

AN ABSTRACT OF THE THESIS OF

Thomas J. Conte for the degree of Master of Arts in Applied Anthropology presented on June 3, 2013

Title: Changing Pastoral Lifeways in the Land where the Horse was King: The Effects of China's Grassland Contract Policy on Mongolian Herders' Attitudes Towards Grassland Management and Cooperation

Abstract approved:

Bryan D. Tilt

This thesis explore the effects of China's Grassland Contract policy on sedentary and mobile Inner Mongolian pastoralists' attitudes towards cooperation, current grassland management practices, and the future viability of livestock herding in New Barag Right Banner, Inner Mongolia. Semi-structured interviews, a scaled survey instrument, and participant observation were carried out in three case-study villages in New Barag Right Banner. The author hypothesized that because they maintain a livestock management strategy more closely related to the nomadic grazing traditionally practiced in the region, mobile pastoralists would have significantly more positive attitudes than their sedentary counterparts. Results show that herders representing both sedentary and mobile livestock management strategies share the same attitudes towards cooperation, grassland management, and the future viability of pastoralism in Inner Mongolia. Thus, the study results suggest that recent grassland policy may be affecting Inner Mongolian pastoralists representing different settlement categories in uniform ways.

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Changing Pastoral Lifeways in the Land where the Horse was King: The Effects of
China's Grassland Contract Policy on Mongolian Herders' Attitudes Towards Grassland
Management and Cooperation

by

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Thomas J. Conte, Author

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Foreword: The Importance and Difficulties of Doing Research in China

“Why are you here at this hotel?” As soon as I saw the uniforms, I knew I was in for it
-excerpt from field notes

“Why me?” ran through my head as I sat being interrogated by police officers in a squalid, bathroom-less hotel room in Manzhouli, China that reeked of stale sweat and cigarette smoke.

“You are supposed to call if any foreigners come to your hotel, foreigners are supposed to be in the big hotels downtown, they’re not allowed to stay here,” an officer barked at the *laoban*, the hotel manager who had assured me that it would be perfectly fine for me to stay at his hotel earlier that morning.

“Had Uighurs come here, I would have called you, an American is no problem,” the *laoban* answered the officer while handing me a conciliatory cigarette. After explaining my purpose for “being here” to one of the officers in a seven-year-old’s Chinese, I was told “pack your things, we’re leaving.” Ten minutes later under the gaze of suspicious shopkeepers and passersby the hotel manager and I were escorted into a police van and driven to the local police station. This is what I had feared for years: I was being apprehended by police in a foreign country for reasons I didn’t entirely understand. Why did it matter what hotel I stayed in? My mind clawed desperately for a family and girlfriend 7,000 miles away, but there was no help to be had. I could see it in my mind’s eye at that very moment: Bill Clinton, negotiations, newsreels, *gulags*, *The Manchurian Candidate*. Instead, I was sentenced to Russian luxury: forced by the police to book a

room in the most expensive luxury hotel in town, built to cater to wealthy Russian tourists, not poor American graduate students. Two hours, and \$625 later, I was in the lap of luxury (and in the depths of misery) on the 17th floor gazing out at the expanse of grassland on the other side of the Russian border, which this city straddles.

“Was this a good decision? Should I get on the next flight home? What could possibly happen next? Is anthropology worth it?” These questions flittered through my mind over the next few hours. When I called my academic advisor, Bryan Tilt, to inform him about the day’s exploits, he replied (without any sense of alarm) “Yeah, that sounds pretty normal, I wouldn’t worry. It happens.” This is simply research in China. There are problems for foreigners in China and often, it seems as if there is nothing that is not a problem. Buying a rail ticket? No, it’s the high travel season, there are no seats available. 没有! Interviewing the last semi-nomadic Mongolian herders on the Sino-Mongolian border? Impossible, the area is restricted to foreigners! 不可以! Staying in this hotel as opposed to that hotel? 限制! Walking down that street? 没办法!

In frustration, the New Yorker in me came out as I thought to myself: “This is ridiculous; I want to get the hell out of here! But I spent a lot of money and time to be here. I spent months preparing for this. Police be damned, come hell or high water, I’m getting this project done!”

When conducting research in China, difficulty must be accepted with a Zen-like stoicism and flexibility, or in my case, the ironclad recalcitrance of a resident of The

Bronx. But why put up with it? Why force yourself to pursue social science research in a region that is, at times, openly hostile towards foreign researchers?

First and foremost, China represents one of the oldest state societies in the world, one that has continuously existed as a multi-ethnic political entity even as the rest of the world has been continually reshaped geopolitically. While the Chinese state has evolved through a tumultuous “dynastic cycle” of the rise and fall of imperial ruling families, ethnic groups, and modern nation states, the idea of the Chinese *Zhongguo*, or “Middle Kingdom” has never ceased to exist since the founding of the earliest imperial dynasties (Usher 1989). The latest iteration of the Chinese state, the People’s Republic of China, represents China’s social evolution into one of the most influential political and economic powers in a globalized world. The formerly isolated Chinese economy now boasts a nearly 10% annual growth in GDP as Western nations struggle to increase understanding of the history, culture, and current socio-political climate of a nation they still know little about (Tilt 2009). Therefore, it is essential for social science researchers to work to expand current knowledge of China’s multiethnic state as well as its prominence in international affairs.

China’s economic and political ascent has made it one of the epicenters of global environmental degradation. The Chinese landmass contains regions of enormous biodiversity as well as some of the world’s most extensive mountain, grassland, and desert ecosystems. Concurrently, however, industrial smog blots out the tops of buildings in Beijing and other major cities, desertification rapidly expands along China’s northern and western frontiers, and water quality in China’s numerous riparian ecosystems is

affected by industrial pollution and waste. Therefore, China offers both one of the world's largest ecological dilemmas and ecological opportunities. Furthermore, because China contains rich ethnic diversity, it also offers a wealth of indigenous systems of sustainable land use: systems that are being challenged by the development of modern China. Thus, studying the traditional land use practices of China's ethnic minorities allows us to understand how indigenous systems of land use are responding to marketization and neoliberal economic forces as well as how indigenous knowledge can hold some of the keys to sustainable development. With these reasons in mind, I had come to China's Inner Mongolia Autonomous Region to study how the grassland management and settlement policies that have accompanied China's rise as a global economic power are affecting the cultural values and land management practices of one northern China's largest ethnic minorities, the Mongols.

Changing Pastoral Lifeways in the Land Where the Horse was King: The effects of China's Grassland Contract Policy on Mongolian herders' attitudes towards grassland management and cooperation

Chapter 1: Introduction

The Purpose of this Study

The overall purpose of this study was to investigate the effects of changing settlement patterns and grassland management policies on the attitudes towards livestock herding and cooperation of pastoralists in China's Inner Mongolia Autonomous Region. The following is intended to provide readers with the necessary background information on the socio-political and ecological history of the greater Mongolian cultural area as well as the current state of ecological degradation in northern China given recent changes in regional land management policy and land tenure regimes.

The Current State of Land Degradation in the Inner Mongolia Autonomous Region

Since the latter half of the 20th century, Inner Mongolia has experienced a marked deterioration of grassland productivity and ecological health characterized by an overall decrease in plant species biodiversity, an increase in unpalatable weeds and noxious plants, the expansion of mobile sand dunes and desert conditions, and increasingly erratic climatic and precipitation conditions (Williams 2002). The desertification of Inner Mongolian grasslands threatens not only the livelihoods of regional agricultural and pastoral communities but also the livelihoods of populations in surrounding provinces. The extent of grassland degradation in China has become so severe that, presently, it is

estimated that over 90 percent of Chinese grasslands are degraded, and consequently, desert conditions expand over 10,000 km² annually (Nelson 2006) in China. This degradation threatens the agricultural production base of eastern and central China and even affects residents in Beijing who experience frequent dust storms caused by soil erosion in Inner Mongolia.

Previous research suggests that grassland degradation is a result of both the expansion of agriculture into grassland regions poorly suited to farming (Humphrey and Sneath 1996a) as well as government policies that have led to the collapse of the nomadic grazing and common pool resource management strategies that were common in Inner Mongolia prior to the 1950s (Taylor 2006; Humphrey and Sneath 1999). In particular, past studies have highlighted the role that the Household Responsibility System and Grassland Contract Policies initiated by the reform government of Deng Xiaoping have had in degrading both the nomadic grazing strategy of Mongolian herders as well as the cultural norms that supported its practice (Li and Huntsinger 2011; Ho 1996). In addition, the development of non-agricultural and non-pastoral industries such as mining in Inner Mongolia has been cited as root causes of the current state of land degradation in northern China (Squires et al 2009).

The history of land degradation in Northern China

The origins of land degradation in Inner Mongolia are rooted in the explosive growth of Chinese population in the 18th and 19th centuries during the Manchu Qing Dynasty (1644-1912). It is estimated that between 1700 and 1900, the population of

China grew from 200 to 600 million (Smil 1993). Thus, the Qing government was presented with the difficulty of providing food and arable land to the growing population. To overcome this challenge, the dynastic government promoted the inward migration of Han Chinese agriculturalists into northern and western frontier areas ecologically poorly suited to intensive agriculture. This expansion of agriculture continued well into the 20th century and contributed to grassland degradation both due to soil erosion from repeated plowing of fragile grassland soils and the marginalization of pastoralists onto less productive grassland areas. For example, in 1947, there were 87 million hectares of available grassland in Inner Mongolia and 7.7 million sheep units of livestock. By 1986, due to the expansion of agriculture and other non-pastoral industries, the total available pasture decreased by 8 million hectares, but livestock numbers increased to 32 million sheep units (Humphrey and Sneath 1996a). Thus, the remaining Inner Mongolian grassland was put under increased levels of grazing pressure and the traditional nomadic herding strategy of Mongolian herders was disrupted for some pastoral communities because of the loss of grassland to agriculturalists.

After the formation of the People's Republic of China in 1949, the government of Mao Ze Dong took a "tame nature" approach to resource management in which natural resources were to be bent to the will of man for productive use (Tilt 2009). The government viewed grassland as wasteland that needed to be reclaimed for cultivation. Therefore, from 1949 to the late 1950s, Inner Mongolia experienced high degrees of land degradation as a result of deforestation, industrial development, and land reclamation for agriculture. The expansion of agriculture in IMAR was not curbed until 1957, when the

Inner Mongolian regional government under Ulanhu, the founder of the Inner Mongolian Autonomous Region, passed legislation that prohibited further conversion of grassland into cropland (Williams 2002; Jiang 2004; Bulag 2002).

During the 1950s, livestock production and grassland in Inner Mongolia were collectivized much as agriculture and cropland had been in agricultural regions of China. Mongolian herders were required to join rural collectives that worked to meet state-mandated targets for animal products. Collectives maintained common management of grassland and continued nomadic migrations that had been common in the pre-collective period to a large degree, however, it was at this time that Inner Mongolia experienced a sharp increase in livestock numbers on already diminished grassland (Humphrey and Sneath 1999). Therefore, rural herding collectives served to exacerbate widespread grassland degradation between the 1950s and 1970s.

After Deng Xiaoping initiated the Reform and Opening Period in the late 1970s, the Chinese government allowed certain parts of the economy to be exposed to international markets, foreign direct investment, and private enterprise. Key to these economic reforms was the dismantling of rural collectives and the division of agricultural land to individual rural families through the Household Responsibility System (Rozelle et al 2005). Under this system, households were allowed greater autonomy over land management and could make decisions on which crops to grow based on market demand (Tilt 2008; Rozelle et al 2005). Similarly, from the early 1980s to the mid-1990s, the Inner Mongolian government sought both to protect the fragile grassland environment and industrialize livestock production in response to growing domestic and international

markets for animal products (Ma 2003). The Grassland Contract Policy privatized grassland and contracted pastures first to small groups of families and later to individual families similar to the way that agricultural land was divided among farming families under the Household Responsibility System.

Through the Grassland Contracting Policy, and under the guidance of the World Bank and the UN Development Program, the government hoped to mitigate the tragedy of the commons that they felt could cause degradation on commonly-owned grassland as well as improve the productivity of herders by encouraging them to adopt Western models of sedentary, industrialized livestock production (Zukosky 2008; Fratkin 1997; Hardin 1968). Key to the implementation of these policies was the encouragement of pastoralists to cease seasonal nomadic migration, follow state-mandated livestock carrying capacities for grassland, and fence their family pastures to prevent other herders from misusing them (Banks and Doman 2001). However, the privatization of grassland has been suggested as a key factor contributing to the continued deterioration of Inner Mongolian grasslands because it has led to the collapse of the traditional mobile grazing practices that allowed Mongolian herders to flexibly manage the variable topographic and climatic conditions of their pastures (Fernandez-Gimenez and Le Febre 2006). Therefore, livestock now place constant pressure on small private grassland leaving grassland little time to regenerate as well as making them more sensitive to negative climatic events (Li and Huntsinger 2011).

IMAR also contains some of the largest coal deposits in China and some of the largest rare-earth deposits in the world. The regional mining industry has expanded in

response to China's rapid industrialization and growing energy needs. The expansion of mineral extraction has come at the cost of both a decrease in the grassland available to pastoralists as well as grassland degradation and soil erosion due both to open pit mining techniques and industrial pollution (The Economist 2012; BBC News 2011; Squires et al 2009). Mining has been shown to be a contributing factor of water contamination and its related health effects (i.e. increased cancer rates) among Inner Mongolia's rural and urban populations (Guo et al 2001).

Traditional Mongolian Nomadic Pastoralism and Grassland Management

Previous research on nomadic pastoral systems suggests that nomadic pastoralism exists in Inner Asia to allow pastoralists to flexibly manage grassland resources and to respond to highly variable seasonal ecological and climatic conditions (Humphrey and Sneath 1999). Hence, Mongolian herders traditionally conducted seasonal pastoral migrations as well as additional shorter migrations during each season to allow pastures long periods of rest and regeneration after intensive grazing pressure. In addition, during negative climatic events such as severe winter storms and drought, Mongolian herders would conduct additional emergency migrations known as *otor* to fulfill their herds' nutritional and water requirements and provide their animals with shelter from severe weather conditions (Li and Huntsinger 2011). Prior to the 20th century, herding families would migrate both within their own administrative districts as well as conduct emergency *otor* to other regions where kin and other related families would let them

pasture their livestock based on a system of mutual assistance and reciprocity (Cooper 1993).

The frequency, length, and regularity of pastoral migrations have been highly dependent on the ecological and climatic specificities of particular grassland regions of Inner Asia. In the early 20th century, the Russian ethnologist A.D. Simukov identified six categories (along with various sub-categories) of pastoral migration patterns that correspond with the various ecological, climatic, and topographic conditions that exist in Inner Asia (Humphrey and Sneath 1999). Simukov noted that as seasonal climatic and precipitation conditions became more regular and predictable in what are known as “equilibrium grazing conditions,” seasonal pastoral migrations became more regular and shorter in length (Sheehy 1993). Hence, herders living under these more predictable conditions typically migrated in a cyclical pattern, likely returning to the same seasonal pastures each year (Allen and Lawrence 2007). However, as climatic conditions and precipitation become more variable (i.e. in desert regions of the southern Mongolian Plateau), “disequilibrium grazing conditions” predominated and annual seasonal migrations tended to be longer and more irregular (McCabe 2004). These observations correspond with foraging peoples’ settlement patterns and mobility which suggests that as the net primary productivity of a given foraging landscape decreases, forager mobility increases (Kelly 2007). Thus, just as foraging peoples have developed diverse settlement patterns and systems of mobility in response to variable environments, Inner Asian pastoralists developed diverse grazing and settlement patterns that are adapted to regional ecological and geographic conditions.

Previous research has shown that the traditional ecological knowledge of Mongolian herders heavily influences their resource decision making and grassland management (Fernandez-Gimenez 2000). Traditional ecological knowledge entails the cumulative body of knowledge and beliefs handed down generationally through cultural transmission about the relationship of living beings with their surrounding environment (Berkes, 2008; Borgerhoff-Mulder and Coppolillo, 2005). Thus, Mongolian herders utilize complex ethnobiological and ethnobotanical knowledge to make decisions on how to manage livestock and where and when to conduct seasonal migrations. For example, herders exhibit an intimate understanding of the plant species preferences of individual livestock species as well as the topographic and hydrological conditions ideal for each season. For example, herders seek winter pastures with adequate topography to create windbreaks for livestock during winter storms (Williams 2002). Mongolian herders traditionally kept multi-species livestock herds to both mitigate the economic risk of single-species grazing as well as to more efficiently utilize the available topographic and plant species conditions on seasonal pastures (Soderquist 2009; Humphrey and Sneath 1999). Therefore, the traditional ecological knowledge of Mongolian pastoralists enabled them to effectively make resource utilization decisions and sustainably manage their grassland through pastoral mobility and multi-species herding.

Traditional Mongolian Cooperative Social Structures

Prior to the mid-20th century, social organization in the greater Mongolian culture area was centered on cooperative social networks of related pastoral families that

collaborated for both economic and political reasons. According to *The Secret History of the Mongols*, prior to the unification of the Mongol tribes and the formation of the Mongol Empire, groups of up to several hundred tribally-related herding families formed into administrative units known as *khuree* that would camp, herd, and migrate together to defend themselves from attacks by neighboring groups (Bold 1996). After the unification of the Mongol tribes by Chinggis Khan, *khuree* broke down into smaller groups of families known as *khot ail* that shared labor and cooperated to herd livestock. *Khot ail* were made up of closely related families, but often, included fictive kin, neighbors, as well as herding families of varying socioeconomic statuses. Hence, the *khot ail* system supported social segmentation in Mongolian society and systems of both cooperation and exploitation among wealthy and poor herding families. For example, wealthy herders were able to form relationships with poorer households in which poor herding families would provide labor to manage the larger herds of wealthy families in return for the right to utilize livestock products for subsistence (Cooper 1993).

Research on the ecological effects of the *khot ail* system suggests that cooperative relationships among herders allowed them to efficiently manage both livestock and grassland for several reasons. First, cooperation between herders enabled pastoralists to share knowledge and skills regarding geographic conditions on seasonal pastures, livestock species, and plant species (Bold 1996). Cooperative social structures also allowed herders to divide herding tasks amongst families to both free up labor for other domestic and economic activities as well as herd livestock species according to their geographic and plant species preferences to efficiently utilize available grassland

(Fernandez-Gimenez et al 2012, Cooper 1993). Furthermore, the *khot ail* system of cooperation enabled pastoralists to create a social support network for assistance with both seasonal pastoral migrations and during severe weather conditions and drought. Therefore, traditional Mongolian cooperative social structures helped create the conditions necessary for herders to maintain an ecologically sustainable nomadic system of livestock management.

