

SUSTAINABLE RANGELAND MANAGEMENT IN MONGOLIA: THE ROLE OF HERDER COMMUNITY INSTITUTIONS

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ABSTRACT

Following the economic and political shifts in Mongolia in the early 90s, the state herding collectives were dismantled and their livestock was privatized. Pastureland remained state owned, to be used in common by the herders of defined administrative areas (*soum* and *bag*). Herders became entirely responsible for their own herd management. Weakening the customary regulatory institutions of the collective period, without any clear formal institutions to regulate pasture use, led to unsustainable grazing practices. Consequently, excessive pastureland degradation in Mongolia has raised debate over how pastureland should be allocated and regulated in a market economy. An overview of historical patterns of pastureland use and a case study of the territory-based herder group approach in a semi-equilibrium ecosystem suggests that a promising solution to address the current trends in unsustainable grazing practices and increasing conflicts over pasture use and access is residence-based groups with exclusive user rights over pasture within their area. In the past, the patterns of pastureland use were managed by a combination of formal regulation imposed by governance structure in place in each period together with informal norms and customs described by the herders themselves. A combination of formal and traditional regulation governed the use of common pasture. In the current situation, privatization of Mongolian rangeland does not provide appropriate solutions and is opposed by almost all Mongolian herders. Focus group discussion and informal interviews with the members of territory-based groups and local authorities has revealed that the direct involvement of resource users in management is a promising approach to improved pastureland management and herders' cooperative behavior, thereby altering the open access situation. Strong informal users cooperation is more powerful and could help to establish formal regulation on pastureland and or policy formulation in the future. Key findings are summarized in a brief conclusion.

1. INTRODUCTION

Mongolia, with its vast territory of 1.56 million square km, is an upland country with about 85% of its area over 1000 m a.s.l., most between 1000 and 1500 m. A total of 72% of the land, or 112.8 million hectares, is categorized as rangeland which supports over 170,000 herder families. The rangeland falls into five ecological zones, namely high mountain, forest steppe, steppe, desert steppe, desert with markedly different terrain, climate, flora and fauna (Mongolian Society for Range Management, 2008). Practices of pasture use for grazing livestock vary across these five ecological zones, from nomadic herding in the desert zone to transhumance systems in the more fertile forest steppe.

In 2007, livestock herding accounted for 20.6% of gross domestic production and 14% of export earnings. About 18% of the total population in Mongolia, or 366,200 people, rely on herding for their livelihood, which comprises 34.8% of the economically active population (Mongolian Society for Range Management, 2009).

During the country's transition from a centralized socialist system to a market economy in the 1990s, state herding collectives that allocated pastures and campsites and coordinated grazing land were dismantled and all collective assets, including livestock, were privatized by 1993. However, pastureland remained under state ownership (Fernandez-Gimenez, 2002; Upton, 2005).

The privatization of state collective livestock provided an incentive for many Mongolians to turn to herding and the sector experienced a sharp upturn in number of herders (Mau & Chantsalkham, 2006). Many new herders had been workers in collectives in the *soum* (sub-province) center, e.g., those who lost a job but were provided with some livestock as a share of the collectives (Sneath, 2003). In addition some of these newcomers were unemployed due to the closing of factories in the city, and thus they migrated to rural areas and became herders. As rural communities swelled in size, they also became more heterogeneous (Mearns, 2004; Mau & Chantsalkham, 2006). Thus the livestock sector turned from a yield-focused state production system to subsistence-oriented family-based herding (Sneath, 2003; Upton, 2005).

The immediate response to the new ownership arrangements was to increase the number of animals owned by each household as a means of increasing income. Livestock numbers therefore increased from 22 million in 1990 to 40.3 million in 2007 (Mongolian Society for Range Management, 2009).

The disappearance of collectives left an institutional vacuum since there was no longer a formal regulatory entity to govern pasture use (Fernandez-Gimenez, 2002). Herders were free to move anywhere, and use the pasture freely, converting the herding system from a controlled pasture system to an open access system that led to overgrazing; a classical example of the tragedy of the commons (Hardin, 1968).

A key herding practice in Mongolia is seasonal movement, where herders set aside pasture for the non-growing harsh winter time as a reserve. These areas are left ungrazed during the growing summer and autumn season. In this way before 1990 prevention of out-of-season grazing and protection of reserve pasture was enforced both by traditional practices and formal regulation.

Increased livestock numbers combined with weakened traditional regulatory institutions during the collective period, and without any clear formal institutions to regulate the pasture use, led to a situation where herders' expectations were not consonant with each other's behavior and this has resulted in an increase in out-of-season grazing and trespassing.

