China.

The relevant literature in the disciplines of social sciences has been reviewed in a chapter of *Grasslands and Grassland Sciences in Northern China* (Ma Rong, 1992:121-132). According to these previous works and the author's research experiences in grasslands, the human dimension seems to have played a more important role in environmental changes than natural "factors" such as weather and soil. To study the grassland ecosystem in Inner Mongolia, several points need our special attention:

1. The native-migrant relationship

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The native residents in the grasslands of Inner Mongolia are Mongolians whose traditional economic activity has been animal husbandry for centuries (Jagchid and Hyer, 1979). Since the beginning of this century, many Han farmers migrated into Inner Mongolia and cultivated grasslands for agricultural production. The process was enforced by the Qing dynasty which intended to increase population density in the northern frontier areas for national defense (Ma Rong, 1987). The Han population in Inner Mongolia has increased from 1 million to 18 millions during the past 90 years. The area of cultivated land in Inner Mongolia increased to 5 million hectares by 1991. Gradually, the Mongolians became the minority group in Inner Mongolia and the expansion of cultivation reduced the area of grasslands.

2. The impact of governmental policy on "grain production"

For decades, the Chinese government had strongly emphasized national "agricultural production", especially grain production. The government policies in the 1950s, 1960s, and 1970s, especially during the period of the "Cultural Revolution", encouraged herdsmen to cultivate grasslands to reach the goal of "self-supply with grain" (Liu and Zheng, 1979: 185; Si and Hu, 1983: 102). Therefore, even in the pure pastoral areas, cultivated lands appeared under the administrative arrangement. But because of cold weather, shortage of rainfall, short "frost-free period", the quality of soil and other limitations, the attempt failed and turned into disasters. Those cultivated lands soon became desert or semi-desert.

3. The System Changes in the Past

The commune-brigade system was established in the late 1950s. Enforced by government policies, management of land use, cultivation and animal husbandry had been under the plans of the government (Liu and Zheng, 1979). The system reform in the early 1980s brought tremendous system changes in grassland areas as in other parts of China. The communes and brigades have disintegrated, and then cultivated land, animals, and part of pastures were redistributed among rural households². Now pasture use and management of animal husbandry in grassland areas are no longer under the control of the government. In some areas, overgrazing was reported because of herdsmen's short-term money-making strategy. In some other areas, local herdsmen carried out grassland constructions to improve the quality of their pastures³.

4. New Migration Trends after the Household Responsibility System

Following the practice of the new reform policies, many Han migrants who migrated into pastoral areas under the commune system then moved out from pastoral areas to towns, because they were discriminated in the process of animal redistribution while the new policies also provided them with new opportunities in towns (private business in services, trade, handicraft, transportation, etc.). The new patterns of migration changed the economic structure of the native community in grasslands.

5. New Market Economy and High Income

In the past decades, because of the government policy to open the door of China to the world market and international trade, the prices of pastoral products (meat, wool and cashmere) increased rapidly. Therefore, the income of herdsmen also increased rapidly. But on the other hand, many herdsmen intend to increase their number of animals and exploit pasture as much as possible. We found this phenomenon in Chifeng, central Inner Mongolia (Ma and Pan, 1993). One reason is to

² In some pastoral areas as in Chifeng, only the grasslands for mowing were distributed among individual households. The pastures for grazing are still the common property of the community. This pattern actually encouraged people to increase the number of their animals to take advantage of common property (cf. Ma and Pan, 1993).

³ According to the official statistics, 8,379.5 million *mu* (or 561.4 hectare) grasslands were fenced in East Wuzhumuqin Banner in 1985 (Gerletu, 1988: 264).

get a higher income, another is that they are afraid that pasture and animals will be taken away from them again in the future. This short-term money-making strategy results in serious ecological problems (overgrazing, degradation and desertification) in grasslands.