Following the establishment of socialist states in Mongolia (1924) and China (1949), pastoralists were organized into rural collectives that subdivided herding families into small production teams consisting of between two and ten households (Humphrey and Sneath 1996a, Cooper 1993). This collectivized system largely maintained the cooperative social structures of the pre-collective period but herders were now responsible for meeting production quotas mandated by the collective and were often in charge of managing state-owned single-species herds rather than making decisions on the livestock species distributions within their herds.

After the advent of Reform and Opening in China in the late 1970s and the collapse of the Mongolian People's Republic in 1992, livestock were privatized and divided amongst members of rural collectives. In addition, the pastoral economies of Inner Asia were exposed to both domestic and international markets for livestock products. This marketization process contributed to socioeconomic segmentation among Mongolian herding families as they experienced varying degrees of success and failure in private livestock production (Humphrey and Sneath 1999; Bold 1996). Therefore, as the social and livestock services provided by collectives in both China and Mongolia were

discontinued, some herders have resumed traditional forms of cooperation among small groups of families in many regions of the Mongolian Plateau (Fernandez-Gimenez et al 2012). The relationships that existed between wealthy and poor herding families in the pre-collective period have also resurfaced in both the form of wealthy families hiring labor from poorer families or allowing them to herd livestock in exchange for the right to use subsistence products (Cooper 1993).

Following decollectivization, the Inner Mongolia Autonomous Region and the Republic of Mongolia have followed different grassland and livestock management paths. While the Republic of Mongolia privatized livestock and left common ownership of land intact, in Inner Mongolia, both land and livestock were privatized to individual herding families. In addition, while the Republic of Mongolia maintained nomadic livestock herding, Inner Mongolian pastoralists were encouraged to become sedentary and to fence their pasture allocations for private use. Previous research suggests that the privatization of grassland has degraded the traditional social structures of cooperation among Inner Mongolian herders that existed in the pre-collective and collective periods. Fencing and privatization of formerly common grassland has rendered pastoralists unable to collaborate with kin and neighbors to herd livestock and cope with inclement weather and drought (Li and Huntsinger 2011, Williams 2002).

Although previous research suggests that cooperation among pastoralists in Inner Mongolia has decreased following the privatization of land and livestock and the sedentarization of nomadic herders, comparatively little research has been conducted to measure their attitudes towards cooperative labor and grassland management. Therefore,

there is little understanding of how the discontinuation of grassland management strategies and social structures that existed among pastoral families prior to the Reform and Opening Period has affected the cultural attitudes towards cooperation of Inner Mongolian pastoralists. This study aimed to both measure Inner Mongolian pastoralists' current attitudes towards cooperation and grassland management and compare them with the attitudes of herders that maintain a system of grassland management more closely related to the previous nomadic system of livestock management.

General thesis outline:

This manuscript will serve as a partial fulfillment of the requirements of a Master of Arts in Applied Anthropology at Oregon State University. Following this introduction is a description and results of fieldwork I conducted in Inner Mongolia in July – August 2012 and two journal article manuscripts. This approach is a more efficient way to present the results of this study to a wider audience as well as foster greater professional development for a career in anthropology and academic research. Namely, writing manuscripts bounded by background information would meet the needs of writing for an academic audience and provide broader context for the public audience.

The chapters that follow this introduction will provide readers with greater context and background information on the study population that is later condensed in the two article manuscripts. Chapter 2 provides a description of the study population and site including historical background, changes in land tenure and grassland management strategies, changes in social organization and traditional social structures of cooperation,

community perceptions of land degradation, and new models of grassland management and social structures that are emerging in the study site. Chapter 3 outlines the theoretical framework for the study and a description of the research methods and data analysis techniques I utilized to interpret my observations.

The first manuscript focuses on the effects of settlement patterns and land tenure regimes in the study site on pastoralists' attitudes towards cooperation. This manuscript has been submitted to the *Journal of Human Ecology* for publication and was co-authored with Bryan Tilt, Associate Professor of Anthropology at Oregon State University.

The second journal article manuscript focuses on the effects of settlement patterns, land tenure regimes, and grassland management policies in the study site on pastoralists' attitudes towards grassland management and the future of pastoralism in the Inner Mongolia Autonomous Region. This manuscript has been submitted to the *Journal of Political Ecology*.

The concluding chapter provides observations on the current state of grassland management, social organization, and ecological health in the study site and the Inner Mongolia Autonomous Region as a whole and suggestions on land management policies that would be most likely to successfully mitigate grassland degradation. In addition, it provides suggestions for further study of pastoralism in Inner Asia as well as research methods that can be useful in understanding Mongolian social relations in the context of grassland ecology.

Chapter 2: Changing pastoral lifeways in the land where the horse was king

Herding is a new job opportunity in this area...

-excerpt from field notes

When one travels in China's frontier regions, the pace of change and industrial development in rural China becomes immediately apparent, and at times, contradictory and confusing to newcomers from abroad. In northeastern Inner Mongolia's Hulunbuir League, the traditional pastoral economy that has existed in the region for centuries is being eclipsed by industrial development, infrastructure construction, mining, and tourism. Thus, it is an ideal place to study the dizzying changes that are affecting the economic livelihoods, ecological relationships, and cultural values of China's rural population.

After arriving in Manzhouli, one of China's busiest inland ports and border settlements, I was immediately struck with a sense of transience and impermanence. The city of 300,000 abuts the Sino-Russian border and is one of the centers of rail transportation and trade among China, the Russian Federation, and Eastern Europe. Dozens of trains cross the border daily laden with both raw materials (especially timber from Siberia and coal from Inner Mongolia) and finished goods, and the almost constant blaring of train whistles seems to signal the city's importance in international trade. Local businesses and hotels cater to both domestic tourists who flood to the city during the summer months to tour the local grassland and minority nationality settlements and Russian nationals who arrive daily on busses from Zabaykalsk, the Russian city directly

across the border. And yet, on the grasslands surrounding the city, Mongolian pastoralists still directly depend on naturally occurring grassland resources to produce livestock products as they have for centuries. The region can be viewed as a representation of China's transition from a primarily agrarian nation to one of the world's leading industrial powers.

The Study Site: New Barag Right Banner

This study focuses on the pastoral population in three villages of the New Barag Right Banner (NBR), Hulubuir League's westernmost administrative district. The terms league and banner correspond with the Chinese prefecture and county administrative divisions, respectively, and stem from provincial divisions established during the Qing Dynasty. The banner lies directly south of Manzhouli City, is approximately 23,000 km² in area, and shares international borders with the Republic of Mongolia to the west and south and the Russian Federation to the north. Because of its location on two international borders, NBR remains a politically sensitive region in which the People's Liberation Army maintains a large presence and the movement of foreign nationals is highly restricted.

New Barag Right Banner lies on the eastern edge of the Mongolian Plateau and is dominated by short-grass steppe grasslands that receive between 200-300 mm of annual precipitation (Daly and Hannaway 2005; Hu et al 1992). Although pastoralism is currently being encroached by industries such as mining, NBR is a unique place to study changes in pastoral management and herder attitudes because, unlike other areas of Inner

Mongolia, herders in NBR were not affected by the encroachment of agriculture into traditionally pastoral areas during the 19th and 20th centuries. Therefore, because NBR remains a predominantly pastoral area, the cultural norms and grassland management practices of NBR pastoralists can be studied within the context of changes in pastoral management and land tenure themselves rather than in the context of the marginalization of pastoral peoples by the expansion of agriculture.

The three case study villages, Dashimo (pop = 835), Hulun No'er (pop = 255), and Ehe No'er (pop = 458) lie within the central region of New Barag Right Banner approximately 30 km south of Manzhouli City. The research team was based in the

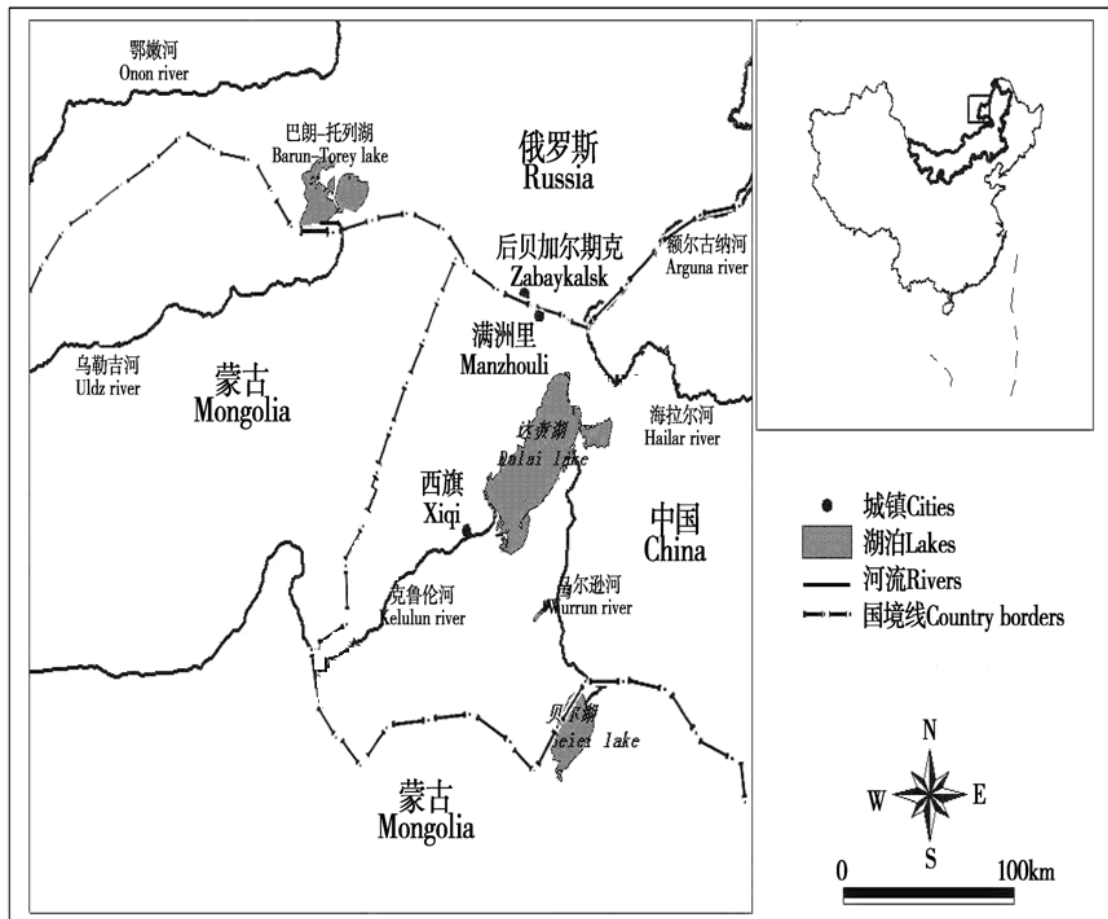


Figure 1: Map of the study area (Liu n.d.)

Dashimo village center, a one kilometer strip of mud-brick houses which includes a small hotel, several restaurants and grocery stores, the village government headquarters and grassland monitoring center, an elementary school, and a small beer brewery which was under construction at the time this research was conducted. The main regional economic activities in the three villages include livestock production as well as a burgeoning copper and coal mining industry. Service industries such as small restaurants, mechanic shops, and grocers can be found in village centers serving the surrounding pastoral population. The average annual per capita pastoral income for the three villages in 2011 was 8,369 CNY (~\$1,300), roughly equivalent to the 2012 national mean rural income for the People's Republic of China (Holmes 2012).



Figure 2: Dashimo Village Center

The pastoral population is dominated by ethnic Barga Mongols who have traditionally populated the western areas of Hulunbuir League as well as the extreme eastern portion of the Republic of Mongolia. The Barga are a subgroup of the Buryat Mongols who live in northeastern Mongolia and in the Trans-Baikal region of Southern Siberia, and speak a Buryat-Mongol dialect (Humphrey and Sneath 1996a). In the early 20th century, the Barga became embroiled in the struggle for political influence in Inner Mongolia among the former Soviet Union, the Republic of China, and Imperial Japan. In 1928, for example, they conducted an uprising against Chinese authorities in Hulunbuir which was ultimately defeated by the Republic of China Army (Yakhontoff 1936).

Although the pastoral population is predominantly Barga, many village residents and even some pastoralists are Han Chinese. Prior to the privatization of grassland, Han Chinese herders lived in similar settlement patterns and migrated along with their Mongolian neighbors. Upon seeing my surprise that Han Chinese pastoralists were also nomadic, one sixty-three -year-old Chinese herder exclaimed “Of course we moved just like everyone else. We even lived in a yurt and drank milk tea!” Many of these Han Chinese residents migrated to Hulunbuir during times of economic strife and famine following the “Great Leap Forward” (1958-1961) from regions of northern China such as Shandong and Hebei Provinces (Pasternak and Salaff 1993).

As of July 2012, I was one of the first American citizens to conduct research and spend an extended period of time living in Dashimo Village. This made conducting research in this area both exciting and, at times, difficult and frustrating. It was not uncommon for individuals to stop at the residence where I was staying to either ask me questions about where I had come from or why I was staying in the village as well as to simply watch inquisitively as I wrote field notes, ate dinner, or brushed my teeth in the morning. My reception among the pastoral population was also mixed. Because of the short time frame of this research project (July-August 2012), it was extremely difficult to build the level of rapport with local herders necessary to conduct ethnographic research. My previous experience working with Mongolian herders led me to understand that they generally value strong work ethic, humor, and respect of local customs and living arrangements. My living situation in the village center, rather than on the grassland among herding families, made it difficult to show these qualities to herding families

during short interviews or surveying sessions, and therefore, at times served as a point of contention and frustration because I could not get to know pastoral families before asking them permission to survey or interview them. At other times, however, families were extremely receptive to my presence and offered both hours of their time as well as food and drink. Therefore, this research project offered a unique opportunity to experience the often messy and opportunistic process of ethnographic research. The greatest take-away lesson is to never expect to be given preferential access to an individual's time or attention simply because you are a scientist from a faraway place.

The history of land management policy in New Barag Right Banner

The history of land use, social organization, and change in land management policy in New Barag Right Banner corresponds closely with the rest of the Inner Mongolia Autonomous Region with several key distinctions. These differences have placed the banner on a different social and ecological trajectory with other areas of the autonomous region.

During the Qing Dynasty (1644 – 1912), grassland in NBR was governed by local princes who represented the ruling dynasty in Beijing or Buddhist monasteries that held economic authority over pastoral districts. These rulers collected taxes and tribute from herding families for the central dynastic government as well as consulted and coordinated local herders to regulate the use of pastures among households and facilitate seasonal migrations and herd species compositions (Humphrey and Sneath 1999). Communities also regulated the establishment of winter grasslands and emergency pastures for use in

times of adverse climatic conditions. Therefore, although grasslands were officially administrated by ruling elites during the pre-revolutionary period, overgrazing and unsystematic pasture use were prevented through collective action and community-based decision making. During this period, herders managed livestock based on the *khot ail* system of cooperation among small groups of families. In regions where grasslands were administrated by monasteries, some herding families attempted to ensure the support of the monastery by sending one of their sons to pursue a religious vocation and thereby secure an agent in the ruling institution who could help provide the family with both political influence and support in times of economic difficulty (Cooper 1993). This system remained largely intact after the collapse of the Qing Dynasty (1912) and the establishment of the Republic of China even as Hulunbuir League became one of the hotbeds of political strife among the Republic of China, the Soviet Union, and the Japanese Empire in the decades prior to the Second World War (Yakhontoff 1936).

Following the solidification of communist power in today's Inner Mongolia Autonomous Region in 1947, nomadic herders in NBR were organized into collective herding units and livestock were seized from monasteries, ruling princes, and prominent pastoral families and redistributed to members of the collectives. The pastoral collectives attempted to modernize livestock production by developing infrastructure such as roads, milk and meat processing stations, and facilities to conduct modern livestock breeding techniques. The collectives also provided veterinary assistance to herders, facilitated mechanized transportation for seasonal migrations, and continued to regulate the establishment of reserve pasture for emergency forage (Williams 2002). Furthermore,

during the collective period, herders in NBR were organized into small groups of related families who worked cooperatively to herd livestock and to meet yearly livestock production quotas (Jiang 2004). Thus, during the collective period, NBR herders maintained a social structure similar to the *khot ail* system of the pre-revolutionary period (Bold 1996).

Following the Reform and Opening period and the advent of the Household Responsibility System and Grassland Contracting Policy in Inner Mongolia in the 1980s and 1990s, the regional governments of Inner Mongolia dismantled the pastoral collectives and divided grassland first among small groups of families and then among individual families (Ma 2003). However, although these policy changes took effect in most pastoral areas of Inner Mongolia in the 1980s, grassland was not privatized in NBR until 1996, when local officials divided available grassland among herding families based on their *hukou* (household registration) status and the number of livestock they had at the time of the division. Therefore, the previous nomadic system of livestock herding and common-pool resource management remained functional in NBR until far more recently than in most other regions of Inner Mongolia. Following the division of land, families were assigned individual pastures that they could then subdivide for seasonal use as well as provided access to small public grasslands close to the village center that are reserved for emergency use. The length of family contracts has changed many times since the original privatization and is now at 30 years. Williams (2002) found that frequent changes in land tenure policy and contract lengths had a negative effect on herder confidence in their long term ability to manage grasslands, however, study participants in

NBR generally agreed that they were confident they would be able to manage the land they were contracted indefinitely. This could be a reflection of a general stabilization of land tenure policy that is currently occurring throughout rural China (Li et al 1998).