The open access system introduced with the adoption of a free-market economy system, combined with increasing livestock numbers, has resulted in significant deterioration of pastureland and the system is no longer sustainable. Strengthening herder and local government capacity for collective action therefore appears to be the only possible approach to control and reverse the pasture degradation and sustain or improve basis of rural livelihood. The question of the best approach to do this is therefore at the core of the sustainable livelihood issue.

Thus, one of Mongolia's key challenges today is to find a way to manage pastureland in a sustainable way and to develop sustainable herding strategies to adapt to changing socio-economic conditions.

This report aims to find out how a self-regulating herder organization could play a key role in changing the open access situation into a sustainable resource use system, without compromising cultural traditions and the nomadic herding lifestyle.

My hypothesis is that territory-based herder groups are a promising approach to change open access into common resource management that could greatly reduce rangeland degradation and at the same time improve the livelihood of the herder community.

Section two provides information about current pasture conditions, historical information about the state and traditional institutions that have influenced pastoral land use, a review of initiatives for sustainable pasture land use that have been implemented in the last decade and information about the current state role in pastureland management. Section three explores common pool resources and its regime in relation to use and the experiences of a few countries and possible lessons for Mongolia. The section also briefly discusses key herding strategies in Mongolia and concepts of the Pasture User Group system. Section four describes the case study site and methods and reviews the territory-based approach that has been testing in the steppe ecological zone in Mongolia. The territory-based herder organizations, the Pasture User Groups (PUGs), have clearly defined boundaries (natural) and include all herders who have traditionally grazed in the same territory. In the results and discussion section I explore the benefit of having a boundary and changed norms and rules developed by herders

themselves, and also main integrated strategies (seasonal movement and flexibility) and norms (set aside reserve pasture for harsh times and reciprocity) of nomadic herding. The last two sections include recommendations and a conclusion.

Since the territorial approach to herder organizations has only been tried in Mongolia for two or three years, the hypothesis cannot be conclusively proved or disproved. Instead it will be investigated by studying the speed and ease of setting up the organizations, the range and intensity of sustainable and other practices that have been introduced, and the conditions for organizational success and sustainability.

2. CURRENT CONDITION OF PASTURELAND AND CHANGES IN PASTURE USE

2.1 Current condition of pastureland

An understanding of current pasture condition is important when analyzing the present pasture resource use state and helps in the development of an appropriate pasture management plan.

Mongolia has a continental climate with extreme fluctuations in temperature, both daily and annually. July is the warmest month, with mean temperatures between 15°C in the mountains and 20 to 30°C in the southern semi-deserts and desert. The lowest temperatures are recorded in January, with monthly averages under -15°C and minimum temperatures as low as -40°C (Mongolian Society for Range Management, 2009).

Precipitation is generally low, varying within the different ecological zones. It ranges from less than 50 mm per year in the extreme south (Gobi desert region) to about 500 mm per year in certain areas in the north. The average countrywide precipitation is about 230 mm per year.

Grasslands in Mongolia have a very short growing season, limited by cold temperatures and by variable precipitation. Pasture growth begins in mid-May and mostly ends after mid-August.

Table 1. Pasture area size (million hectares) and livestock distribution in five different ecological zones, Mongolia. (Source: Mongolian Society for Range Management, 2009).

Ecological zones	Pasture Area, million ha (%)	Distribution of livestock, %	Number of livestock (in sheep units) per 100 ha
Forest steppe	24.9 (22.2)	42.7	111
High mountain	14.0 (12.5)	14.0	62
Steppe	30.2 (26.9)	24.6	77
Desert steppe	26.8 (23.9)	13.5	32
Desert	16.4 (14.6)	5.2	20

The warm growing season is longer in the ecological zones of desert steppe and desert areas, where rainfall is highly variable, than in the other zones (Mongolian Society for Range Management, 2008).

Pasture land area and the number of livestock of different ecological zones vary significantly. In the forest steppe zone, with 24.9 million ha or 22.2% of the total pasture land, 42.7% of the country's livestock are kept. In desert areas, covering 16.4 million ha (14.6%) of pasture land, only 5.2% of livestock are kept. The number of livestock per 100 ha varies from 20 sheep units in the desert to 111 sheep units in the forest steppe zone (Mongolian Society for Range Management, 2009).

Increased livestock numbers combined with unfavorable climatic conditions (drought) lead herders in desert and semi-desert areas to practice extensive migration to forest and steppe areas (see Table 1). According to a study by Jigjidsuren (2005), the number of animals exceeded the carrying capacity of pastureland by 32.5% or 16 million sheep units at a national level. The problem is especially severe in forest steppe and steppe zones, where the pressure from pasture use is 2–3 times more than the estimated carrying capacity of those areas (Mongolian Society for Range Management, 2009).