From reviewing the history of the past several decades, the chain of cause and effect is clear: first, government policies in China strongly regulated the local administrative and economic systems. Secondly, the systems (the commune system or new "household responsibility system") directly regulated and indirectly affected land use, agricultural and livestock production of local communities, which then have a strong impact on the environment. Policy - management systems - economic activities - environment is the chain indicating the process of environmental changes in China. Keeping the above points in mind, this study has focused on the following two issues which are closely related to the ecosystem:

1. Han in-migration in pastoral areas

Han population was 1.2 million in Inner Mongolia in 1912, and increased to 17.3 million in 1990. The rapid growth of population and the demand for land cultivation (Han are traditionally farmers) is one of the most important factors in this study. The large volume of in-migration increased population density and pressure on natural resources.

2. The policy changes

The policies for the ownership and management systems in these areas had known several significant changes since 1949. First, the government distributed animals and lands of landlords and herdlords among the poor herdsman, then established collective productive units step by step (first "mutual aid group", then collective, finally brigade and commune), and recently it redistributed animals and lands among the residents again. Such system changes had a tremendous impact on land use, which in turn is related to environment. The questions this survey will try to answer are: what were the major system changes in the past four decades? What were the residents' responses to these system changes? What are the results of these system changes regarding migration, land use and environment? What has been the relationship between economic development and environment?

Findings on the above major aspects will provide important insights in understanding the human dimensions of environment changes under not only the historical condition, but also under the Chinese social and economic systems and their recent reform. The goal of this project - to define key factors affecting environmental changes - may be beneficial to both the ecosystem and the policy-makers in China. The topics of this research project are associated with a wide range of social, economic, ethnic, demographic and cultural content which make this multi-disciplinary study more difficult but also more interesting. As a part of this project, this article will report our major findings in migration patterns and pasture management.

The Survey Site

Hurqige Gaca (a former brigade) is located in Shamaï Sumu (a former commune), East Wuzhumuqin Banner (at county level), Xilinguole League. Gaca is on the China-Mongolia border and considered one of the best pastures in this region. In 1993, the total area of Hurqige Gaca is 869 square kilometers (or 97,363 hectares). This area is a part of Balongmagedong Hill - Wave Plateau with chestnut soil and dark chestnut soil. The average annual rainfall is between 250 and 300 mm (Gerletu 1988: 17).



Figure 1. The Location of Research Site

By the end of 1992, there were 91 households and a population of 516 officially registered in Gaca. But among them, 20 households and 109 people did not live in the Gaca nor work in pastoral production. They left Gaca after animal redistribution in 1983 and most of them now live in the county town and engage in other economic activities. All residents living in Gaca in 1993 are native Mongolians. Among those who live in Sumu or the county town, about 40 percent are Mongolian migrants and 60 percent are Han migrants who moved into Hurgige in the 1950s and 1960s.

The annual income per capita of Hurgige Gaca was 2,679 yuan in 1992, a little higher than the average level of the whole Banner⁴. By the end of June, 1993, there were 1,997 horses, 4,800 cattle and 35,222 sheep and goats owned by the herdsmen of Hurgige Gaca⁵. The pastoral income of Hurgige herdsmen was 1,259,924 yuan, 99.7% of their total income. Thus Gaca represents a pure

⁴ The highest annual income per capita by Sumu in East Wuzhumuqin Banner in 1992 was Bayanhbur Sumu (3,263 yuan), the lowest one was Daotenor Sumu (1,150 yuan). Shamai Sumu (where Hurgige Gaca is located) was 2,439 yuan. Generally, the residents living in Sumu site have a lower income than herdsmen in Gaca.

⁵ The difference between these numbers and the numbers by the end of 1992 indicates the survived new born animals in the past spring.

pastoral area with an average income level.

Another important reason for choosing Gaca as our research site is that I had spent a period of time in the past as a herdsman in Gaca. I went to this brigade in 1968 when I was a high school student in Beijing. Before I obtained a chance to enter college in Hohhot in 1973 I had continually worked in this pastoral community as an ordinary herdsman for 5 years. Therefore I know this place very well, know the patterns of pastoral management, and know these Mongolian herdsmen and their lives. Another former "intellectual youth", Prof. Li Ou who spent 11 years in the same brigade, also joined me during the two visits. This is a great advantage for us to study this community. In the summer of 1992 and 1993, we visited this community twice. To talk to those old friends and neighbors recalled our memories of the past. Many old people have already passed away, those at our age are going to have their grandchildren. Pastures, hills, valleys, and sand dunes are still the same, but there are many new brick and tile-roofed houses instead of tents. People now own their animals and have the right to use assigned pastures, their standard of living also increased tremendously.