As of the summer of 2012, the average land holdings among study participants was 622.5 hectares (9,338 *mu*) (1 hectare = 15 *mu*), although, some study participants were granted as little as 213 hectares (3,200 *mu*) of grassland and others as much as 2,000 hectares (30,000 *mu*) through renting additional pastures from other pastoral families. In interviews, study participants indicated that they felt that although land was originally assessed based on forage quality and was intended to be divided equitably among pastoral families, certain families received use rights over larger and higher quality resource patches than other families. When I asked one middle aged male herder why he felt some families had received better quality land than others, he sharply responded in Chinese “*Tamen you hao guanxi* (They had good relations with the officials, emphasis added)!” Thus, some pastoralists are concerned that nepotism and corruption factored into the division of grassland, and families with better connections with local officials fared better than less well-connected families. This has placed some families at a clear economic disadvantage, and may be contributing to increasing wealth disparities among the pastoral population of New Barag Right Banner (Humphrey and Sneath 1996a).

After dividing grassland among pastoral families, the banner government then assigned local grassland monitoring stations to examine available grassland and assign a fixed livestock carrying capacity to each family pasture allocation that would be

reassessed every three years. In 2012, the state-assigned carrying capacity for NBR grassland was 1 sheep unit per 20 *mu* of grassland. However, because livestock products remain one of the sole sources of income for NBR pastoralists, many herders far exceed their maximum allowance for livestock. At the time of this study, over 90% of study participants (n = 50) reported herd sizes far in excess of the carrying capacity assigned to their land. In some cases, herders reported having more than three times the number of livestock they were legally allowed to keep.

Bounded Nomads: Maintaining mobility in a sedentary system

Although presently, most pastoral families in New Barag Right Banner remain on their private pasture allocations throughout the year, some herders are able to retain a degree of seasonal mobility by renting pastures from other families that they then move their livestock to each season. To rent pastures from another family, both families must present themselves at the grassland monitoring station in Dashimo Village and sign a formal rental agreement which legally binds each party to fulfill their obligations to one another. Rented pasture is often obtained from families with *hukou* in the region who were granted rights to pasture but are engaged in other economic activities such as shop-keeping, mining, etc. Many families strive to make at least one pastoral movement each

year because they believe that movement is beneficial to both land and livestock. One 28



Figure 3: A Barga pastoralist herds sheep using a motorcycle

-year-old female herder commented: “If we stay in one place all the time, the animals get sick more often. So we try to move to a new pasture each season so we can rest our own pastures.” Another 40-year-old male herder asserted “If you stay in one place, the animals trample the ground and the grass can’t grow well. If you move each season, the animals trample the ground for a short amount of time and then the land can rest.” Herders indicated that before 1996, they moved at least 4 times a year but sometimes migrated as many as ten times. One family indicated that during a year with bad weather

conditions and poor precipitation, they might have made up to 30 movements and emergency *otor*.

While it may be easy to view seasonal movement by renting pastures as a direct continuation of the nomadic strategy practiced prior to 1996, many herders have expressed dissatisfaction with the usefulness of renting additional pastures. One 29-year-old herder expressed:

“I think that we need to move to keep our animals and land healthy, but it’s useless to move now. My family has only one pasture and it has good grass for summer but not for winter. If we rent another pasture in the winter that also only has good grass for summer, the move is useless.”

This comment is indicative of the fact that previous forms of pastoral mobility took into account the plant species associations and topographic conditions ideal for different seasons and livestock species (Fernandez-Gimenez 2000). Thus, the new form of mobility is based more on grassland availability and monetary compensation than the traditional ecological knowledge of the herding community and needs of livestock species.

Even though study participants and grassland management professionals indicated that they valued the mobility and flexibility that a nomadic lifestyle provides, many also believe that the use of fencing to enclose privatized pasture is a useful and effective way to manage their grasslands. In one particular interview, a herder who had just finished explaining what he thought were the benefits of seasonal mobility then went on to explain that he felt that the use of fencing helped herders to better manage grassland and prevent overgrazing. Additionally, herders’ responses to survey variables pertaining to mobility

and the use of fencing indicated overwhelming agreement with the benefits of pastoral mobility while at the same time also expressed agreement with the grassland management practice that most threatens a nomadic lifestyle. Therefore, it appears that the use of fencing in NBR to delineate privatized pastures has become engrained in the cultural values of herders regardless of the practice's negative implications for the continuance of a mobile lifestyle (Williams 2002; 1996). This is most likely due to the fact that free movements of livestock are now prohibited, and fencing represents the only management strategy available to NBR herders.

Although the vast majority of pastoral families in New Barag Right Banner have been settled and must rent additional pastures from other families if they wish to maintain mobility, the banner is also home to a group of Mongolian herders who are, arguably, the last truly nomadic pastoralists in eastern Inner Mongolia. These families live within 20 km of the Mongolian border in a remote and extremely sparsely populated region of the banner. All grassland in this strip of territory is held in common as it had been prior to 1996, and herders are able to move seasonally based on the plant species and topographic conditions ideal for each season. Part of this border area serves as an emergency forage production region for the rest of the banner, and the nomadic herders are able to conduct *otor* to this hay producing area by paying a fee to the grassland station. These herders are also contracted by the Chinese government and the People's Liberation Army (PLA) to monitor the movement of people on the Mongolian border because NBR often is used as a border crossing by refugees from the DPRK attempting to cross into Mongolia. Thus, this international border area is extremely politically sensitive and remains completely

restricted to foreign researchers. Therefore, I was not able to interact with the truly nomadic segment of the NBR pastoral population because I was not permitted to travel within 20 km of the international border.

Many NBR pastoralists and grassland monitoring station staff indicated that they felt the grasslands and livestock managed by the nomadic segment of the pastoral population are healthier and more productive than that of sedentary herders. One 29-year-old herder commented: “Their (the nomadic herders) animals are healthier and don’t get sick often. They have more nutritious grass to eat and more types of it. Even the meat tastes better than ours.” Therefore, although the settlement patterns and grassland management strategies have changed greatly since 1996, NBR herders still perceive the benefits of pastoral mobility as well as the plant species conditions for producing livestock products using naturally-occurring grasslands.

New models of pastoral production in NBR

In response to the deterioration of grassland conditions in NBR, the local government has initiated policies and programs aimed at both mitigating the negative effects of overgrazing as well as policies intended to reduce both livestock numbers and pastoralists’ dependence on naturally occurring grassland (Humphrey and Sneath 1996b). Local herders and grassland monitoring personnel are particularly concerned with the prevalence of *lang zhen* (*Stipa baicalensis*) (Roshevitz 1929), a species of needle grass with sharp seed pods that can injure or kill livestock. During interviews, herders indicated that *lang zhen* had always been present in local plant species associations, but had

increased dramatically in relation to other more favorable plant species in the last two decades. Therefore, the local grassland monitoring station is currently trying to develop hay cutting machinery that can remove *lang zhen* before its sharp seed pods can develop. Because only the seeds of *lang zhen* are dangerous, if it is cut before they develop, it can be used as valuable emergency livestock fodder. Grassland monitoring personnel also believe that increasing the numbers of horses in livestock herds could help mitigate the spread of *lang zhen* because horses both eat *lang zhen* before its seeds develop and trample its stalks, thus making it less dangerous for other livestock species.



Figure 4: NBR grassland dominated by *Lang Zhen* Grass (*Stipa baicalensis*) (Roshevitz 1929).

The local government is also intent on decreasing livestock numbers on the naturally occurring grasslands of NBR. In August 2012, the NBR government initiated a

policy that would require herders to decrease their livestock numbers to 200 sheep units regardless of the size of their land holdings. The local government plans to increase the number of livestock that are exclusively pen-fed with supplementary fodder such as hay and corn to decrease grazing pressure on natural grasslands and mitigate ecological degradation and desertification. Therefore, it is the state's intention to curb grassland degradation and decrease grazing pressure by increasing the industrialization of livestock production based on Western models of intensive livestock production rather than the extensive grazing system that has existed for millennia in Inner Mongolia. Supplementary sources of livestock fodder are both available for purchase at each herding family's expense (for corn and other external fodder sources) and provided by the banner government at a small cost from winter hay reserves in the extreme west of the banner.

The governments of two of the three case-study villages are also encouraging the establishment of herding cooperatives among pastoral families in which they can cooperatively manage livestock based on a corporate structure. Key to the development of these rural cooperative organizations is the consolidation of private grassland into cooperative land that is managed collectively by families who join the cooperative. For example, one cooperative organization is being encouraged by the local government to consolidate privatized land and then divide it into larger seasonal pastures and emergency grassland which can then be used on a rotational basis. Cooperative members are encouraged to pool financial resources and share hay cutting and transportation machinery. Cooperative leaders intend to share profits among member families commensurate with the number of livestock they contributed to the collective herd and

the labor they provided the cooperative. They would also like to establish brands for the livestock products produced by the cooperative as well as a means of marketing these brands both to domestic and international consumers. The cooperatives also plan on developing production infrastructure for meat, dairy, and fiber processing in the future.

Many of these nascent cooperative organizations intend to hire labor to manage herds and produce livestock products. One 49-year-old Mongolian pastoralist who has spent her entire life as a herder remarked that “herding is becoming a new job opportunity in this area that people are taking advantage of.” Although pastoralism has obviously existed as a way of life on the Mongolian Plateau for millennia, much of the previous literature on the effects of the marketization of livestock production in both China and Mongolia has shown that there has been an overall increase in the number of pastoralists who are pursuing livestock herding as a form of waged labor following the collapse of pastoral collectives in both nations (Zukosky 2008, Humphrey and Sneath 1999, Cooper 1993).

The new cooperatives have received mixed receptions from local herders and community members and varied degrees of success in both their formation and operation. For example, although the local government and cooperative leaders originally intended for privatized grasslands to be reintegrated and utilized seasonally, in most areas this has not been successful since membership in cooperative organizations is currently voluntary and not all families are willing to join. Therefore, because most families are choosing not to join cooperatives and are keeping their grasslands fenced for private use, most

cooperatives have not been able to reintegrate pastures into areas large enough to allow for viable seasonal grazing.

Although prominent cooperative members see cooperatives as a good opportunity to both increase profits from livestock production and take advantage of government funds that are available to encourage communities to form cooperative organizations, many community members and pastoral families are skeptical as to whether or not funds, profits, and machinery will be shared equitably among all members of the organization. In particular, many people fear that wealthy families will have the most influence in the operation of the cooperatives and will use cooperative machinery and resources for their own benefit rather than sharing them with all member families. One community member vocally condemned the cooperatives as organizations that will promote embezzlement and corruption on the part of cooperative leadership and at the expense of less influential members. He stated angrily “It’s nearly impossible for everyone to use the cooperative’s equipment equally. Don’t you think it’s interesting that almost all of the most influential people in the cooperative are also some of the richest herders in the area?”

Because herding cooperatives are such new institutions in New Barag Right Banner and have not yet been fully established, it remains to be seen whether or not they are successful in reintegrating privatized grassland and livestock herds, re-establishing grazing practices based on seasonal mobility, and fostering higher annual pastoral incomes and equitable profit and resource sharing among members. However, new rural cooperatives are growing in number throughout pastoral and agricultural regions of China, and research regarding their operation and effects is increasing (Hale 2013).

Further research regarding NBR pastoral cooperatives may help foster greater understanding of how these institutions affect the economic livelihoods of member families as well as the ecological sustainability of livestock herding in northeastern Inner Mongolia.

Chapter 3: Theoretical Framework and Methods

Study aims and previous research findings

Through this study, I aimed to analyze the effects of settlement patterns and land tenure on NBR pastoralists' attitudes towards cooperation and grassland management. Currently, most NBR herders are fully sedentary and make no seasonal migrations throughout the year. However, some pastoral families are able to retain seasonal mobility through renting additional pastures from other families. Therefore, I was interested in investigating whether herders representing different settlement patterns share the same attitudes regarding cooperation and grassland management or if their different herding strategies have led them to represent distinct populations within the same geographic area and economic production system.

To investigate the main research question of this project, I utilized a deductive approach that draws both on relevant theory and the findings of previous research regarding the effects of new settlement patterns and grassland management strategies on social organization and grassland management strategies among Inner Mongolian pastoralists. Previous studies suggest that the privatization of grassland and sedentarization of nomadic herders has led to a decline in traditional forms of cooperation among Inner Mongolian pastoralists such that previously cooperative relationships among herding families have now become competitive (Li and Huntsinger 2011; Williams 2002, 1996). Therefore, the existing body of literature on this topic suggests that new models of livestock production, land tenure, and settlement patterns are eroding

the traditional networks of cooperation that existed within Inner Mongolian pastoral society and contributing to regional grassland degradation and desertification.

Similar studies focusing on grassland management and cooperation among pastoralists in the Republic of Mongolia, where the nomadic grazing system and common-pool resource management strategies that were common in the pre-revolutionary and socialist periods have remained intact since the collapse of socialism in the 1990s, indicate that Mongolia has followed a different social and resource management strategy than China. Namely, previous studies from the Republic of Mongolia suggest that since the collapse of rural collectives, many pastoral families have reformed cooperative social networks that are similar to the traditional *khot ail* system of cooperation (Fernandez-Gimenez 2012; Humphrey and Sneath 1999; Bold 1996; Cooper 1993) that existed in the pre-collective period. Thus, the findings of previous research from both Northern China and the Republic of Mongolia suggest that herders who have retained common-pool resource management and nomadic herding have maintained traditional forms of cooperation and healthier grasslands compared to those who have become sedentary and live in a privatized system. However, although the literature asserts that cooperation has declined among sedentary herders; few studies, to date, have sought to measure and compare the attitudes towards cooperation and grassland management of sedentary herders and their mobile counterparts.

Theoretical Framework and Hypotheses

Li and Huntsinger (2011) employed the theory of community failure (McCay and Jentoft 1998) to illustrate how the marketization of the Inner Mongolian pastoral economy has destroyed traditional social institutions by making herders more dependent on government mandated regulations than collective action and cooperation to regulate grassland resource use. Thus, as a result of community failure among Inner Mongolian pastoralists, the community identity that previously allowed for the establishment of solidarity, trust, and norms regarding competition and cooperation among community members have eroded to the extent that they no longer allow for the effective management of grasslands. In addition, the sedentarization of nomadic pastoralists has contributed to both the failure of traditional systems of cooperation as well as the more ecologically sustainable mobile grazing that once categorized most regions of Inner Mongolia (Williams 2002; Humphrey and Sneath 1999).

Through this research project, I aimed to test a series of hypotheses that support the theory of community failure by investigating whether or not the maintenance of a system of mobility similar to traditional nomadism has a buffering effect on the attitudes of NBR herders such that mobile herders have a more positive attitude towards grassland management and cooperation than their sedentary counterparts. This is because mobile herders in NBR practice a livestock management system that is more closely related to the nomadic system that existed in the banner prior to 1996, and thus, represent one of the closest links to the traditional system of grassland management as can generally be found in Inner Mongolia.

This research was conducted using the cultural models approach to compare the attitudes towards cooperation and grassland management of the sedentary and mobile segments of the NBR pastoral population. Quinn and Holland (1987:4) describe cultural models as “presupposed, taken-for-granted models of the world that are widely shared and play an enormous role in people’s understanding of the world and their behavior in it.” Thus, using this approach, I aimed to assess whether or not each settlement category shares the same cultural model regarding cooperation and grassland management.

Based on the findings of previous research, I made four hypotheses regarding the attitudes towards cooperation and grassland management of sedentary and mobile herders in NBR:

H₁: Because they utilize different grassland management strategies, mobile and sedentary herders will not share the same cultural model regarding their attitudes towards cooperation.

H₂: Because they are more closely related to the traditional system of grassland management, herders who are able to retain seasonal mobility will have a more positive attitude towards cooperation with other herders than those who are sedentary.

H₃: Because their settlement patterns represent two different herding strategies, mobile and sedentary herders will not share the same attitudes towards the effectiveness of their current grassland management practices.

H₄: Because their settlement pattern more closely resembles the ecologically sustainable nomadic system that existed in NBR prior to 1996, mobile herders will have a more

positive attitude towards their grassland management strategy and the future of pastoralism in NBR than sedentary herders.

Thus, by testing these hypotheses, I hoped to understand the effects of changing pastoral policies on a small group of herders representing the transition of pastoral production from a nomadic past to a sedentary present. Hypotheses 1 and 2 are investigated in the first stand-alone journal article one and hypotheses 3 and 4 are examined in article 2.

Methods:

I conducted field research in the three case-study villages in the summer of 2012 using a mixed methods approach. Given the short time frame of this research project, I felt that a mixed qualitative and quantitative study was most appropriate due to difficulties in building rapport with local herders and village residents as well as the ability to attain larger sample sizes in a shorter amount of time using quantitative methods. Thus, this study relies heavily on quantitative survey methods and statistical analysis and employs ethnographic methods to provide context and clarification to the quantitative results.

I conducted semi-structured field interviews ($n = 12$) with herders and key community leaders to investigate changes in cooperative social structures since the privatization of grassland and herders' perceptions of changes in grassland management and health. The interview process was semi-structured and included questions regarding grassland management, cooperative relationships, and perceptions of land degradation. Each interview was tailored to the specific individual being interviewed. For example,

herders who were members of NBR's new cooperative herding organizations were asked questions regarding their specific experience and attitudes regarding the function, value, and administration of the organizations.

I chose a quantitative survey approach to measure pastoralists' attitudes towards cooperation because this approach enabled the research team to both quickly collect data within the study population as well as utilize a deductive approach to statistically compare the attitudes towards cooperation of each settlement category and test the study hypotheses. In addition, the survey variables utilized in this study also allow for the possibility of future comparisons across sites. Therefore, I developed a five point Likert scale survey instrument (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) that addresses herders' attitudes towards cooperation and grassland management which I administered to a sample of 50 pastoralists. The survey variables were based on the findings of previous research studies in both Inner Mongolia and the Republic of Mongolia (i.e. Li and Huntsinger 2011; Williams 2002; Fernandez-Gimenez 2000; Humphrey and Sneath 1999; 1996a; 1996b) and addressed herders' perceptions about the willingness of their kin, friends, and neighbors to cooperate in livestock herding, herders perceived obligation to help neighbors and kin manage their livestock, and herders' beliefs about whether the frequency of cooperation has changed in the community since 1996. Other survey variables addressed herders' perceptions of land degradation and beliefs regarding the effectiveness and sustainability of their current grassland management strategies. Table 1, illustrates the demographic breakdown of the

survey sample including age, ethnicity, and settlement categories. Tables 2 and 3 highlight the survey variables that address both grassland management and cooperation.