Overgrazing threatens grassland productivity, soil cover and biodiversity. The grass species which probably disappeared gradually over the decades were replaced by poorly palatable weeds and shrubs, resulting in the decline of productivity and vegetation cover of the pastureland. According to the literature study of Lkhagvajav (2006) the number of plant species decreased by 50% in the forest steppe from 1961 to 2006 (Fig. 1).

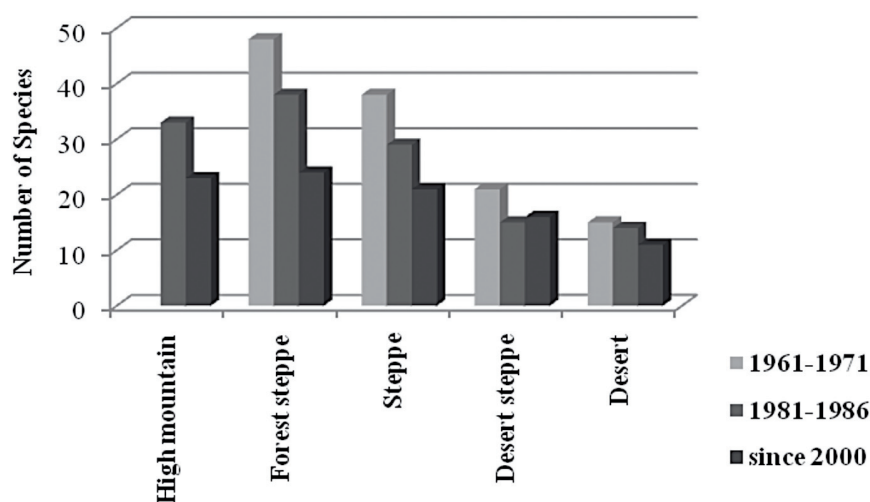


Fig. 1. Number of plant species by ecological zones and years. (Adapted from Avaadorj and Lkhagvajav, 2006).

A dramatic decrease in the productivity of the rangeland was reported by herders and researchers. The pasture productivity was decreased by 28.6% in the desert area and by 52.2% in the steppe area from 1961 to 2006 (Fig. 2).

The dry climate makes Mongolia susceptible to drought and rapid depletion of natural pastures (Mongolia Environment Monitor, 2003). It is generally agreed that Mongolia's grassland is sensitive and vulnerable to climate changes and inappropriate management of these ecosystems (Mongolian Society for Range Management, 2009).

Since the onset of economic changes in the early 1990s, the increase in livestock without any pasture use management measures led to increasing concentration of grazing pressure, causing rangeland degradation. This is especially relevant in the cases where overgrazing occurs near the settlement, cities and watering points. Because of grazing pressure, vegetation cover has been reduced heavily and extinction of palatable plant species represents an irreversible change in range condition. Recent studies by Erdenetuya (2006) show that about 78% of the pasture area is degraded in some form.

Even though little verifiable information exists on the trend of pastureland health at the national level, Mongolia does not have a standardized national pastureland monitoring system (Mongolian Society for Range Management, 2009). The present condition and clear risk for future degradation are thus alarming. This means that in the future it will be even more difficult to support the herders' lifestyle and provide the necessary feed for their livestock. This message points to the fact that incipient pastureland degradation in Mongolia under economic transition is attributable to more complex institutional causes.

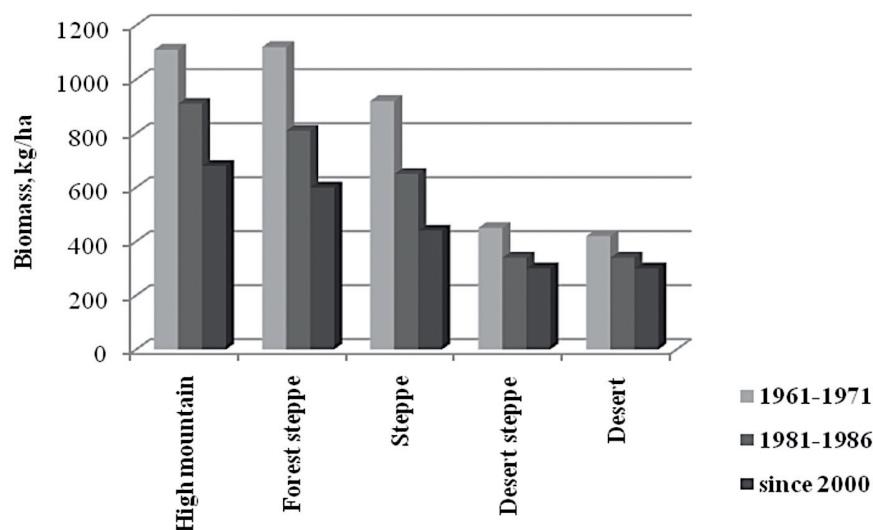


Fig.2. Biomass of pastures by ecological zones and years (Adapted from Avaadorj and Lkhagvajav, 2006).