We visited this community twice, once in the summer of 1992, and again in 1993. We interviewed 42 households, which is about half of the households remaining in this area. From the local government, we obtained the relevant statistics of population changes and livestock production. Many materials have not been explored but we will certainly work on them soon.

Changes in Local Administrative Systems

The area of today's East Wuzhumuqin Banner was under the rule of Mongolian Prince Demuchukedonglupe until 1947, in which year the Inner Mongolia Autonomous Region was established. In 1952, a work team was sent by the Banner government to Hurqige valley. The team taught herdsmen to read and write and called to organize a "mutual aid group" among the herdsmen. According to the memory of an old herdsman, there were about 40 households and less than 10,000 animals in Hurqige area ("Seventh Bage"). At that time, the pastures were not fixed. Before the winter, sheep and cattle moved to East Sunite Banner in the west of Xilinguole League where the lighter snowfall made the animals survive the winter much easier. Then animals moved back to Hurqige Valley before spring.

Six "mutual aid teams" ("Gaote") were established in 1956, then pastures became fixed. One "Gaote" consisted of 8 households and less than 800 sheep. Animals moved within the border of "Seventh Bage" of the Banner (including today's Hurqige and Mandelatu Gacas). In 1957, the "cooperative movement" was introduced into this area. In 1958, all animals became the property of cooperatives which paid the prices back to their owners in the following years. In 1959, a nearby Shunite Pastoral Farm joined the "Seventh Bage" and separated from it again in 1960. In 1961, Shamai Commune was established, consisting of three brigades: Hanwula, Hurqige, and Mandelatu. The southern part of "Seventh Bage" became separated Mandelatu brigade, the rest northern part became Hurqige brigade (Figure 1).

The administrative boundary had been kept stable during 1961-1986. In 1983, the commune was disintegrated and animals and pastures were distributed among brigade members. In 1986, the east part of pasture of Hurqige was given to a new established Bayinaobao Gaca. This new Gaca was based on the former Wunite State Farm which was forced to move to Gesgewula Mountain areas before the "Cultural Revolution". The area of Hurqige Gaca was reduced from 1161.5 square kilometers (116,092 hectare) to 869 square kilometers (86,837 hectare).

Changes in Migration Patterns

In-migration (1959-1972)

Among 91 households registered in Hurqige in 1993, six were Mongolian in-migrants (some of them came from other leagues), 14 were Han in-migrants, and 71 were native Mongolians.

The first in-migrant family (a Mongolian family) came in 1959 to join the newly established cooperative. Their place of origin (Ningcheng County of Chifeng) had a drought in 1958, and therefore the government managed migration of some local residents to other places. This family had a relative working in Shamai Commune and asked to migrate to this area.

In 1960 and 1961, because of natural disasters in their place of origin, 3 Han farmers and their families moved to a state farm near Shamai Commune. Through introduction of their relatives who already worked in Shamai Commune (workers in commune-managed workshop, teachers in commune primary school, cadres in Commune government, etc.), they came to work in the workshop of Shamai Commune in 1962. When the work order was disturbed in the commune workshop (consisting of carpenters, cobblers, felt-makers, etc.) because of the "Cultural Revolution" and the workshop could not maintain itself financially in 1967, some workers from the commune workshop joined three brigades under this commune ("Xia-fang") and became brigade members. This action was volunteered by these workers and arranged by the Commune government. Among them, 3 came to Hurqige brigade.

During the "Cultural Revolution", migration control in this remote region was loosened. The local cadres were criticized politically and were unable to enforce the relevant regulations. On the other hand, by its work assignment system, the Commune-brigade system organized some "collective work" (drilling a well, building houses, mowing grass, transportation, and farming production when policies requested). These works needed and absorbed migrant laborers. They earned "work points" like other herdsmen and shared the income of the brigade which was almost totally from livestock production.