Table 1: Description of Sample Population¹

<u>Ethnicity</u>		<u>Sex</u>		<u>Age</u>			<u>Settlement Pattern</u>	
Han	Mongol	Male	Female	Mean	Median	Range	Sedentary	Mobile
9	41	33	17	39.46	38	18 - 67	25	25

¹n = 50

Because I lacked access to local population censuses and many areas of the banner were restricted, I utilized convenience sampling to recruit the sample population (Bernard 2006: 191-192). My original intention before being introduced to the current political atmosphere in NBR was to survey both fully sedentary herders and herders living close to the Mongolian border that are truly nomadic. When this became impossible due to restrictions, I chose to divide the study sample into two categories

Table 2: Survey variables pertaining to attitudes towards cooperation¹

1. I often quarrel with my neighbors over pasture boundaries.
2. I am angry if my neighbors' livestock cross into my land.
3. My neighbors can help me herd my livestock.
4. My kin can help me herd my livestock.
5. My friends can help me herd my livestock.
6. I want to fence my family's pasture to keep other herders' livestock out.
7. I can rely on my neighbors to help me in bad weather.
8. People work together more now than they did 20 years ago.
9. I have an easy time arranging *otor* with other herders.
10. I feel my neighbors are interested in helping me herd my livestock.
11. I feel my kin are interested in helping me herd my livestock.
12. I feel an obligation to help my neighbors manage their livestock.
13. I feel an obligation to help my kin manage their livestock.
14. My neighbors and I help each other cut hay.
15. I can rely on my neighbors to help me make an *otor*.

¹Survey variables coded on a 5 point scale (1 = strongly disagree, 5 = strongly agree).

based on pastoral mobility. Herders that reported no pastoral movements in the previous twelve months were classified as "sedentary," and those that reported at least one pastoral

migration in that time were classified as “mobile.” Therefore, the analysis includes both herders that maintain seasonal movement and those that have become fully sedentary as a result of recent policy changes. However, this categorization quickly became problematic because even the mobile segment of the study sample are not “nomadic” in the traditional Mongolian sense, and thus, represent a system of land management that is different than the system of mobility practiced before 1996. However, because these herders still value movement even in the current sedentary system and practice a land management strategy different than that of their fully sedentary neighbors, mobility still serves as the unit of analysis in this study.

The research team conducted surveys within the homes of individual herding families as well as both within the village center and on the grassland itself. Because some herders are not literate in Chinese or only speak Mongolian, we administered the surveys to herders orally and recorded their responses. Although this approach was more time consuming than providing herders with a written version of the survey, one strength of utilizing oral surveys was that we could ask follow-up questions to herder responses to each survey variable. This provided rich qualitative data to clarify and illustrate why survey participants selected levels of agreement or disagreement for each statement.

Table 3: Variables pertaining to attitudes towards grassland management¹

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1. During times of drought, I can move my livestock to new pastures if I need to.
 2. During a white disaster, I can take my livestock where they can get enough forage to eat.
 3. During a black disaster, I can take my livestock to where they can get enough water to drink.
 4. Herd mobility is needed to manage grasslands effectively.
 5. The way herders herd their animals now gives grassland enough time to regenerate before it is grazed again.
 6. Fencing pastures helps herders to manage grasslands more effectively than before grassland was contracted to individual families.
 7. I have a harder time conducting *otor* now than in the past.
-

¹Survey variables coded on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

The above survey variables were translated from English to Mandarin and read to survey respondents in Mandarin or Mongolian by both my research assistant as well as a driver who was fluent in both languages. My knowledge of both written and spoken Mandarin at the time of this study was conversational, and although I was often able to ask follow-up questions to participants' survey responses as well as understand their responses, my limited knowledge of Mandarin made it impossible for me to conduct this research without the assistance of an interpreter.

Data Analysis:

I performed all statistical analyses of the survey data using SPSS 19 to compare survey responses across herder settlement categories and G*Power to test whether or not the study was sufficiently statistically powered to detect significant differences between each category. To determine which statistical tests were appropriate for analyzing the survey data, I first performed Shapiro-Wilks' tests for normality on each survey variable to determine whether or not survey data were normally distributed. The results of these tests indicated that the survey variables were not normally distributed, thus, making non-parametric tests more appropriate for analysis than standard parametric procedures.

To test the first two hypotheses that herders who retain seasonal mobility would have more positive attitudes towards both cooperation and grassland management than those who are fully sedentary, I utilized Mann-Whitney U Tests (a commonly used non-parametric procedure) to observe whether or not there was a statistically significant difference between the responses of each settlement type to the survey variables. I

determined whether or not comparisons were statistically significant based on the standard p value of $p \leq .05$. I then analyzed the results of the Mann-Whitney U Tests for statistical power by comparing the sample size and the observed effect sizes (Cohen's d) for each survey variable. Variables that were powered below .80 were deemed not sufficiently powered to detect a statistically significant comparison given the sample size and effect size for each statistically insignificant Mann-Whitney U Test.

To test the third and fourth hypotheses that sedentary and mobile herders would not share the same cultural model regarding their attitudes towards cooperation and grassland management, I utilized inter-rater reliability using Cronbach's α to measure both within and between-group agreement on the survey variables (Bang et al 2007; Atran et al 2007; Gliem and Gliem 2003). If the analysis yielded a Cronbach's α of .65 or greater, then results were determined as indicative of high levels of agreement among survey respondents.

I analyzed the qualitative data collected both during semi-structured structured interviews and during oral surveys by coding interview data topically and thematically (Bernard 2006). I then utilized this qualitative data as well as field notes from participant observation of community events, herding activities, and the daily life of pastoral families to inform the statistical analysis of the quantitative data. Therefore, this study is based on both statistical analysis and ethnographic methods.

The Effects of China's Grassland Contract Policy on Pastoralists' Attitudes towards Cooperation in an Inner Mongolian Banner

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Abstract China's Inner Mongolia Autonomous Region is experiencing high levels of grassland degradation partially as a result of government policies to sedentarize nomadic pastoralists and privatize collective grasslands. Previous research suggests that traditional forms of cooperation among Inner Mongolian pastoralists have deteriorated as a result of privatization and sedentarization. Herders in New Barag Right Banner (n = 50) representing both sedentary and mobile livestock management strategies were asked to respond to a scaled survey regarding their attitudes towards cooperation with other pastoralists. Inter-rater reliability and Mann-Whitney U Tests were utilized to compare the attitudes towards cooperation across settlement categories and to test whether or not sedentary and mobile herders share the same cultural model regarding cooperation. The authors show that there is both high intra and inter-group agreement on the survey variables across settlement categories, indicating that sedentary and mobile herders share the same cultural model regardless of their settlement pattern.

Keywords Pastoralism, China, Inner Mongolia, Cooperation, Marketization, Privatization, Cultural Models

Introduction:

China's Inner Mongolia Autonomous Region is currently experiencing an unprecedented rate of grassland degradation and desertification despite efforts by the regional and national governments of China to create policies aimed at improving

grassland conditions (Nelson 2006). Previous studies suggest that some of the contributing factors of land degradation include China's Household Responsibility System and Grassland Contracting Policy, which have led to the privatization of livestock production through the exposure of the Inner Mongolian pastoral economy to global markets for livestock products (Taylor 2012; Humphrey and Sneath 1996a). This is due to the fact that these policies have eroded both the ecologically adaptive semi-nomadic grazing strategies and traditional Mongolian cultural norms of cooperation that allowed herders to collectively manage grassland in the past (Li and Huntsinger 2011; Williams 2002).

This study analyzes the effects of the privatization of grassland on a small population of Mongolian herders in the New Barag Right Banner (NBR) of Northeastern Inner Mongolia by measuring and comparing the attitudes towards cooperation of sedentary and mobile herders in three case-study villages.

Background: Grassland Ecology and Cooperation in Pastoral Systems

The northern, western, and highland frontiers of China contain some of the most extensive grassland resources in the world. Nearly half of Chinese territory consists of temperate, desert, and alpine grasslands which, traditionally, have been managed by pastoralists to convert grassland resources into consumables in the form of herds of sheep, goats, horses, camels, and cattle. The Inner Mongolia Autonomous Region (IMAR) accounts for nearly 20 percent of China's total grasslands (Deng et al 2009) and lies within the ecological and cultural transition zone between Han Chinese-dominated intensive agriculture and Mongolian-dominated pure pastoralism (Lattimore 1940).

Since the second half of the 20th century, Inner Mongolia has experienced a marked deterioration of grassland productivity, decreased plant species biodiversity, and the expansion of desert into pastoral and agricultural areas (Williams 2002). It is estimated that, currently, over 90% of Chinese grasslands are degraded and desert conditions expand over 10,000 km² annually in China (Nelson 2006). Previous research suggests that grassland degradation is a result of both the expansion of agriculture into pastoral regions poorly suited to farming (Humphrey and Sneath 1996a) as well as government policies that have led to the collapse of the nomadic grazing and common pool resource management strategies that were common in Inner Mongolia prior to the 1950s (Taylor 2006; Humphrey and Sneath 1999). In particular, past studies highlight the role that the Household Responsibility System and Grassland Contracting Policies initiated by the reform government of Deng Xiaoping have had in degrading both the ecologically adaptive nomadic grazing strategy of Mongolian herders and the cultural norms that supported its practice (Li and Huntsinger 2011; Ho 1996).

In a series of policy changes from the early 1980s to the mid-1990s, the Inner Mongolian government sought both to protect the fragile grassland environment and industrialize livestock production in response to growing domestic and international markets for animal products (Ma 2003). The policies privatized grassland and contracted pastures to individual herding families the same way that agricultural land was divided among farming families under the Household Responsibility System (Tilt 2008; Rozelle et al 2005). Through this grassland contracting policy, and under the guidance of the World Bank and the UN Development Program, the government hoped to mitigate the

tragedy of the commons that they felt could cause degradation on common grasslands as well as improve the productivity of herders by encouraging them to adopt Western models of sedentary, industrialized livestock production (Zukosky 2008; Fratkin 1997; Hardin 1968). Key to the implementation of these policies was the encouragement of pastoralists to cease seasonal migration, follow state-mandated livestock carrying capacities for grassland, and fence their family pastures to prevent other herders from misusing them (Banks and Doman 2001).

The privatization of grassland has been suggested as a key factor contributing to the continued deterioration of Inner Mongolian grasslands because it has led to the collapse of the traditional mobile grazing practices that allowed Mongolian herders to flexibly manage the variable topographic and climatic conditions of their grasslands (Fernandez-Gimenez and Le Febre 2006). Prior to the privatization of grassland, pastoralists utilized a nomadic strategy centered on seasonal pastoral migration that allowed grasslands long periods of regeneration after they had been grazed. Additionally, herders were able to respond to seasonal variability in precipitation and plant growth as well as negative climatic events by conducting additional seasonal pastoral movements known as *otor* during times of unfavorable ecological conditions (Humphrey and Sneath 1999). Following the division of pastures and their allocation to individual households from the 1980s to mid-1990s, herders encountered greater difficulty in conducting *otor* and responding to climatic variability as the enclosure of formerly common grasslands with fencing became widespread (Li and Huntsinger 2011). Therefore, the privatization of grasslands and sedentarization of nomadic herders, although intended to mitigate

grassland degradation by preventing overexploitation, have actually been shown to contribute to the continued deterioration of Inner Mongolian grasslands for two reasons. First, by decreasing the mobility of pastoralists, the policies have contributed to overgrazing because constant pressure is placed on small family pasture allocations rather than spread over multiple seasonal pastures. Second, to conduct *otor*, herders must now acquire the use of additional seasonal pastures by renting land from other families. Therefore, seasonal movements are now based on the availability of grassland for rent and monetary compensation rather than the traditional ecological knowledge that influenced movement decisions in the past. And so, herders that are not able to rent additional pastures must rely on securing external sources of supplementary livestock fodder (at their own expense) as well as depend on diminished resources on their family pastures during negative climatic events (Williams 1996). In addition, low investment in the pastoral sector of the Inner Mongolian economy renders the Western model of ranching ineffective because it is highly dependent on external sources of fodder and complex transportation infrastructure that are currently unavailable in many areas of Inner Mongolia (Sheehy 1993).

Furthermore, the privatization of grasslands has also negatively affected the socio-cultural norms that allowed herders to sustainably manage common-pool grassland resources in the past (Li and Huntsinger 2011). Traditionally, livestock and grassland were managed cooperatively by small groups of families known as *khot ail*. These groups could be composed of kin, neighbors, friends, or other members of the pastoral community, and could vary in composition from year to year. *Khot ail* cooperated to herd

livestock, conduct seasonal migrations, and make decisions on how to manage the highly variable grassland environment. These cooperative units gave herders the ability to maximize their use of available geographic features and plant species because they could divide labor and herd livestock species according to their topographic and plant species preferences (Bold 1996). Therefore, the *khot ail* system enabled pastoralists to utilize cooperation to spread grazing impacts more efficiently over available grasslands.

Williams (2002) found that the traditional socio-cultural norms of cooperation among Inner Mongolian pastoralists have been eroded by the privatization of grassland and the decline in herder mobility to the extent that previously cooperative relationships among herding families have now become competitive. Li and Huntsinger (2011) employed the theory of community failure (McCay and Jentoft 1998) to show how the marketization of the Inner Mongolian pastoral economy has destroyed traditional social institutions by making herders more dependent on government mandated regulations rather than collective action and cooperation to regulate grassland resource use. Thus, as a result of community failure among Inner Mongolian pastoralists, the community identity that previously allowed for the establishment of solidarity, trust, and norms regarding competition among community members have eroded to the extent that they no longer allow for effective grassland management. However, to date, few studies have systematically studied the relationship between settlement patterns and the attitudes towards cooperation of Inner Mongolian herders.

Based on the community failure theoretical framework and the findings of previous studies (Li and Huntsinger 2011, Williams 2002), the authors anticipated that

there would be an observable difference in the attitudes towards cooperation between herders representing the current sedentary livestock production system and those more closely related to the traditional nomadic strategy. The New Barag Right Banner of Northeastern Inner Mongolia provided an ideal setting to measure pastoralists' attitudes towards cooperation because it did not adopt privatization policies until 1996, nearly two decades after most of the other regions of Inner Mongolia. Thus, many pastoralists in the region have had experience in both the traditional nomadic system of livestock production and the current sedentary system. Moreover, many herders in NBR continue to practice seasonal mobility by conducting migrations to pastures rented from other herders. Thus, the authors made two hypotheses. First, because they utilize different grassland management strategies, mobile and sedentary herders would not share the same cultural model (Quinn and Holland 1987) regarding cooperation. Second, because they are more closely related to the traditional system of grassland management, herders who are able to retain seasonal mobility would have a more positive attitude towards cooperation than those who are sedentary. The aim of this study was to understand the effects of changing pastoral policies on a small group of herders representing the transition of pastoral production from a nomadic past to a sedentary present. The results can help illustrate the effects of current grassland management practices on Mongolian pastoralists' social organization and inform future grassland management policy in Inner Mongolia.

Changing Pastoral Policies and Practices in Inner Mongolia

The three case-study villages, Dashimo (pop = 835), Hulun No'er (pop = 255), and Ehe No'er (pop = 458) lie within the New Barag Right Banner (NBR) of Northeast Inner Mongolia's Hulunbuir League. The banner is approximately 23,000 km² in area and shares international borders with the Republic of Mongolia to the west and south and the Russian Federation to the north. The region lies on the eastern Mongolian Plateau and is

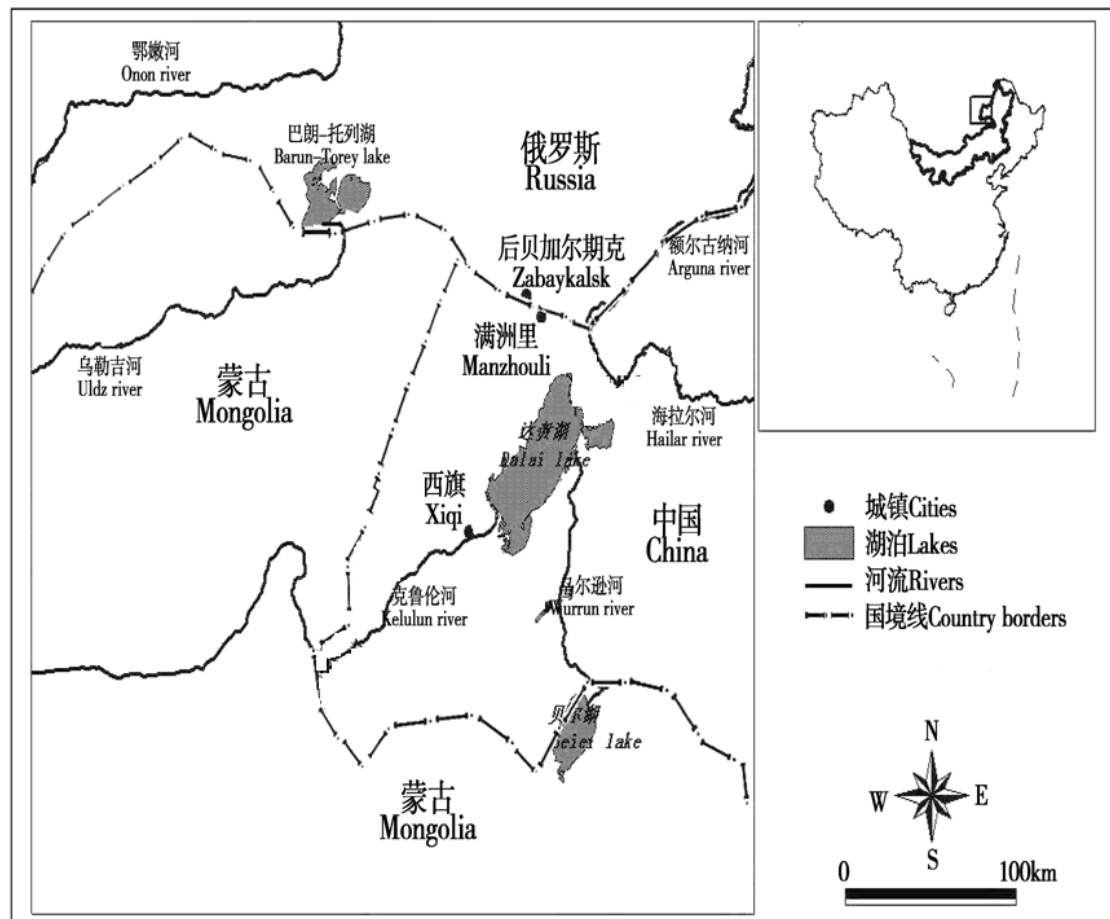


Figure 1: Map of the study area (Liu n.d.)

dominated by short-grass steppe that receives 200-300 mm of precipitation annually (Daly and Hannaway 2005; Hu et al 1992). NBR is a unique place to study changes in pastoral management and herder attitudes because, unlike other areas of Inner Mongolia,

herders in NBR were not affected by the encroachment of agriculture into traditionally pastoral areas during the 19th and 20th centuries.

The main regional economic activities include livestock production as well as a burgeoning copper and coal mining industry. Service industries such as small restaurants, mechanic shops, and grocers can be found in village centers. The average annual per capita pastoral income for the three villages in 2011 was 8,369 CNY (~\$1,300), which is roughly equivalent to the 2012 national mean rural income for the People's Republic of China (Holmes 2012). The pastoral population is dominated by ethnic Barga Mongols who have traditionally populated the area but also includes some Han Chinese pastoralists whose families migrated into the area from other regions of China during periods of political and economic turmoil in previous decades (Pasternak and Salaff 1993).

Prior to the 1990s, NBR was dominated by mobile pastoralism characterized by seasonal nomadic migration and the management of grassland through collective action. Herders typically conducted between four and ten annual pastoral migrations, but could conduct as many as thirty movements and emergency *otor* during years with poor precipitation and climatic conditions.

During the Qing Dynasty (1644 - 1912), grasslands in NBR were administrated by local princes who represented the ruling dynasty in Beijing or Buddhist monasteries that held economic authority over pastoral districts. These ruling institutions collected taxes and tribute from herders for the central dynastic government and consulted local herders to regulate the use of pastures among households and facilitate seasonal

migrations and herd species compositions (Humphrey and Sneath 1999). Communities also regulated the establishment of winter grasslands and emergency pastures for times of adverse climatic conditions. Therefore, overgrazing and unsystematic pasture use was prevented through collective action and community-based decision making during the pre-revolutionary period.

After the establishment of the People's Republic of China in 1949, nomadic herders in NBR were organized into collective herding units and livestock were redistributed from ruling elites to herding households. The herding collectives provided veterinary assistance to herders as well as constructed infrastructure and facilitated mechanized transportation for seasonal migrations. Collectives continued to regulate the establishment of reserve pasture for emergency forage (Williams 2002). During the pre-revolutionary period and after collectivization, the *khot ail* system of cooperation between small groups of families remained largely intact through the formation of small cooperative groups of families by rural collectives (Bold 1996; Cooper 1993).

In 1996, collective management of grassland ended after the NBR government initiated the Grassland Contract Policy that had already taken effect in most of the other regions of Inner Mongolia. Government officials divided up available grassland among herding families based on their *hukou* (household registration) status and the number of livestock they had at the time of division. Families were assigned individual pastures that they could then subdivide for seasonal use and also had access to small public grasslands close to the village center that were reserved for emergency use. The average land holdings in the study sample was 622.5 hectares (9,338 *mu*) (1 hectare = 15 *mu*),

although, some study participants had access to as little as 213 hectares (3,200 *mu*) of grassland and others as much as 2,000 hectares (30,000 *mu*) through renting additional grassland from other pastoral families.

After dividing grassland among pastoral families, the banner government then assigned local grassland monitoring stations to examine available grassland and assign a fixed livestock carrying capacity to each family pasture allocation that would be reassessed every three years. In 2012, the state-assigned carrying capacity for NBR grasslands was 1 sheep unit per 20 *mu* of grassland. However, because livestock products remain one of the sole sources of income for NBR pastoralists, many herders far exceed their maximum allowance for livestock. At the time of this study, over 90% of study participants reported herd sizes far in excess of the carrying capacity assigned to their land. In some cases, herders reported having more than three times the number of livestock they were legally allowed to keep.

Herders, grassland management officials, and grassland ecologists have reported the negative effects of the decline in mobility and growth in livestock numbers. For example, many NBR herders reported concern with a decline in desirable plant species and a rise in the occurrence of unpalatable and less nutritious species. In particular, they mentioned an overall increase in *lang zhen* (translated: “wolf needle”) (*Stipa baicalensis*) (Roshevitz 1929), a species of needle grass with hard, pointed seeds that can injure or kill livestock (Wang 1992). Community members agreed that *lang zhen* had always been present in local plant species associations, but has increased dramatically in proportion to other more desirable species in the last decade.

In response to the deterioration of grassland conditions in NBR, the local government has initiated programs to try to develop hay cutting machinery that can remove *lang zhen*. It has also created programs to decrease both livestock numbers and herders' dependence on natural grassland (Humphrey and Sneath 1996b). In August 2012, the NBR government initiated a policy that would require herders to decrease their livestock numbers to 200 sheep units regardless of the size of their land holdings, and to increase the number of their livestock that are exclusively pen-fed with supplementary fodder such as hay and corn. Therefore, it is the state's intention to curb grassland degradation and decrease grazing pressure by increasing the industrialization of livestock production based on Western models of industrial animal husbandry.

While the traditional nomadic grazing strategies practiced by NBR herders prior to 1996 were disrupted by the institution of the Grassland Contract Policy, some herders are able to retain seasonal mobility by renting additional pastures from other families to conserve their own grassland. Many herders will attempt to make at least one migration to an additional rented pasture each year, and it is not uncommon for many mobile families to move between two and four times during the year. This strategy enables them to pasture more livestock without placing as much grazing pressure on their own private grassland allocations. However, while it may be easy to view this type of mobility as a direct continuation of the nomadic strategy practiced prior to 1996, many herders have expressed dissatisfaction with the usefulness of renting additional pastures. One 29 year-old Mongol herder expressed: "I think that we need to move to keep our animals and land healthy, but it's useless to move now. My family has only one pasture and it has good

grass for summer but not for winter. If we rent another pasture in the winter that also only has good plants for summer, the move is useless.” This comment is indicative of the fact that previous forms of pastoral mobility took into account the plant species associations and topographic conditions ideal for different seasons and livestock species (Fernandez-Gimenez 2000). Thus, the new form of mobility is based more on range availability and monetary compensation than the traditional ecological knowledge of the herding community and needs of livestock species. Nevertheless, the mobile segment of the NBR pastoral population still values pastoral mobility even as other herders have chosen to remain fully sedentary. Therefore, because there is a segment of NBR pastoralists that maintains a relationship to the former nomadic system, mobility served as the unit of comparison in this study.

Methods:

The lead author conducted field research in the three case-study villages in the summer of 2012 using a mixed methods approach. A key component of this mixed approach was semi-structured field interviews ($n = 12$) with herders and key community leaders to investigate changes in cooperative structures since privatization and herders' perceptions of changes in grassland management and grassland health. The authors also developed a scaled survey instrument (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) that addressed attitudes towards cooperation, and the lead author administered the survey to a sample of 50 pastoral households. The survey variables addressed herders' perceptions about the willingness of their kin, friends, and

neighbors to cooperate in livestock herding; herders' perceived obligation to help neighbors and kin manage their livestock; and herders' beliefs about whether the frequency of cooperation has changed in the community over the past twenty years. Table 1 shows the age, ethnicity, and mobility, breakdown for the sample population. Because the authors lacked access to local population censuses, convenience sampling was used to recruit the sample population (Bernard 2006: 191-192).

Table 1: Description of sample population¹

<u>Ethnicity</u>		<u>Sex</u>		<u>Age</u>			<u>Settlement Pattern</u>	
Han	Mongol	Male	Female	Mean	Median	Range	Sedentary	Mobile
9	41	33	17	39.46	38	18 - 67	25	25

¹n = 50

The authors chose a quantitative survey approach to measure pastoralists' attitudes towards cooperation because of both time constraints as well as difficulties in conducting ethnographic research in NBR due to the political climate of frontier regions of China. NBR's position on two of China's international borders makes many areas of the banner restricted to foreign researchers, and the movement of foreign nationals within the region is heavily regulated by both police and the People's Liberation Army. Therefore, the survey approach enabled the research team to both quickly collect data within the study population and utilize a deductive approach to statistically compare the attitudes towards cooperation of each settlement category and test the study hypotheses. In addition, the survey variables utilized in this study also allow for the possibility of future comparisons across sites.

The sample population was then divided into two categories based on pastoral mobility. Herders that reported no pastoral movements in the previous twelve months

were classified as “sedentary,” and those that reported at least one pastoral migration in that time were classified as “mobile.” Therefore, the analysis includes both herders that maintain seasonal movement and those that have become fully sedentary as a result of recent policy changes.

The authors used the cultural models approach and inter-rater reliability to test for both within and between-group agreement on the survey variables (Bang et al 2007; Atran et al 2007). Quinn and Holland (1987:4) describe cultural models as “presupposed, taken-for-granted models of the world that are widely shared and play an enormous role in people’s understanding of the world and their behavior in it.” Through the use of inter-rater reliability, the study aimed to test whether herders with different settlement patterns share the same cultural model regarding their attitudes towards cooperation or if sedentarization and the privatization of grassland have led them to represent distinct populations within the same herding community.

To test the first hypothesis that herders who retain mobility would have a more positive attitude toward cooperation than those that are fully sedentary, Mann-Whitney U Tests (a commonly used non-parametric procedure) were used to observe whether or not there was a statistically significant difference between the responses of each settlement type to the survey variables. Mann-Whitney U Tests were used in place of Independent Samples T-Tests because survey data were not normally distributed.

Analysis:

To assess whether or not the fifteen survey variables pertaining to herder attitudes measure a single unidimensional construct, reliability analysis was conducted using Cronbach's Alpha. Table 2 illustrates the results of this analysis. Reliability analysis indicated that there is high inter-rater agreement on the fifteen survey variables ($\alpha = .78$).

Table 2: Reliability analysis for survey items measuring attitudes towards cooperation¹

	<u>Item Total</u> <u>Correlation</u>	<u>Alpha if Item</u> <u>Deleted</u>	<u>Cronbach's Alpha</u> <u>(α)</u>
<u>Attitudes towards cooperation</u>			.78
1. I often quarrel with my neighbors over pasture boundaries.	.22	.78	
2. I am angry if neighbors' livestock cross into my land.	-.06	.80	
3. My neighbors can help me herd my livestock.	.64	.74	
4. My kin can help me herd my livestock.	.44	.76	
5. My friends can help me herd my livestock.	.51	.76	
6. I want to fence my family's land to keep other herders' livestock out.	-.25	.82	
7. I can rely on my neighbors to help me in bad weather.	.60	.75	
8. People work together more now than 20 years ago.	.17	.78	
9. I have an easy time arranging <i>otor</i> with other herders.	.38	.77	
10. I feel my neighbors are interested in helping me herd my livestock.	.51	.75	
11. I feel my kin are interested in helping me herd my livestock.	.61	.74	
12. I feel an obligation to help my neighbors herd their livestock.	.55	.75	
13. I feel an obligation to help my kin herd their livestock.	.50	.76	
14. My neighbors and I help each other cut hay.	.55	.75	
15. I can rely on my neighbors to help me make an <i>otor</i>	.54	.75	

¹Survey variables coded on a 5 point scale (1 = strongly disagree, 5 = strongly agree)

Analysis of alphas if survey items are deleted shows that the overall reliability of the survey variables would be improved if the variables “I am angry if neighbors’ livestock cross into my land” and “I want to fence my family’s pasture to keep other herders’ livestock out” were omitted from the construct. However, they were both retained in the analysis because previous research suggests that fencing and conflict between herders over pasture boundaries have had an effect on cooperation among Inner Mongolian pastoralists (Williams 2002).

The authors then conducted inter-rater reliability analysis to assess whether herders representing different settlement patterns share the same cultural model regarding their attitudes towards cooperation. Table 3 illustrates the results of this analysis for the sedentary and mobile categories of the sample population.

Table 3: Intra/Inter-group agreement for cooperation variables

<u>Settlement Type</u>	<u>Sample Size</u>	<u>Cronbach’s Alpha (α)</u>
Sedentary ¹	25	.79
Mobile ²	25	.90
Between Groups	50	.92

¹Herders who reported 0 pastoral movements during the previous 12 months

²Herdes who reported at least 1 pastoral movement during the previous 12 months

Inter-rater reliability analysis for attitudes towards cooperation and settlement patterns indicate a high level of intra-group agreement for both the sedentary ($\alpha = .79$) and mobile ($\alpha = .90$) segments of the sample. There was also a high level of agreement on these variables between the sedentary and mobile categories of the sample population ($\alpha = .92$).

To test the second hypothesis that mobile herders would have a more positive attitude toward cooperation than sedentary herders, Mann-Whitney U Tests were conducted for the fifteen cooperation variables to compare the responses of each settlement category. Table 4 illustrates the results of this analysis. The results of the

Table 4: Comparison of attitudes towards cooperation among sedentary and mobile pastoralists

<u>Variable</u>	<u>z – value</u>	<u>p – value</u>	<u>Sedentary Mean</u> <u>Rank</u>	<u>Mobile Mean</u> <u>Rank</u>
1. I often quarrel with my neighbors over pasture boundaries.	-.79	.43	26.8	24.2
2. I am angry if neighbors' livestock cross into my land.	-1.03	.30	27.3	23.7
3. My neighbors can help me herd my livestock.	1.10	.27	23.3	27.7
4. My kin can help me herd my livestock.	.65	.52	24.3	26.7
5. My friends can help me herd my livestock.	.42	.67	24.7	26.3
6. I want to fence my family's land to keep other herders' livestock out.	-.30	.77	26	25
7. I can rely on my neighbors to help me in bad weather.	1.50	.13	22.6	28.4
8. People work together more now than 20 years ago.	-.56	.58	26.6	24.4
9. I have an easy time arranging <i>otor</i> with other herders.	1.74	.08	22.3	28.7
10. I feel my neighbors are interested in helping me herd my livestock.	1.05	.30	23.6	27.4
11. I feel my kin are interested in helping me herd my livestock.	1.17	.24	23.2	27.8
12. I feel an obligation to help my neighbors herd their livestock.	2.48	.01*	20.7	30.3
13. I feel an obligation to help my kin herd their livestock.	2.41	.02*	20.9	30.1
14. My neighbors and I help each other cut hay.	1.76	.08	22.1	28.9
15. I can rely on my neighbors to help me make an <i>otor</i>	.67	.50	24.3	26.7

* Statistically significant comparison

Mann-Whitney U Tests indicate that there are few statistically significant differences at the 95% confidence level between the sedentary and mobile segments of the sample population regarding the survey variables pertaining to attitudes towards cooperation. Notable exceptions are the variables “I feel an obligation to help my neighbors herd their livestock” ($z = 2.48, p = .01$) and “I feel an obligation to help my kin manage their livestock” ($z = 2.41, p = .02$). For both of these variables, the mobile segment of the study population has a significantly more positive attitude towards a perceived obligation to help kin and neighbors manage their livestock than the sedentary herders.

A power analysis was then conducted to test if the study was sufficiently powered to detect statistically significant differences in responses to the thirteen statistically insignificant survey variables if they were present. This analysis was performed by using the mean responses and standard deviations of sedentary and mobile herders to determine the effect size (Cohen’s d) between the sample distributions for each of the thirteen statistically insignificant comparisons. The results of the power analysis indicate that the study was not sufficiently powered to detect a statistically significant difference between the sedentary and mobile segments of the study population at the small and medium effect sizes observed for each of the thirteen statistically insignificant Mann-Whitney U Tests. The results of this analysis are illustrated in Table 5.

Discussion:

This study’s lack of statistical power is due to both the limits on sample size given the short time-frame of this research and the author’s limited access to pastoral

populations in NBR. Previous research suggests that there should be a large effect size between herders representing the new sedentary system of livestock production and herders utilizing a grassland management strategy more closely related to the traditional nomadic system. Therefore, this research was oriented to detecting a large effect between

Table 5: Power Analysis for Cooperation Variables¹

<u>Variable</u>	<u>Sedentary</u> <u>(M, SD)</u>	<u>Mobile</u> <u>(M, SD)</u>	<u>Effect Size</u> <u>(d)</u>	<u>Power²</u> <u>(1 – β err</u> <u>prob.)</u>	<u>Sample Size</u> <u>Needed³</u>
1. I often quarrel with my neighbor over pasture boundaries.	2.04 (1.67)	1.64 (1.32)	.27	.24	342
2. I am angry if neighbors' livestock cross into my land.	2.32 (1.75)	1.76 (1.27)	.37	.36	184
3. My neighbors can help me herd my livestock.	3.08 (1.71)	3.56 (1.69)	.28	.25	318
4. My kin can help me herd my livestock.	3.80 (1.58)	3.92 (1.55)	.08	.09	3866
5. My friends can help me herd my livestock.	3.64 (1.60)	3.84 (1.46)	.13	.12	1466
6. I want to fence my family's land to keep other herders' livestock out.	3.72 (1.84)	3.64 (1.75)	.04	.06	15458
7. I can rely on my neighbors to help me in bad weather.	3.40 (1.50)	4.00 (1.32)	.42	.43	142
8. People work together more now than 20 years ago.	2.68 (1.63)	2.40 (1.47)	.18	.15	766
9. I have an easy time arranging <i>otor</i> with other herders.	3.48 (1.73)	4.28 (1.24)	.53	.58	90
10. I feel my neighbors are interested in helping me herd my livestock.	2.12 (1.56)	2.64 (1.91)	.30	.27	278
11. I feel my kin are interested in helping me herd my livestock.	2.64 (1.80)	3.24 (1.79)	.33	.31	230
12. My neighbors and I help each other cut hay.	2.52 (1.81)	3.36 (1.66)	.48	.51	110
13. I can rely on my neighbors to help me make an <i>otor</i>	3.92 (1.58)	4.36 (1.11)	.32	.30	244

¹Variables coded on a 1 to 5 scale (1= strongly disagree, 5 = strongly agree).

²Variables were deemed sufficiently powered if (1 – β err prob. \geq .80)

³Sample size required given observed effect size

the settlement categories. In addition, although the Mann-Whitney U Tests were not sufficiently powered to conclusively show that there is a statistically significant difference between the two population categories for these thirteen variables, the high levels of agreement observed in the inter-rater reliability analysis, which is less dependent on sample size, suggest that the same insignificant results would be observed if sufficient sample sizes were attained.