In 1967 and 1968, 52 "intellectual youths" came to Hurqige brigade from Beijing. They were middle school students sent here for "re-education". They were organized into 10 groups living in 10 tents. Each group was assigned a flock of sheep (around 2000 sheep and goats), together with another herdsman household at the beginning. After some years they became experienced herdsmen. The authors of this article belonged to these groups. These students left Hurqige gradually for different reasons: illness, high education, new job assignment, family reunion, etc. The last one left in 1979. In 1972, 5 students from Xilinhote (the capital of Xinligole League) arrived in Hurqige, and also left again in the following years.

Two Mongolian families moved to Hurqige in 1961, one from a nearby commune, another from Chifeng (a southern league). These two still remain in Hurqige as native herdsmen. Two other Mongolian in-migrants, who moved to Hurqige in 1971 and 1978, migrated to another place in the early 1980s.

During 1969-1974, the policies of the regional government of Inner Mongolia asked herdsmen to produce grain for themselves. Followed this policy, three brigades of Shamai Commune cultivated three pieces of grasslands in one site ("Tumute"), and they locate next to each other. This area was easier to drill for irrigation. "Tumute" therefore was the "farming base" for three brigades. Like other brigades, Hurqige brigade sent several in-migrant households and Beijing students to live and work in Tumute in order to maintain the base. After 1974, it was proved that to cultivate grasslands in such a marginal area resulted in desertification and no harvest, so the "farming base"

was gradually abandoned.

Out-migration (1984-1985)

Except for three Mongolian households (2 from nearby communities and 1 from another league far away), all in-migrants now live in Sumu or in the county town and none of them engage in animal husbandry. They left Hurqige in 1983 or 1984 after animal redistribution. The standards of animal distribution for native Mongolians and Han in-migrants were different: 30 sheep, 3.5-4 cattle and 3.5-4 horses per capita for native Mongolians (including 2 Mongolian in-migrants who moved into Hurqige from nearby communities); 10 sheep per capita, 3 cattle and 3 horses per household for in-migrants (including 5 Mongolian in-migrant households who speak Mongolian language but came from far away).

Only one Mongolian in-migrant household received the low standard of animal distribution now remaining in pastoral production. This household has lived in "Tumute" (the brigade agricultural base) for over two decades. The brigade built them houses. Although this "farming base" could not produce grain in most years, it produced millet straw and maize stalks which can be used to feed weak animals in winter. Brigade also drilled a well and built animal pens in Tumute for this purpose. Therefore, this household living in Tumute actually has some advantages in livestock production though it started with a smaller group of animals. In 1993, the animals of this household increased from 50 sheep, 3 cattle and 2 horses (the share of 6 persons in 1983) to 150 sheep, 45 cattle and 14 horses (the size of the household remains 6 persons).

There were two kinds of households in Hurqige during the commune period regarding their relationship with livestock production. One worked with a flock of animals (sheep or cattle). This group were native Mongolian herdsmen. Another engaged in other activities (gardener, cook for brigade office and school, carpenter, horse-drawn cart driver, tractor driver, and other seasonal work assigned by the brigade such as well drilling, building houses, grass mowing, etc.).

The second group were in-migrants and their in-migration only became possible in pastoral areas under the former commune-brigade system. Under that system, the government requested the local pastoral community (commune and brigade) to organize some collective activities which native herdsman families did not want to do (to live in work sites away from their families, and the work is very hard for herdsmen) and they did not have the surplus laborers to do either. Under the commune system, the commune and brigade cadres had the power to arrange official in-migration (to get residential registration).

The work-point distribution system made the contribution of the in-migrants to brigade mixed up with herdsmen's contribution, so herdsmen tolerated in-migration to a certain extent. Generally, most of the brigade income comes from livestock production (selling animals and wool). For example, pastoral income was 154,538 yuan while sideline income 13 yuan and "other income" 10,714 yuan in Hurqige brigade in 1978. In the same year, livestock expenses were only 8,445 yuan while sideline expenses 16,279 yuan and "other expenses" 5,738 yuan. Because the work done by the second group of laborers might not be counted as "income" (houses, well, fold, transportation, grass cutting, etc.), the contribution of the second group to brigade's economy is underestimated by the statistics. But the pure income of 134,803 yuan was mainly from livestock production.