Although the Mann-Whitney U Tests were not sufficiently powered to detect statistically significant differences between each category of the sample population, mean responses to survey variables pertaining to cooperation with kin, friends, and neighbors indicate that herders of both settlement categories share in overall agreement that neighbors, kin, and friends can help them manage their livestock. Table 6 illustrates the mean responses and standard deviations for these survey variables. Overall mean responses for survey variables pertaining to cooperation with neighbors, kin, and friends indicate that herders of both settlement categories still place a high value on cooperation regardless of changes in the NBR pastoral system, but also believe that cooperation has

Table 6: Mean responses to cooperation variables¹

<u>Variable</u>	<u>Sedentary</u> <u>(M, SD)</u>	<u>Mobile</u> <u>(M, SD)</u>
1. My neighbors can help me herd my livestock.	3.08 (1.71)	3.56 (1.69)
2. My kin can help me herd my livestock.	3.80 (1.58)	3.92 (1.55)
3. My friends can help me herd my livestock.	3.64 (1.60)	3.84 (1.46)
4. I want to fence my family's land to keep other herders' livestock out.	3.72 (1.84)	3.64 (1.75)
5. People work together more now than 20 years ago.	2.68 (1.62)	2.40 (1.47)

¹Variables coded on a 1 to 5 scale (1 = strongly disagree, 5 = strongly agree)

declined since the end of collective herding in 1996.

In regard to the statistically significant comparisons observed for the survey variables pertaining to herders' perceived obligation to help neighbors and kin manage their livestock, mobile herders may have significantly more positive attitudes for the following reason. Because the mobile segment of the population has greater need for cooperation with neighbors and kin during seasonal transfers of livestock to rented pastures, they may perceive a greater sense of obligation to help others manage their livestock, whereas sedentary herders may rely on their kin and neighbors less frequently.

The high degree of agreement indicated by the results of inter-rater reliability analysis lead the authors to reject the hypothesis that herders representing different settlement patterns would not share the same cultural model regarding their attitudes towards cooperation. These findings could be a result of a homogenizing effect on herder attitudes given the current policy and management atmosphere in NBR. For example, when asked about the current state of cooperation among herders during interviews, both sedentary and mobile interview participants agreed that they rarely cooperate with their friends, neighbors, and kin to manage their land and livestock. Many herders asserted that they felt this was because the division of grassland in 1996 had separated them from the families they traditionally cooperated with, thus, rendering cooperative herding with kin and friends impractical. These findings are supported by herder responses to the survey variable "People work together more today than 20 years ago." Mean responses to this variable by both sedentary and mobile herders (2.68, 2.40, respectively) indicate that herders of both settlement categories generally disagree that cooperation between herders

is greater today than in the previous herding strategy. “We do everything ourselves now” was a common theme stated during interviews.

Mean responses to survey variables pertaining to cooperation with kin, friends, and neighbors indicate that herders of both settlement categories share in overall agreement that neighbors, kin, and friends can help them manage their livestock. However, when participants were asked to estimate how many times in the last twelve months they actually helped other herders manage their livestock and how many times others herders helped them manage their livestock, responses were less optimistic. Of the 39 valid responses (responses other than “I don’t know” or “It is difficult to say”) to this question, 25 herders stated that they had not cooperated with other herders at all or only infrequently during the previous year. Therefore, although there seems to be a high cultural value attached to cooperation with other herders, given the current state of grassland and livestock management in NBR, actual cooperation between herders is minimal compared to the levels of cooperation reported by informants to have occurred during the *khot ail* system.

Mean responses to the survey variable “I want to fence my family’s pasture to keep other herders’ livestock out” indicate that herders of each settlement category value the use of fencing in the current herding strategy regardless of their utilization of the mobile grazing strategy. Mean responses of both sedentary and mobile herders (3.72, 3.64, respectively) indicate that there is general agreement with the use of fences in the current privatized grazing system for both categories of the study sample. Therefore, the privatization and marketization of pastoral production in NBR could be contributing to a

homogenizing effect in the value orientation and attitudes of herders representing different settlement patterns as they adapt to new non-indigenous models of pastoral production. For instance, herders may conclude that if they no longer have an unlimited ability to make decisions on where to migrate within NBR grasslands, then fencing could offer them an alternative method for preventing overgrazing by restricting other herders' access to their pastures.

Conclusions:

The results of this study suggest two possible conclusions pertaining to current anthropological thought regarding the effects of globalization and resource privatization on the economies and land management strategies of small-scale societies. First, it is possible that globalization is having an equally negative effect on the attitudes towards cooperation of NBR herders regardless of their settlement patterns and Mongolian cultural values attached to cooperation. This could be a result of the privatized herding system's emphasis on individual family livestock production and sale to domestic and international markets rather than collective production. However, it could be possible that there is an as yet unknown cultural buffering effect that is leading NBR herders to retain a similar cultural model regarding cooperation even as the marketization of pastoral production has dramatically altered the indigenous herding system and has led them to represent different herding and settlement strategies. For example, Quinlan and Quinlan (2007) suggest that modernization and globalization may have complex effects on indigenous knowledge and production systems such that globalization may lead to the

deterioration of certain features of indigenous systems and the reinforcement of others. Therefore, the NBR community may retain the traditional Mongolian values of hospitality and cooperation even as the new system of livestock management has made them impractical.

To investigate these issues further, the authors recommend that additional studies be conducted to compare the attitudes towards cooperation of herders that are utilizing a truly nomadic system of livestock production based on common-pool resource management and sedentary herders that manage their livestock on private grassland. This can be achieved by comparing the attitudes of sedentary Barga Mongols in NBR with nomadic Barga Mongols living in the Republic of Mongolia's Dornod Aimag, which shares a common border with the study area. In this way, nomadic pastoralism, rather than mobile grazing in a sedentary system can serve as a unit of analysis for comparing the attitudes of herders representing conflicting grassland management strategies.

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The effects of China's Grassland Contract Policy on Mongolian herders' attitudes towards grassland management and the future of pastoralism in northeastern Inner Mongolia

Thomas J. Conte

Abstract China's Inner Mongolia Autonomous Region is experiencing high levels of grassland degradation partially as a result of government policies to sedentarize nomadic pastoralists and privatize collective grasslands. Previous research suggests that these policies have reduced Mongolian pastoralists' ability to effectively manage grasslands and cope with negative climatic events. Herders in New Barag Right Banner (n = 50) representing both sedentary and mobile livestock management strategies were asked to respond to a scaled survey regarding their attitudes towards the effectiveness of their current grassland management strategies and their perceptions regarding the future of pastoralism in Inner Mongolia. Inter-rater reliability and Mann-Whitney U Tests were utilized to compare the attitudes towards grassland management and the future viability of livestock production and to test whether or not sedentary and mobile herders share the same attitudes towards these facets of their pastoral way of life. There is both high intra and inter-group agreement on the survey variables across settlement categories, indicating that sedentary and mobile herders share the same attitudinal orientations regardless of their settlement patterns.

Keywords: Pastoralism, China, Inner Mongolia, Grassland Management, Privatization, Marketization

Introduction:

The grasslands of northern China's Inner Mongolia Autonomous Region are currently one of the epicenters of global desertification even as the Chinese government is attempting to create policies to curb grassland degradation. Previous research suggests that one major contributing factor to grassland degradation in Inner Mongolia is China's Grassland Contracting Policy and the Household Responsibility System, which have encouraged the privatization of livestock production and the integration of the Inner Mongolian pastoral economy with global markets for livestock products (Taylor 2012; Ho 1996; Humphrey and Sneath 1996a). This is because these policies have been shown to have eroded both the ecologically adaptive nomadic grazing and common-pool resource management strategies that allowed herders to collectively manage grasslands in the past (Li and Huntsinger 2011; Williams 2002).

The aim of this study was to analyze the effects of the privatization of grassland on a small population of Mongolian pastoralists in northeastern Inner Mongolia's New Barag Right Banner. The author measured and compared sedentary and mobile herders' attitudes towards current grassland management and the future of pastoralism in three Inner Mongolian case-study villages following the privatization of grassland and the elimination of nomadic grazing in the region.

Background: The Current State of Land Degradation in Inner Mongolia

Northern and western China contain some of the world's most extensive grassland resources. Nearly half of Chinese territory is categorized as temperate, desert, and alpine

grasslands which are utilized by pastoralists to sustain herds of horses, sheep, goats, camels, and cattle. Northern China's Inner Mongolia Autonomous Region (IMAR) contains nearly 20 percent of China's total grassland resources (Deng et al 2009) and has been managed by Mongolian pastoralists and their ethnic predecessors for at least three millennia (Lattimore 1941).

Since the latter half of the 20th century, however, Inner Mongolia has been one of the focal points of desertification and grassland degradation in China. The effects of this ecological degradation include an overall deterioration of grassland productivity, decreased plant species biodiversity, and the expansion of desert conditions into both pastoral and agricultural areas (Williams 2002). At present, it is estimated that over 90 percent of Chinese grasslands are degraded and desert conditions expand over 10,000 km² annually in China's dryland interior (Nelson 2006). Previous research suggests that grassland degradation is a result of both the expansion of agriculture into grassland regions ecologically unsuitable for farming (Humphrey and Sneath 1996a) and the implementation of land tenure and grassland management policies that have led to the collapse of nomadic grazing and the common pool resource management strategies that were common in IMAR prior to the 1950s (Taylor 2006; Jiang 2004; Humphrey and Sneath 1999). In particular, previous studies highlight the role that the Household Responsibility System and Grassland Contracting Policy initiated by the reform government of Deng Xiaoping have had in the collapse of the nomadic grazing strategies of Mongolian herders and the settlement patterns that allowed their practice (Li and Huntsinger 2011; Ho 1996).

From the early 1980s to the mid-1990s, the Inner Mongolian regional government sought to implement policies designed to both curb grassland degradation and increase economic growth by integrating the pastoral economy with growing international and domestic markets for livestock products (Ma 2003). The policies privatized formerly collective grassland by contracting pastures to individual herding families the same way that agricultural land was divided among farmers under the Household Responsibility System (Tilt 2008; Rozelle et al 2005). Through this grassland contracting policy, the Inner Mongolian government hoped to mitigate the “tragedy of the commons” that they felt would cause degradation on common grasslands as well as attain the same levels of economic growth and rural income increases in the pastoral economy as had been achieved in the agricultural sector following the privatization of farmland (Zukosky 2008; Fratkin 1997; Hardin 1968). Key to the implementation of these new rural policies was the encouragement of pastoralists to cease seasonal nomadic migration, follow set livestock carrying capacities for grassland, and fence their family pasture allocations to prevent other herders from accessing them (Banks and Doman 2001).

Rather than improving ecological and economic conditions, the privatization of grassland has been suggested to be a key contributing factor in the progressive deterioration of Inner Mongolian grasslands because it has led to the collapse of the traditional mobile grazing practices that allowed Mongolian herders to flexibly manage the variable climatic and topographic conditions of their grasslands (Fernandez-Gimenez and Le Febre 2006). Before the privatization of grasslands and the sedentarization of herders, Inner Mongolian pastoralists practiced a nomadic strategy centered on seasonal

migrations that allowed grasslands long periods of regeneration after they had been grazed. In addition, through seasonal migration, herders were able to draw upon Mongolian traditional ecological knowledge to make decisions on where to move their livestock based on each type of animal's plant species preferences and seasonal dietary and water needs (Fernandez-Gimenez 2000). Therefore, the former nomadic system of livestock management contributed to the sustainable management of Inner Mongolian grasslands because it allowed herders to efficiently utilize grassland resources and more widely distribute grazing pressure on available pastures.

Nomadic migration also enabled Mongolian herders to cope with the variable annual climatic conditions and susceptibility to negative climatic events of Inner Asian grasslands (Sheehy 1993). The regional climate experiences periodic severe weather conditions known as *dzud*, which are a major threat to both livestock health and the economic livelihoods of pastoralists. *Dzud* can come in the form of winter droughts (black disaster), severe snowstorms (white disaster), and other combinations of inclement weather and precipitation conditions (Begzsuren et al 2004). Some of the most dangerous conditions occur when a severe snowstorm is followed by a rapid rise and decrease in temperature that causes a thick layer of ice to form over the snow. Livestock are unable to reach the forage under the ice, and thus, if not provided with supplementary fodder, can starve during the winter or the following spring. It is estimated that *dzud* occurring in the Republic of Mongolia from 1999-2010 killed nearly 21 million head of livestock and contributed to the complete loss of many pastoral families' herds (UNDP 2010; Sawyer 2010).

Traditionally, Mongolian herders in both Inner Mongolia and the Republic of Mongolia responded to *dzud* through the practice of additional seasonal pastoral movements known as *otor* which involved short distance migrations or long distance movements into neighboring districts and provinces less affected by the *dzud* (Humphrey and Sneath 1996a). Thus, this mobile system enabled herders to better respond to the variable grassland conditions (McCabe 2004, Fernandez-Gimenez and Diaz 1999) that exist on much of the Mongolian Plateau through a highly flexible grassland management system. In addition, pastoralists depended both on traditional ecological knowledge and cooperation with other herders to determine which areas to conduct *otor* to, when to move, and if the risks of movement outweighed the potential benefits (Ericksen 2013; Ericksen, personal communication, March 21, 2013).

Following the allocation of pastures to individual households in the 1980s-1990s and the widespread enclosure of grasslands with fences, herders have been unable to conduct either seasonal migrations or emergency *otor*. Since Inner Mongolian herders are no longer able to practice the degree of seasonal mobility that was common prior to the privatization of grassland, constant grazing pressure is placed on small family pasture allocations rather than spread over multiple seasonal pastures. Under the present privatized system, if they wish to conduct an *otor* or seasonal migration, pastoralists must now acquire the use of additional seasonal pastures by renting land from other families. Therefore, whereas in the past, seasonal migrations were based on traditional ecological knowledge and the seasonal needs of livestock species, seasonal movements are now made based almost solely on the availability of pastures for rent and monetary

compensation. Herders that are not able to rent additional pastures must rely on securing external sources of supplementary fodder to meet the nutritional needs of their livestock and to cope with negative climatic events (Williams 1996). In addition, Williams (2002) found that land tenure insecurity played a significant role in shaping herders' negative attitudes regarding their ability to maintain long-term use of their family pasture and their unwillingness to engage in sustainable grassland management practices because they might not be able to manage the same land in the future.

Based on the findings of previous studies (Li and Huntsinger 2011; Williams 2002), the research hypothesis was that there would be an observable difference in attitudes towards grassland management and the future of pastoralism in NBR between herders representing the current sedentary livestock production system and those that are more closely related to the traditional nomadic strategy. The New Barag Right Banner of Northeastern Inner Mongolia provided an ideal setting to measure pastoralists' attitudes towards grassland management because it did not adopt privatization policies until 1996, nearly two decades after most other regions in Inner Mongolia. Thus, many pastoralists in the region have had experience in both the traditional nomadic system of livestock production and the current sedentary system. Moreover, many herders in NBR continue to practice seasonal mobility by conducting migrations to pastures rented from other herders. Presumably, herders who have been able to retain seasonal mobility would have a more positive attitude towards grassland management and the future of pastoralism than those who are sedentary. The aim of this study was to understand the effects of changing

pastoral policies on a small group of herders representing the transition of pastoral production from a nomadic to a sedentary system.

Changing Systems of Grassland Use in New Barag Right Banner

This study focused on three case study villages: Dashimo (pop = 835), Hulun No'er (pop = 255), and Ehe No'er (pop = 458) of the New Barag Right Banner of Northeast Inner Mongolia's Hulunbuir League. The area represents 23,000 km² of Inner Mongolia's temperate grassland and shares international borders with the Russian Federation to the north and the Republic of Mongolia to the west and south. The banner is dominated by short-grass steppe that receives between 200-300mm of annual precipitation (Daly and Hannaway 2005; Hu et al 1992). NBR is a unique place to study changes in grassland management and pastoralist attitudes because, unlike other areas of Inner Mongolia and Hulunbuir League as a whole, NBR's grasslands were not affected by the encroachment of agriculture into traditionally pastoral areas during the 19th and 20th centuries.

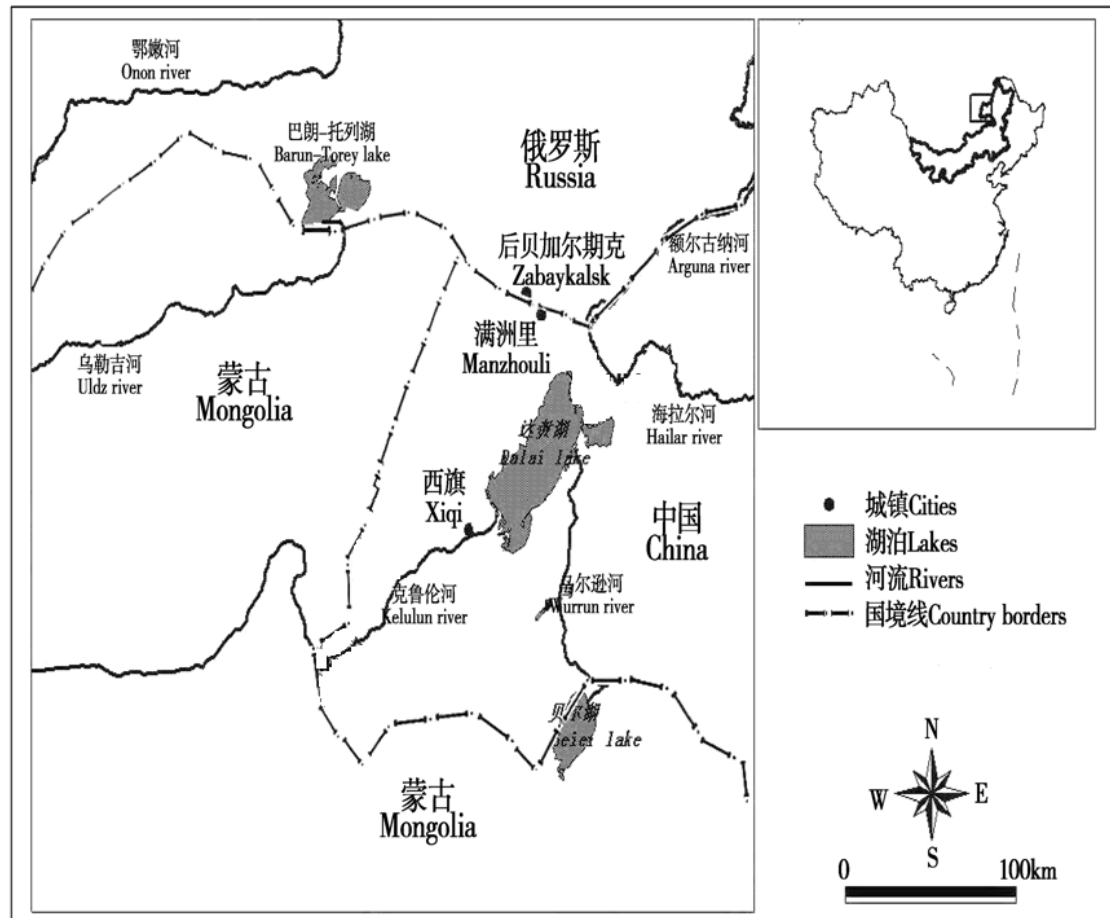


Figure 1: Map of the study area (Liu n.d.)