"Urban intellectual youths" were a special migrant group. They were organized by "tent" and each tent consisted of 4 to 6 students. Every "student tent" was assigned a flock of sheep. Because to take care of a flock of sheep usually needed only 2 laborers (3 in spring), the other students joined in-migrants in other activities. They all left Hurqige before animal redistribution in 1983.

The household number decreasing after 1972 indicates their out-migration.

Table 1 introduces the expenditure of this brigade during 1978-1982, showing the distribution structure of the brigade annual income. The annual total income of this brigade was stable as well as its distribution structure. The part to be distributed among households according to the work points they earned consisted of 60-70% of the total. "Public welfare fund" (about 2-6%) were mainly used to cover the health care expenses provided by three "barefoot doctors" and maintain the expenditure of the brigade school (textbooks, meals, etc. of the students and teachers). "Sideline expenditure" was also very important to build fences, driving wells, and build storage houses that were collective properties and essential to maintain and support animal husbandry activities. When commune and brigade system disintegrated, these expenses have to be taken care of by individual households and then caused a lot of social problems in rural areas.

Table 1. Expenditure Structure of Hurqige Brigade (1978-1982) (in yuan)

		Livestock expenditure	Sideline expenditure	Others	State Tax	Accumulation fund	Public welfare fund	Distribution among households	Total
1978	yuan	8,445	16,279	5,738	6,073	13,221	4,958	90,450	140,664
	%	6.0	11.6	4.1	4.3	9.4	3.5	64.3	100.0
1979	yuan	12,606	25,858	204	6,190	7,250	2,993	87,050	142,151
	%	8.9	18.2	0.1	4.4	5.1	2.1	61.2	100.0
1980	yuan	11,670	31,389	5,797	0	9,636	3,576	94,009	156,077
	%	7.4	20.1	3.7	0.0	6.2	2.3	60.2	100.0
1981	yuan	3,252	18,020	4,830	0	9,794	3,638	93,762	133,296
	%	2.4	13.5	3.6	0.0	7.3	2.7	70.3	100.0
1982	yuan	1,369	14,351	11,656	0	20,970	10,485	119,782	178,613
	%	0.8	8.0	6.5	0.0	11.7	5.9	67.1	100.0

The urban students had some impact on the native Mongolians in their knowledge of structure and customs. They provided a channel for the native Mongolians to contact the outside world. Some herdsmen visited Beijing to see doctors or to travel and such an experience helped them to know more beyond the grassland world. After returning to Beijing, these students still keep some contact with native Mongolians. After animal distribution, in-migrants cannot live on the small number of animals, and they cannot get a work assignment from the brigade to earn "work points" either. Therefore, they left Hurqige and moved to Sumu or county town for other opportunities. Some even returned to their place of origin in another province and left their adult children here. They all still register in Hurqige as their official residence. The number of these households and population appears in the records of the public security station, but is not included in economic records of Gaca as shown in Table 2 for the period of 1989-1992.

Table 2. Basic Statistics of Hurqige Brigade (Gaca)

Year	Number of households	Population	Number of horses	Number of cattle	Number of sheep/goat	Annual income per capita (yuan)
1962	49	253	-	-	-	126
1963	59	315	-	-	-	110
1972	85	438	-	-	-	180
1979	77	415	1698	1442	11051	179
1982	74	406	4191		21113	295
1984	75	442	4665		18084	817
1989*	88 (63)	481 (369)	1746	3175	28180	2318
1990	88 (65)	486 (385)	1707	3553	29017	1503

1991	91 (67)	504 (408)	1706	4040	32625	2126
1992	91 (71)	516 (407)	1852	4356	31948	2679

* The numbers in parentheses are the number of herdsmen households and people.

Although these former migrants do not live in Hurqige any more, a large proportion of them still keep a close relation with Hurqige herdsmen. When herdsmen need someone to drill a well, to fence a piece of grassland, to mow grass in fall, to repair a tractor, to build a house or a sheep-pen, they turn to these in-migrants and pay them for the job and services. They and these in-migrants worked in the same brigade for decades before, so they know each other well. For example, a Han in-migrant opened a restaurant in Sumu, and when Hurqige herdsmen visit Sumu, they go to his restaurant instead of three others. When we visited Sumu, we also had a meal in his restaurant and he refused to accept our money.

The story of a Han in-migrant household might help us to understand the changes in migration patterns in this pastoral area. In 1960, a Han farmer (Wang) moved from Henan to Huqiartai Farm, which is located near Shamaï Commune. When this state farm disintegrated in 1962, he came to work in the workshop of Shamaï Commune, then became a member of Hurqige brigade in 1967 and brought his whole family from Henan. The farmer's wife returned to the place of origin as some other in-migrants' wives in 1969 when China-Russian relations worsened. They felt it was dangerous to live in China-Mongolian border at that time. Other migrants' wives returned to Hurqige two or three years later, but this farmer's wife remained in Henan.

In 1984, the 58 year-old father returned to Henan finally, his oldest son (26 years old) married a girl from his hometown in Henan and the young couple moved to the county town. The young man bought a tractor and became a self-employed tractor driver to transport constructive materials and other goods by contract. In the fall, he organizes a team (the team members are his friends and neighbors in county town) and comes back to Hurqige to mow grass. The team mows grass in the assigned areas and transports grass to pens near each herdsman's house. The price of grass (including mowing and transportation) is negotiated between brigade cadres and this young man (contractor): 0.05 yuan per kilogram in 1991 and 0.06 yuan per kilogram in 1993. This young man also becomes a contractor of house construction. When we visited several residents in Hurqige, we found out that many of their houses were built by a small construction team from Henan Province, which is a thousand miles away. The team leader is the second son of the Henan farmer (Wang). His oldest son signs the contract, and his second son organizes a team in his hometown in Henan and comes to Hurqige to build houses in summer. The native Mongolians, who do not speak Mandarin language and do not have the skill and time to build Han-style houses, consider this young man more reliable than other strangers.

This example shows that the experience of working in Hurqige for a period of time helped those in-migrants build up a close relationship with native Mongolians and this relationship benefits them after they left the brigade.

New Trend of Seasonal Migration

Because now each household has a flock of sheep, a flock of cattle, and some horses, the households with less laborers have a problem to take care of these different animals.

One solution is to keep a large family including married children. Under the commune system, newly married couples soon established their own households in order to apply for a flock of animals to become "livestock households". If they remained with parents, they had to participate in other collective activities to earn work points. The flock assigned to his parents only offered a

certain amount of work points⁶. Therefore, we found some "big" families in Hurqige. In 1993, there are 8 households with 8-9 members, 5 households with 10 or more members. There was no such big household before 1983. Big households had obvious disadvantages in the commune system and advantages in new household responsibility system.

A second solution is that 2 or 3 households with kinship relations live together or near to each other. They join their animals into one flock by kind. This is an effective way to save labor force, especially as the size of flock became much smaller compared with the period of the commune system. By joining their animals in grazing, the ownership of animals does not change.

A new phenomenon appeared in Hurqige and other pastoral communities recently. In 1993, four households in Hurqige which lacked laborers hired outsiders to graze their animals. These employees live and eat at the house of their "boss", and earn 150-210 yuan per month. One of them has been working in Hurqige for 7 years and he works annually. Three others only work for spring and summer. All these "hired livestock workers" are Mongolians from poor areas in other leagues, far away from Hurqige. This new pattern can be called "seasonal migration". The earliest one came in 1986, the second one in 1991, the other two in 1993. Because a large proportion of native households are going to have surplus laborers soon when their children grow up, we do not expect the number of these "hired herdsmen" to increase. But this phenomenon will exist since some families do need a helping hand.