The main regional economic activities include pastoralism as well as a recently established copper, coal, and molybdenum mining industry. Village centers also include service industries such as restaurants, grocery stores, and mechanic shops that serve both village residents and the surrounding pastoral population. The average annual per capita income for the pastoral population of the three study villages in 2011 was 8,369 CNY (~\$1,300), which is roughly equal to the 2012 national average rural income for China (Holmes 2012). The banner's population is dominated by ethnic Barga Mongols who have traditionally populated the western areas of Hulunbuir League and the extreme

eastern portion of the Republic of Mongolia. The Barga are a subgroup of the Buryat Mongols that live in northeastern Mongolia and in the Trans-Baikal region of Siberia, and speak a Buryat-Mongol dialect (Humphrey and Sneath 1996a, 1996b). However, both the village and pastoral populations include some Han Chinese whose families migrated into the region from other provinces following periods of famine and economic strife in the 1950s and 1960s (Pasternak and Salaff 1993).

Before the 1990s, like other regions of Inner Mongolia, NBR pastoralists practiced mobile pastoralism characterized by seasonal nomadic migrations and collective management of grasslands. Herders typically made between four and ten annual pastoral movements, but during years of poor precipitation, harsh winters, or drought, they might have made as many as thirty movements and emergency *otor*.

Similar to other pastoral regions of Inner Asia, during the Qing Dynasty (1644 – 1912), pastoral production in NBR was regulated by local elites and feudal princes as well as Buddhist monasteries that held economic and political authority over pastoral regions. These ruling institutions collected taxes and tribute from pastoralists for the imperial government and regulated nomadic migrations, pasture use rights, and herd species compositions among local herding families (Humphrey and Sneath 1999). Communities also regulated the establishment of pasture reserves for both winter use and for emergency forage during negative climatic events. Therefore, overgrazing and grassland degradation was prevented during the pre-revolutionary period through the reinforcement of traditional nomadic grazing and systematic pasture use through collective action.

After the Inner Mongolia Autonomous Region was established by the Communist Party of China in 1947, nomadic herders in NBR were reorganized into collective herding units and livestock were seized from ruling elites and monasteries and redistributed to pastoral households. The herding collectives provided veterinary assistance to herders as well as constructed infrastructure to facilitate seasonal migrations and milk and meat production. The collectives also continued to regulate the establishment of reserve pasture for emergency forage (Williams 2002).

In 1996, collective management of grasslands ceased after the local government of NBR decided to initiate the Grassland Contract Policy that had been instituted in most of the other regions of Inner Mongolia in the late 1970s to mid-1980s. Government officials divided up available grassland among herding families based on their *hukou* (household registration) status in the region as well as the number of livestock they had at the time their grassland contract was initiated. The average land holdings for survey participants was 622.5 hectares (9,338 *mu*) (1 hectare = 15 *mu*), although, some study participants had access to as little as 213 hectares (3,200 *mu*) of grassland while others acquired as much as 2,000 hectares (30,000 *mu*) through renting additional grassland from other families. When asked about the disparities between the size of many families' land holdings, many herders asserted that although land was originally intended to be divided equitably among families, they felt that some families had been given preferential treatment by local officials. For example, when asked why he had been given so little land in relation to his neighbors, one forty year old herder commented angrily in

Mandarin “*Tamen you hao guanxi!* (Translated: They had good relationships with the officials!)”

After dividing grassland among pastoral families, the banner government then established local grassland stations that monitor the quality of available grassland and assign a fixed livestock carrying capacity to each family’s pasture allocation that is recalculated every three years. In 2012, the state-assigned carrying capacity for NBR grasslands was 1 sheep unit per 20 *mu* of grassland. However, because livestock products are one of the sole sources of income for pastoral families, many herders far exceed their maximum allowance for livestock. Regardless of the size of their pasture allocation, age, or economic status, at the time of this study, over 90% of study participants reported herd sizes far in excess of the carrying capacity that was assigned to their land. In some cases, herders reported stocking rates greater than three times their maximum allowance (Conte and Tilt n.d.). Thus, the grassland contracting policy has effectively ended NBR’s traditional nomadic system of livestock management because the policy has ossified the boundaries between family pasture allocations and rendered nomadic grazing impossible (Williams 2002). Herders must now manage excessive numbers of livestock by relying solely on both the grassland resources on their pasture allocations and supplementary sources of fodder.

Although the nomadic grazing strategies practiced by NBR herders prior to 1996 were disrupted by implementation of the Grassland Contract Policy, some pastoralists are able to retain a degree of seasonal mobility by renting additional pastures from other families. Many herders will attempt to make at least one migration to additional pastures

each year, and some families are able to move between two and four times during the year. This strategy allows them to relieve grazing pressure on their own private grassland allocations each season. However, although this system of mobility might seem similar to the traditional nomadic system that existed in NBR prior to the mid-1990s, many herders have expressed mixed feelings regarding the usefulness of this contemporary system of mobile grazing. One 29 year old herder asserted “I think we need to move to keep our animals and land healthy, but it’s useless to move now. My family has only one pasture and it has good grass for summer but not for winter. If we rent another pasture in the winter that also only has good plants for summer, the move is useless.” (Conte and Tilt n.d.). This comment is indicative of the fact that previous forms of pastoral mobility took into account the plant species associations and topographic conditions ideal for different seasons and livestock species (Fernandez-Gimenez 2000). Thus, the new form of mobility is based more on range availability and monetary compensation than the traditional ecological knowledge of the herding community and needs of livestock species. Nevertheless, the mobile segment of the NBR pastoral population still values pastoral mobility even as other herders have chosen to remain fully sedentary. Therefore, because there is a segment of NBR pastoralists that maintains a relationship to the former nomadic system, mobility serves as the unit of comparison in this study.

Methods:

This research was conducted in the three case-study villages during the summer of 2012 using a mixed methods approach. Semi-structured field interviews (n = 12) were

conducted with herders and key community leaders to investigate changes in grassland management and settlement patterns since privatization and herders' perceptions of changes in grassland health. The author also developed a scaled survey instrument (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) which was administered to a sample of 50 pastoral households. The survey variables addressed herders' perceptions about their ability to effectively manage grasslands, cope with natural disasters, and promote grassland health. Additional survey variables addressed herders' perceptions of the future economic viability of pastoralism, desires to have their children become herders, and the future health of their local grasslands. Table 1 shows the age, ethnicity, and mobility breakdown for the sample population. Because the author lacked access to local population censuses, convenience sampling was used to recruit the sample population (Bernard 2006: 191-192).

Table 1: Description of sample population¹

<u>Ethnicity</u>		<u>Sex</u>		<u>Age</u>			<u>Settlement</u>	
<u>Pattern</u>								
Han	Mongol	Male	Female	Mean	Median	Range	Sedentary	Mobile
9	41	33	17	39.46	38	18-67	25	25

¹n = 50

The author chose a quantitative survey approach to measure pastoralists' attitudes towards their current grassland management practices and the future of pastoralism because of both the short time scale of this research project as well as difficulties in conducting social science research in NBR due to the political climate of frontier regions of China. NBR's position on two of China's international borders makes many areas of the banner restricted to foreign research, and the movement of foreign nationals is heavily

regulated and monitored by both local police and the People's Liberation Army. Therefore, the survey approach enabled the author to collect data quickly and employ a deductive approach to statistically compare the attitudes of each settlement category and test the study hypotheses. Additionally, the survey variables utilized in this study allow for the possibility of future comparisons across sites. Table 2 illustrates the mean responses and standard deviation for survey variables pertaining to both rangeland management and the future of pastoralism in NBR.

The sample population was then divided into two categories based on pastoral mobility. Herders that reported no pastoral movements in the previous twelve months were classified as "sedentary," and those that reported at least one pastoral migration in that time were classified as "mobile." Therefore, the analysis included both herders that maintain seasonal movement and those that have become fully sedentary as a result of the Grassland Contract Policy.

Inter-rater reliability using Cronbach's Alpha was utilized to test for both within and between-group agreement on the survey variables (Bang et al 2007; Atran et al 2007). Using this analysis, the author aimed to test whether herders representing different settlement patterns share the same attitudes regarding the effectiveness of their current grassland management practices and the future of pastoralism in NBR or if sedentarization and the privatization of grassland have led them to represent distinct populations within the same pastoral community.

To test the first hypothesis that herders who retain mobility would have a more positive attitude toward the perceived effectiveness of their current grassland

management practices and the future of pastoralism, Mann-Whitney U Tests (a commonly used non-parametric procedure) were utilized to observe whether or not there was a statistically significant difference between the responses of each settlement type to the survey variables. Mann-Whitney U Tests differ from independent samples t-tests in that they compare the mean-ranks between two study populations rather than mean responses. Therefore, this test is more appropriate for analyzing non-normally distributed data.

Analysis:

Table 2 provides study participants' mean responses and standard deviations for the survey variables pertaining to attitudes towards their current grassland management practices and capabilities and the future of pastoralism as a viable economic activity in NBR. Overall mean responses indicate general agreement that forage quality will increase and that pastoralism will remain a viable livelihood in NBR in the future. However, study participants of each settlement category generally disagreed that they could make effective management decisions to provide their livestock with forage and water during natural disasters such as white and black *dzud*. Herders of each settlement category also generally agreed that they would be able to continue managing their family's pasture allocation in the future without fear of frequently changing land tenure laws.

To test the first hypothesis that pastoralists representing sedentary and mobile settlement patterns would not share the same attitudes towards the effectiveness of their

grassland management strategies and the future viability of pastoralism in NBR, inter-rater reliability analysis was conducted to assess the level of agreement in survey responses both between and within each settlement category. Tables 3 and 4 illustrate the

Table 2: Mean Responses for grassland management and future of pastoralism survey variables¹

<u>Variable</u>	<u>Sedentary (M, SD)</u>	<u>Mobile (M, SD)</u>	<u>Total (M, SD)</u>
1. During times of drought, I can move my livestock to new pastures if I need to.	3.16 (1.80)	4.12 (1.36)	3.64 (1.65)
2. During a white disaster, I can take my livestock to where they can get enough forage to eat.	2.24 (1.51)	2.04 (1.72)	2.14 (1.60)
3. During a black disaster, I can take my livestock to where they can get enough water to drink.	1.96 (1.46)	2.88 (1.74)	2.42 (1.65)
4. Herd mobility is needed to manage grasslands effectively	3.96 (1.59)	4.44 (1.16)	4.20 (1.40)
5. The way herders herd their animals now gives grassland enough time to regenerate before it is grazed again.	3.68 (1.41)	4.04 (1.10)	3.86 (1.26)
6. Fencing pastures helps herders to manage grassland more effectively than before grassland was contracted to individual families.	3.72 (1.59)	3.68 (1.46)	3.70 (1.51)
7. I have a harder time conducting <i>otor</i> now than in the past.	3.44 (1.71)	2.96 (1.88)	3.20 (1.86)
8. In the future, grassland health will decrease.	2.60 (1.44)	2.76 (1.42)	2.68 (1.42)
9. In the future, herders will be able to make a good living from livestock herding	4.28 (1.31)	4.24 (1.16)	4.26 (1.23)
10. I feel that livestock herding is a good occupation for my children.	1.80 (1.44)	2.32 (1.49)	2.06 (1.48)
11. The quality of forage in my area will increase in the future.	3.64 (1.47)	4.08 (1.32)	3.86 (1.40)
12. I am confident that I will be able to manage the same land I am managing now 20 years in the future.	4.40 (1.22)	4.44 (1.00)	4.42 (1.11)
13. Because laws change so frequently, I am worried that I will not be able to use the land I am using now in the future.	2.40 (1.76)	2.60 (1.85)	2.50 (1.79)

¹Variables coded on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

results of this analysis for survey variables pertaining to grassland management practices and the future of pastoralism in the region.

Table 3: Intra/Inter-group agreement for grassland management variables

<u>Settlement Type</u>	<u>Sample Size</u>	<u>Cronbach's Alpha (α)</u>
Sedentary ¹	25	.81
Mobile ²	25	.88
Between Groups	50	.92

¹Herders who reported 0 pastoral movements during the previous 12 months

²Herders who reported at least 1 pastoral movement during the previous 12 months

Table 4: Intra/Inter-group agreement for future of pastoralism variables

<u>Settlement Type</u>	<u>Sample Size</u>	<u>Cronbach's Alpha (α)</u>
Sedentary ¹	25	.91
Mobile ²	25	.92
Between Groups	50	.96

¹Herders who reported 0 pastoral movements during the previous 12 months

²Herders who reported at least 1 pastoral movement during the previous 12 months

Inter-rater reliability analysis for attitudes towards current grassland management practices and settlement patterns indicate a high level of intra-group agreement for both the sedentary ($\alpha = .81$) and mobile ($\alpha = .88$) settlement categories. There was also a high level of inter-group agreement between the sedentary and mobile categories of the sample population ($\alpha = .92$). Inter-rater reliability analysis for the survey variables pertaining to attitudes towards the future of pastoralism in NBR also indicate a high level of both intra-group agreement for the sedentary ($\alpha = .91$) and mobile ($\alpha = .92$) settlement categories and a high degree of inter-group agreement ($\alpha = .96$) between each settlement category.

Therefore, the results of this analysis show high levels of agreement on the survey variables between the sedentary and mobile categories of the study population.

Table 5: Comparison of attitudes towards grassland management and future of pastoralism between settlement categories

Variable	<i>z</i> - value	<i>p</i> - value	Sedentary Mean	Mobile Mean
			<u>Rank</u>	<u>Rank</u>
1. During times of drought, I can move my livestock to new pastures if I need to.	1.91	.06	21.8	29.1
2. During a white disaster, I can take my livestock to where they can get enough forage to eat.	-.64	.52	26.7	24.3
3. During a black disaster, I can take my livestock to where they can get enough water to drink.	2.24	.03*	21.2	29.8
4. Herd mobility is needed to manage grasslands effectively	1.04	.30	23.7	27.3
5. The way herders herd their animals now gives grassland enough time to regenerate before it is grazed again.	.78	.44	24	27
6. Fencing pastures helps herders to manage grassland more effectively than before grassland was contracted to individual families.	-.20	.85	25.9	24.3
7. I have a harder time conducting <i>otor</i> now than in the past.	-.64	.52	26.7	24.3
8. In the future, grassland health will decrease.	.38	.70	24.7	26.3
9. In the future, herders will be able to make a good living from livestock herding	-.58	.57	26.5	24.5
10. I feel that livestock herding is a good occupation for my children.	1.48	.14	22.8	28.2
11. The quality of forage in my area will increase in the future.	1.10	.28	23.5	27.5
12. I am confident that I will be able to manage the same land I am managing now 20 years in the future.	-.38	.70	26.1	24.9
13. Because laws change so frequently, I am worried that I will not be able to use the land I am using now in the future.	.41	.68	24.7	26.3

*Statistically significant comparison

To test the second hypothesis that mobile herders would have more positive attitudes both towards their current grassland management practices and the future of pastoralism, Mann-Whitney U Tests were conducted for the thirteen variables pertaining to grassland management practices and the future of pastoralism. The results of this analysis are shown in Table 5.

The results of the Mann-Whitney U Tests indicate that there are few statistically significant differences in the responses to these survey variables (at the 95% confidence level) between the sedentary and mobile segments of the sample population. The only exception is the variable “During a black disaster, I can take my livestock to where they can get enough water to drink” ($z = 2.24, p = .03$). For this variable, the mobile segment of the study population has a significantly more positive attitude towards their perceived ability to cope with the effects of a black disaster and avoid livestock loss than the sedentary segment of the population.

A power analysis was then conducted to test if the study was sufficiently powered to detect statistically significant differences in responses to the twelve statistically insignificant Mann-Whitney U Tests if they were present. The results of this analysis are shown in Table 6. This analysis was performed using the mean responses and standard deviations of sedentary and mobile herders to determine the effect size (Cohen’s d) between the sample distributions for each of the thirteen statistically insignificant comparisons. The results of power analysis indicated that this study was not sufficiently powered to detect a statistically significant difference between the sedentary and mobile segments of the study population at the small and medium effect sizes observed for each

Table 6: Power analysis for grassland management and future of pastoralism variables¹

<u>Variable</u>	<u>Sedentary</u> <u>(M, SD)</u>	<u>Mobile</u> <u>(M, SD)</u>	<u>Effect Size</u> <u>(d)</u>	<u>Power</u> ² <u>(1 – β err</u> <u>prob.)</u>	<u>Sample Size</u> <u>Needed</u> ³
1. During times of drought, I can move my livestock to new pastures if I need to.	3.16 (1.80)	4.12 (1.36)	.60	.67	72
2. During a white disaster, I can take my livestock to where they can get enough forage to eat.	2.24 (1.51)	2.04 (1.72)	.12	.11	1,710
3. Herd mobility is needed to manage grasslands effectively.	3.96 (1.59)	4.44 (1.16)	.34	.32	216
4. The way herders herd their livestock now gives grassland enough time to regenerate before it is grazed again.	3.68 (1.41)	4.04 (1.10)	.28	.25	320
5. Fencing pastures helps herders to manage grassland more effectively than before grassland was contracted to individual families.	3.72 (1.59)	3.68 (1.46)	.03	.06	28,000
6. I have a harder time conducting <i>otor</i> now than in the past.	3.44 (1.71)	2.96 (1.88)	.27	.24	340
7. In the future, grassland health will decrease.	2.60 (1.44)	2.76 (1.42)	.11	.10	2,020
8. In the future, herders will be able to make a good living from livestock herding	4.28 (1.31)	4.24 (1.16)	.03	.06	28,000
9. I feel that livestock herding is a good occupation for my children.	1.80 (1.44)	2.32 (1.49)	.35	.34	205
10. The quality of forage in my area will increase in the future.	3.64 (1.47)	4.08 (1.32)	.31	.29	260
11. I am confident that I will be able to manage the same land I am managing now 20 years in the future.	4.40 (1.22)	4.44 (1.00)	.04	.06	15,250
12. Because laws change so frequently, I am worried that I will not be able to use the land I am using now in the future.	2.40 (1.76)	2.00 (1.85)	.22	.19	525

¹Variables coded on a 1 to 5 scale (1= strongly disagree, 5 = strongly agree).