Changes in Pasture Use Patterns

As mentioned before, the brigade border was fixed in 1956. After the commune-brigade system was well organized in 1961, the management of pastoral production and pasture use had a new pattern. Looking at Figure 2, it is clear that the northern pasture along the border was the winter camp for the whole brigade. There is no water or well in this pasture, so it can only be used in winter when animals can eat snow and people can melt snow for water. The small "+" in Figure 2 shows the location of sheep camps in winter while cattle camps spread to the south. Hurqige Valley is the spring camp for the whole brigade. The river and a series of ponds provide water for animals which need to drink water every other day (animals drink water every third day in summer and fall). After animals' baby-bearing season in spring, the flocks were divided into two big groups. One moved west while another moved east. Figure 2 shows their move routes in summer and fall.

⁶ Generally, 10 points for taking care of a flock of sheep in the day time, 8 points at night; 8 points for a flock of cattle in the day time and 6 points at night.



Figure 2. Seasonal Nomadic Herding routine of Hurqige Brigade (1961-1983)

Hurqige usually had 20 flocks of sheep (including some goats) and about 14 flocks of cattle, one flock of horses, plus one flock of breeding sheep. In the early 1970s, each flock of sheep consisted of about 1500-2000 sheep and goats, each flock of cattle consisted of about 150-200 cows and bullocks, the flock of horses consisted of over 2000 horses. Totally about 35,000-40,000 animals were in Hurqige at that time. Each household engaged in pastoral production only needed to take care of one flock of animals: either sheep or cattle. The brigade assigned two herdsmen to take care of horses. When a "cattle household" needed sheep for meat, it went to a "sheep household" (usually in the same group; Hurqige brigade consisted of 7 groups). When a "sheep household" needed a cow for milking or a bullock for transportation, it went to a "cattle household".

Although the total animal number in the 1970s was close to the total number of animals in 1992 (38,156), the management of pastoral production changed completely. After animal and pasture redistribution among residents, now each household has four kinds of animals: cattle, horses, sheep and goats. This has several results: (1) the size of flock became much smaller, now the size of a flock of sheep is around 300-1000, the largest is around 1500; (2) one household needs more laborers to take care of different animals. In order to save labor, some relatives live next to each other and joined their animals by kind; (3) each piece of pasture now is under the management of a household. The animals of a household should not cross its border. In order to protect grasslands for use in spring, all herdsmen fenced a piece of grassland in their spring camp (cf. Table 3 for relevant expenses); and (4) they also built houses for their own residence and pens and sheds for their animals in the spring camp.

Table 3. Expenditure Structure of Hurqige Gaca (1985-1992)

Year	Total expenditure	Animal medicine	Forage	Repairing	Other productive expenditure *	Grassland fence	Pen /shed	Well	House	Tent
1985	177839	350	500	80	6166	3900	5700	4200	5410	-
1986	237427	10622	1650	6220	24120	12476	10415	5910	7965	-
1987	321972	6464	12745	2200	10340	71000	42143	5920	28090	861
1988	398598	12364	23670	6572	49085	56100	11186	500	79810	12321
1989	446199	22668	15100	13210	62380	22500	27670	-	189943	5414
1990	580183	21775	21960	11480	199200	-	37100	300	149600	1486

1991	383015	20198	35700	26440	22680	-	12470	-	126700	4309
1992	624068	20385	20650	17321	21090	-	47165	2100	188087	5196
	Gaca collections								State	
	Animal prices	Pasture management fee		Gaca management fee					tax	
1985	23323								9236	
1986	42299	15725		-					11180	
1987	55077	20032		-					12548	
1988	41929	8730		8354					5500	
1989	22143	9562		-					23059	
1990	34796	14157		9559					36310	
1991	35614	13714		10215					51229	
1992	16110	6440		5194					60959	

* A large proportion of this expenditure has been used to buy tractors, motorcycles, jeeps, generators and other machines.