²Variables were deemed sufficiently powered if (1 – β err prob. \geq .80)

³Sample size required given observed effect size

of the twelve statistically insignificant Mann-Whitney U Tests.

Discussion:

This study's lack of statistical power is due to both the limits on sample size given the short time-frame of this research and the author's limited access to pastoral populations in NBR. In addition, previous research suggests that there should be a large effect size between herders that maintain a grazing system more closely related to the traditional nomadic land management system and those that follow a non-indigenous sedentary system (Williams 2002). Therefore, this research was designed to detect a large effect between settlement categories. Although the Mann-Whitney U Tests were not sufficiently powered to conclusively show that there is a statistically significant difference between the survey responses of each settlement category, the high levels of agreement yielded by the inter-rater reliability analysis suggests that the same insignificant results would be observed if sufficient samples sizes were attained.

The high levels of agreement indicated by the results of the inter-rater reliability analysis lead the author to reject the hypothesis that herders representing different settlement patterns would not share the same attitudes towards the survey variables pertaining to grassland management and the future of pastoralism in NBR. These findings could be a result of a homogenizing effect on herder attitudes due to current policy that is leading them to share the same attitudes towards grassland management and the future economic viability of pastoralism regardless of their different settlement patterns. The high levels of agreement and statistically insignificant differences in responses to the survey variables could be due to the fact that the system of movement practiced by the mobile segment of the sample population differs greatly from the traditional nomadic

system of herding practiced in NBR prior to 1996. Therefore, although they are able to retain some seasonal mobility, the mobile segment of the study population has also been affected by policies that have led herders to adopt non-indigenous land management practices. However, the significantly more positive attitudes of mobile herders on the survey variable pertaining to effective livestock management during black disasters could be a result of the mobile segment of the population's ability to conduct seasonal pastoral movements to pastures that have different water and plant-species conditions.

The quantitative and qualitative data collected during this study indicate that privatization and sedentarization policies are affecting herders of both settlement categories' in several ways. First, sedentary and mobile herders indicated in both their mean responses to the survey variable "herd mobility is needed to maintain healthy grasslands" (3.96, 4.44, respectively) and during interviews that they value pastoral mobility and believe that it contributes to both healthy livestock and productive grassland. One forty-year-old male herder commented "If you stay in one place all the time, the animals trample the ground and the grass can't grow well. If you move each season, the animals trample the ground for a short amount of time and then the land can rest." However, although herders value mobility, the mean responses to the survey variable "fencing grasslands helps herders manage grasslands more effectively than before grassland was contracted to individual families" of both sedentary and mobile herders (3.72, 3.68, respectively) indicate that study participants feel a moderate degree of agreement that the fencing policy that led to the collapse of the nomadic system also helps them to effectively manage their land. Therefore, fencing may be becoming

engrained in the local perceptions of effective grassland management because they no longer have the ability to move freely within NBR grasslands. Thus, regardless of the pastoral populations' belief that mobility is valuable, they may believe that fencing is an effective means of resting pastures following grazing. And so, fencing could be changing the traditional land use ethics and common-pool resource management strategies in NBR such that herders now value a privatized system that they acknowledge is restricting their ability to be mobile (Williams 2002; Conte and Tilt n.d.).

Both herders and local grassland researchers agree that grassland quality and plant species biodiversity have decreased since 1996. For example, when asked about changes in grassland conditions since 1996, one interview participant commented that “the plant species that are bad for the animals have always been present here. But, since 1996, the bad species are becoming more and more common and the animals are less healthy because of it.” One grassland researcher commented: “prior to privatization in the mid-1990s, grassland ecologists would typically observe over twenty plant species in their annual test plots in this area. Nowadays we only see seven to ten, and there has been a decline in the species that the animals, especially sheep, like to eat.” These statements are consistent with previous research in Inner Mongolia that suggests one of the key indicators of grassland degradation and overgrazing is an overall decline in plant species biodiversity and plant species favorable for livestock consumption (Humphrey and Sneath 1996a).

Herders from both settlement categories agreed that their grassland management practices are effective and that they are optimistic that the health of NBR grasslands

would increase in the future. When asked why they felt optimistic about future grassland conditions even though they also acknowledged a decrease in grassland health since privatization, many survey and interview participants cited favorable precipitation and weather conditions in the previous twelve months. One interview participant emphatically asserted “This year’s rain was very good, so I think the grass will get better and better.” After responding to survey variables pertaining to the future of grassland health in NBR, many survey respondents stated “It depends on rain and weather.” These findings are consistent with Fernandez-Gimenez (2000), who found that pastoralists in central Mongolia viewed weather and climatic conditions as having more influence on grassland health than livestock management decisions. Because annual precipitation conditions in northeastern Inner Mongolia vary greatly, NBR herders may not recognize the long-term consequences of current land use policy and livestock management practices (Fernandez-Gimenez 2000). This could be due in part to increasingly erratic precipitation conditions in Inner Asia as a result of climate change. Because traditional ecological knowledge is formed generationally through the accumulation of experiential knowledge (Berkes 1999), the current unprecedented pace of ecological change could be rendering the traditional ecological knowledge of Mongolian herders less effective in helping them make land management decisions.

Land tenure issues and policy changes have been a key area of concern in previous research on Inner Mongolian pastoralists’ land management and economic decision making. Williams (2002) found that frequent changes to land tenure laws in the 1980s-1990s had negatively affected pastoralists’ ability and willingness to make long-

term land management decisions because they were unsure of the amount of years they would have access to their pasture allocation. When asked if they were concerned about their ability to manage their land in the future, many survey and interview respondents indicated that they were not concerned that they would lose the right to use their land before their standard 30 year contract had expired. In addition, many herders indicated that they expected to be able to use their family's grassland for fifty years or more. Therefore, the data suggests that NBR pastoralists may be becoming more confident in current land tenure laws which have stabilized since the late 1990s throughout rural China (Li et al 1998).

Conclusions:

This study suggests two possible conclusions regarding the effects of the marketization and privatization of indigenous land management and economic production systems. First, marketization and privatization could be destroying the Mongolian land management system such that the privatization of grassland and sedentarization of nomadic herders is contributing to grassland degradation and eroding the traditional Mongolian land values that enabled herders to sustainably manage grasslands in the past. Hence, although herders recognize that grassland health is decreasing, they have adapted their economic behavior in such a way that they now value the non-indigenous system of livestock production that was initiated in NBR two decades ago.

Another possible conclusion regarding the effects of changes in land management and settlement patterns in NBR could be the existence of a previously unknown cultural

buffering effect that is leading herders of both settlement categories to share the same attitudes towards their grassland management practices and the future of pastoralism regardless of their differing management strategies. For example, the NBR community may retain traditional Mongolian land ethics and environmental values even though the current livestock management system has rendered them impractical. Therefore, the high degree of agreement between each settlement category on the survey variables could indicate that both sedentary and mobile herders retain the same attitudinal dispositions towards their grassland management practices even as they diverge in their land management practices.

These possible conclusions regarding the effects of privatization and marketization on the attitudes of Inner Mongolian pastoralists towards land management and the future viability of pastoralism could be further analyzed in the following ways. First, since the system of mobility currently practiced in NBR by the mobile segment of the study population is far removed from the traditional nomadic system practiced before 1996, future researchers could better study the effects of mobility and privatization on herder attitudes by comparing the attitudes of sedentary Inner Mongolian Barga Mongols with nomadic Barga herders living in neighboring provinces of the Republic of Mongolia. To better compare the effects of current land management strategies in NBR with that of truly nomadic herders, future research should aim to quantitatively analyze the differences in the ecological health between privatized grasslands in NBR and those across the Mongolian border that are still managed collectively. Therefore, in this way, mobility based on traditional ecological knowledge and common-pool resource

management rather than pastoral mobility adapted to a sedentary system can serve as the unit of both cultural and ecological comparison in future studies.

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Conclusion: Policy Recommendations and Future Research Directions

The results of this research project indicate that study participants recognize that the ecological degradation of NBR grasslands has increased since grassland privatization was initiated in 1996 and that cooperation between herding families has decreased since the widespread sedentarization of nomadic pastoralists. In addition, although the systems of mobility and grassland management in NBR have changed dramatically in the last two decades, herders still value pastoral mobility and feel that it contributes to both productive grassland and healthy livestock.

Given that mobile pastoralism is still a valued, although currently unviable, means of livestock production in New Barag Right Banner, the development of grassland management policies aimed at increasing pastoral mobility, flexible grassland management, and community-based decision making would be most likely to help successfully mitigate grassland degradation in NBR for several reasons. First, the re-institution of mobile grazing could help foster greater cooperation between herding families by allowing them to reform the traditional cooperative networks that enabled them to sustainably manage grasslands in the past. The re-formation of strong cooperative networks between mobile pastoralists could help NBR's pastoral community coordinate grassland use and regulate livestock numbers in a similar way to how grasslands were managed in the pre-revolutionary and collective periods.

By allowing herders to flexibly manage grassland, the pastoral community could once again be able to respond to negative climatic events by conducting additional seasonal *otor* during adverse climatic conditions. Furthermore, by reinstituting mobile

grassland management and *otor*, NBR pastoralists could be more able to spread grazing pressure widely across available grassland and prevent the overgrazing that is currently occurring on privatized pastures.

Finally, the reinstitution of mobile grazing in New Barag Right Banner could be combined with modern livestock production techniques and mechanized transportation both to better facilitate sustainable grassland management and maintain the economic growth in the pastoral sector that has increased the annual per capita incomes of pastoralists. Public policy designed to provide mobile pastoralists with greater access to services and relevant education could both help pastoralists facilitate greater economic resilience by diversifying their economic activities as well as help them to preserve livestock production as a viable regional occupation.

The results of this study, as well as previous research (Taylor 2012; Li and Huntsinger 2011; Williams 2002) suggest that the Grassland Contracting Policy has contributed to growth in the pastoral economy and the annual incomes of herding families in Inner Mongolia at the expense of contributing to increased grassland degradation and overgrazing. However, if the merits of these policies (i.e. allowing herding families more autonomy over their economic decisions) are combined with the reinstitution of the traditional mobile grazing practices that enabled NBR pastoralists to sustainably manage grasslands in the past, then the People's Republic of China can contribute to the mitigation of the widespread desertification that is threatening economic livelihoods and ecological health in Inner Mongolia. This may be especially true in New Barag Right Banner, where the absence of intensive agriculture and the presence of many

herders who have both experience in the previous nomadic system and continue to retain some mobility could create a viable location for the reinstitution of extensive grassland management practices (Sheehy 1993).

In addition, New Barag Right Banner is currently attempting to encourage the further development of cooperative organizations based on the reintegration of private pastures into cooperatively managed commons, and community members have mixed opinions regarding their value. If these organizations are to be successful in promoting both economic growth and sustainable grassland management through mobile grazing, the local government might try to design policies aimed at the equitable sharing of cooperative capital assets and ensuring that each member family has equal access to services, machinery, and technical assistance.

Where to go from here? Implications for Future Research

This study provides insights into the attitudinal dispositions of NBR herders regarding cooperation, the future of pastoralism, and their current grassland management strategies. In the future, it would be useful to use this information to qualify the statements of herders and grassland monitoring station personnel through the collection of additional data on both herders' knowledge of grassland conditions and grassland health in NBR. Recent studies of Inner Mongolian herders' ethnobotanical knowledge of grassland plant species has shown that sedentarization may be negatively affecting herders' knowledge of plant species and grassland conditions (Khasbagan and Soyolt 2008). However, Williams' study of Inner Mongolian herders' knowledge of topographic

and plant species features also indicates that even after sedentarization, many Mongolian herders retain a high degree of traditional ecological knowledge of their surrounding grassland environments (Williams 2002). The results of interviews with NBR herders indicate that this may also be the case in NBR, and herders may still retain a large degree of ethnobotanical and ethnobiological knowledge of their surrounding ecosystems. However, these claims must be validated through further exploration of Inner Mongolian herders' traditional ecological knowledge and sedentarization's effects on knowledge retention, transmission, and application. Furthermore, both grassland monitoring personnel and NBR herders also indicated that they felt overall grassland health had declined since the sedentarization and privatization policies were initiated in 1996. However, these opinions must also be validated through a quantitative exploration of present grassland health on NBR rangelands and the analysis of grassland monitoring data from the previous two decades. It was my original intention to try to do this, but unfortunately, I was denied access to the grassland monitoring station's data.

Although the results of this study and previous research suggest that new models of sedentary pastoral production and the marketization of Inner Mongolia's pastoral economy are contributing to a decline in both sustainable grassland management and traditional forms of cooperation between herding families, the formation of Mongolian herders' social networks of cooperation and the effects of climatic variability on these networks is still poorly understood. Moreover, although previous research suggests that cooperation between herders contributes to sustainable land management, it is currently unclear how negative climatic events such as drought and winter *dzud* affect cooperative

networks. In addition, the social characteristics that contribute to the selection of potential cooperative partnerships among herding families are not fully understood. Therefore, the ecological and social factors that influence cooperation between Mongolian pastoralists must be investigated more fully if policies aimed at fostering sustainable grassland management are to be developed.

This study focused on the effects of changing settlement patterns and grassland management policies on herder attitudes towards cooperation, and the results provide insights into how the shift from nomadic to sedentary livestock production has affected NBR herders' attitudes towards the future of pastoralism, their current grassland management practices, and cooperation with other families. However, it would be more useful for future research to measure actual cooperation between pastoralists and how cooperation changes as a result of changing ecological conditions rather than merely measuring attitudinal differences between sedentary and mobile herders.

Future research on cooperation among Mongolian herders can measure cooperative connectivity between pastoralists and its implications for grassland management in four ways that combine both quantitative and qualitative social science methods. First, future researchers can utilize a human behavioral ecology approach, evolutionary theory, and dual inheritance theory (Heinrich and McElreath 2007, Smith and Winterhalder 1992) to investigate how the grassland ecology and climate of the Mongolian Plateau could have contributed to the evolution of cooperation among Mongolian pastoralists. Namely, this approach can help researchers deduce both the biological and socio-cultural traits that are selected for by pastoralists to choose potential

cooperative relationships as well as how the grassland environment itself could contribute to the formation of Mongolian social networks of cooperation.

Secondly, future research can employ social network analysis to model cooperative networks among Mongolian pastoral families and analyze the cultural and socio-economic factors that most heavily influence cooperative connectivity among Mongolian pastoralists. This method has been successfully employed as a means of mapping labor-exchange networks and understanding how these networks contribute to social organization within small-scale rural societies (Macfarlan 2010).

Currently, little is understood regarding how climatic variability and negative climatic events affect cooperation among Mongolian pastoralists. Studying these effects, however, is exceedingly difficult given the need for longitudinal studies dependent on the occurrence of both positive and negative climatic events. Given this impracticality, evolutionary game theory may serve as a means to simulate the effects of climatic variability on Mongolian herders' social networks of cooperation. Future research could include the development and implementation of game simulations that model the effects of climatic variability on cooperation among pastoralists which could then be tested on the cooperative networks previously mapped using social network analysis. This method has been successfully used by Cronk (2007) and Aktipis et al (2011) to study cooperation among pastoral communities in East Africa and could be further adapted to a Mongolian cultural and ecological context.

While the above quantitative methods could help model the effects of climatic variability and negative climatic events on Mongolian cooperative networks and

investigate the selective processes that contribute to the formation of cooperative partnerships, these research methods should be overarched with qualitative methods and interviews. This ethnographic data could help inform the results of quantitative studies as well as provide valuable insights regarding the cultural significance and meanings Mongolian herders attach to both cooperation and pastoralism as a cultural and economic lifeway.

The development of studies aimed at exploring cooperation among Mongolian pastoralists will be significant for several reasons. First, from a theoretical point of view, they could help social scientists expand current knowledge of the contribution of ecological factors in the evolution of cooperation in pastoral societies. Second, the investigation of Mongolian social networks of cooperation can help foster greater observation and understanding of how social networks are strained or reinforced by climatic variability and negative climatic events. Third, and perhaps most importantly, further research could help legislators and pastoral communities design more culturally and ecologically appropriate land management policies in the face of increasing climate change in the Inner Asian region as a whole. We already understand that cooperation among pastoralists contributes to sustainable grassland management and that negative climatic events pose a serious threat to the future viability of Inner Asian pastoral livelihoods. By expanding this knowledge, further research on Mongolian nomadic pastoralism and traditional social structures could help communities develop future grassland management policy that aims to reinforce, rather than disrupt, traditional land management strategies and social organization.

Future use of research findings:

My hope is that policy makers can utilize the findings of this study to design more ecologically and culturally appropriate grassland management policies in northeastern Inner Mongolia. In its current form, this manuscript may be impractical for policy makers to use given both its length and the fact that the two embedded journal articles are geared towards an academic audience. Therefore, I plan to develop a short policy brief that illustrates the study questions and hypotheses, findings, and possible policy implications. This brief can be translated into both Chinese and Mongolian and provided to local officials, grassland monitoring station staff, and pastoralists.

It is my intention to continue pursuing anthropological research both in China and Mongolia by pursuing doctoral studies in human behavioral ecology and ecological anthropology. This research project has served to expand my understanding of both traditional forms of cooperation among Mongolian pastoralists and the effects of privatization on grassland management in Inner Asia. Therefore, I will utilize these findings to inform a future dissertation research project built upon the research methods I have suggested above.

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