Figure 3 shows the location of these "fenced pastures" and houses. The herdsmen now live in the house for at least two seasons: spring and summer. The autumn camps are usually located very close to their house in summer camps. Herdsmen moved a short distance in fall just to protect the grass around their houses. Of course there are exceptions; we found that some herdsmen only live in a house for spring, some live in tents during the fall. But generally speaking, herdsmen in Hurqige are no longer traditional nomads, they have become semi-nomads and semi-settled.



Figure 3. Residential and Herding Site Distribution of Hurqige Gaca (1983-1993)

The prices of pastoral products increased rapidly in the 1980s. For example, the price for a sheep on average was 30 yuan in 1984 then increased to 100 yuan in 1992; the price for a cow or bullock was 440 yuan in 1986 but 675 yuan in 1992; cashmere was 7 yuan per kilogram in the middle of 1970s, 36 yuan in 1985, 200 yuan in 1989. From Table 1, we can see the increase of herdsmen's income.

After pastures under the management of individual households, there is another very important change regarding livestock production. In the past, the government persuaded herdsmen to sell more animals in the fall to release the pressure on grasslands. But this attempt had a limited effect. According to the experts of livestock production, to sell male lamb in November is the best strategy to earn income while reducing the number of sheep to protect grasslands. During the whole winter and most of spring, lambs of the last year do not increase their value much. Under the commune

system, herdsmen paid less attention to "common pasture" while a flock with many strong, big sheep is easier to graze in bad weather. Now the herdsmen in Hurqige sell almost all male lambs voluntarily because of their concern about "overgrazing".

The new system of pasture management even has some impact on the fertility pattern of local herdsmen. In this pure pastoral area, herdsmen's income is totally dependent on the number of their animals, and the number of animals is limited by the quality and site of pastures. In 1983, all pastures within the boundary of Hurqige were distributed among native herdsmen according to the household size at that time. There is no way for any in-migrants or newly established households to obtain a piece of pasture from Gaca after that. When a herdsman's son gets married and establishes his own household, the father has to split his animals and pastures and give the young couple their share. The young couple will soon have their own children, then the pasture of one household will become smaller and smaller by generation. Now, Hurqige's herdsmen start to worry about their growing population.

Before 1990, there was no limitation on childbearing in Hurqige and nearby pastoral communities. Since 1991, the local government has had a more restrictive regulation for "family planning ". One couple now can only have two children with a four-year interval. In 1992, two families were fined because the interval of their births was less than four years (one for 3000 yuan and another for 4000 yuan). In our conversation with these herdsmen, we had the impression that most of them accept the policy of "two children" because they are worrying about the problem of surplus labor force 5-10 years later in this community. Because their children do not speak good Mandarin Chinese and have less education and urban experience, it is difficult for most of these grassland youths to find jobs in towns or cities. The herdsmen worry about the future opportunities for their children when they grow up.

Summary

(1) Under the commune-brigade system, the animals were grouped into flocks and assigned to individual households. These flocks moved within the brigade boundary by season under the plan of the brigade.

(2) The commune system organized some collective works which attracted some in-migrants, both Mongolians and Han from some poor areas to move to grasslands. Urban student ("intellectual youths") were a very special group of in-migrants during the "Cultural Revolution".

(3) The turn point is the redistribution of animals and pastures when communes disintegrated in 1983. Because the in-migrants received a small amount of animals which they cannot live on, they moved out of Hurqige and found their new opportunities in Sumu and county town. But their relationship with native herdsmen continually benefit them, because native herdsmen need laborers to do some works such as drilling well, fencing pasture, building house, etc.

(4) Because livestock production now is managed at household base, the size of animal flocks reduced. The animals only can be grazed within the boundary of pasture assigned to the household. The move patterns of flocks then changed significantly.

(5) The income of herdsmen increased rapidly in the 1980s mainly due to the rise of prices of pastoral products. Therefore, native herdsmen are able to improve their standard of living while invest a lot in grassland construction.

(6) Because pastures are also under the management of individual households, herdsmen then have a long-run plan to utilize their pastures. They sell more young animals to release pressure on grasslands. Therefore, the system reform in the 1980s brought some tremendous changes in

migration and livestock production patterns. These changes are quite positive to environment in grassland areas, brought positive impact into the grassland ecosystem.

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