2.2 Changes in pasture use: History and current pasture use

Knowing the historical patterns of pasture use of nomadic herding in Mongolia helps to understand the present situation and how the herding system might respond to future external socio-economic changes. In the past, herders in Mongolia have been subject to different sets of management rules, depending on the governance structure in place in each period.

During the Mongol State Empire (prior to the 16th century) the territory of the country was divided into four administrative units: Western, Northern, Central and Eastern. Chingghis Khan (1206–1227) was the first to carry out major developments in the relationship of Mongolian nomads to their lands through granting land to his army associates. The army associates were given the right to control the pastures within the boundary of their land grants and the authority to exact labor and taxes from the herders who dwelled there. This marked the first time that groups of herders were associated with specific or fixed territories. After the successful reintroduction of Tibetan Buddhism into Mongolia in 1586, religious monasteries became a dominant political and economic force in Mongolia (Fernandez-Gimenez, 1999). During this time a religious social hierarchy was established and the overall pattern of pasture use was managed by powerful lamas that managed their own territories (Sneath, 2003).

Under the rule of the Manchu, beginning in 1691, the administrative structure of the country was changed. The Manchu divided the 4 *aimags* of a *khalkha* into some 100 military-territorial units or *khoshuu*. The land within a *khoshuu* was under the authority of the prince and controlled by the hereditary nobility, which formed the basis of the so-called feudal pastoral economy of pre-revolutionary Mongolia (History of Mongolian People's of Republic, 1981). But in this colonial regulation the princes and their subjects alike were forbidden from leaving their birth *khoshuu* (Fernandez-Gimenez, 1999; Riasanovsky, 1965).

However, among herders, the *khot ail* was the primary unit of social organization that cooperated in livestock and pasture management issues (Davaadorj, 1989). *Khot ail* were endogenously developed herding camps, usually kinship-based and the formation of *khot ail* depended on the property relations of its members. Membership in a *khot ail* was flexible and varied from year to year, season to season and usually consisted of 3–5 family units in the most fertile *Khangai* region in contrast to 1–2 families in the desert region. *Khot ail* households cooperated on labor-intensive tasks such as haying, making felt and seasonal movements. In general, it was a kind of social safety net, allowing poor households to benefit from the assistance of wealthier households in informal exchange for their labor (Davaadorj, 1989; Fernandez-Gimenez, 1999; Upton, 2008).

Between the decolonization period under the Manchu in 1911 and prior to the revolution of 1921, monasteries had an important role in directing the movements of herders and in allocating and controlling pasture use in specific parts of the *khoshuu*. The patterns of land use were managed by a combination of formal regulation imposed by the ruling noble or Buddhist

lama (Sneath, 2003), and informal norms, customs described by herders as ‘unwritten law’. An overall mixture of formal and traditional regulation governed the use of pasture (Fernandez-Gimenez, 1999).

The Mongolian Republic was founded in 1921. In the early communist period about 300 *soums* were established as territorial/administrative units and the *khoshuu* was abolished. From 1924 to 1990, Mongolia operated under a Soviet–influenced socialist government with a centrally planned economy (Mearns, 2004). Between 1929 and 1932, livestock were confiscated from nobles and the monasteries and given to the poorest herder households. As a result a pastoral economy was adopted by household subsistence-based small, low productivity, mixed family herds. The government attempt to collectivize all animals in the early 1930s was unsuccessful. Herders opposed taking back their livestock and this resulted in a sharp decline in livestock numbers. Herders slaughtered their animals and drove them into China to avoid giving up their animals. During this pre-collective period from 1921 to 1959, the religious institutions, which were formerly important in pasture use, had been abolished and the influence of the new government was poor. In the absence of the pasture management of the religious feudal system, each group of herders resolutely believed its own methods and pastures to be the best, or at least best suited for its own needs (Fernandez-Gimenez, 1999). During this time, the average number of livestock was 23.2 million head per year, ranging from 20 to 27.5 million (Mongolian Society for Range Management, 2008).

The seasonal movement for pasture use was regulated within the administrative boundary in years with normal climatic conditions. Thus dividing a territorial administrative unit into 100 *khoshuu* during the Manchu rule and moreover into 300 administrative units during the early socialist time resulted in curtailing nomadic movement down to a certain level.

By 1960, the process of collectivization was completed. This process has changed significantly the organization of pastoralism in Mongolia. Under the collective, or *negdel* system, all herders became a waged employer and responsible for specialized single-species collective herds. The basic herding unit *khot ail* changed into *suuri*, with one or two households camping together and caring for a certain type of livestock, e.g. of a certain sex, age class, etc. In addition every family had permission to keep a limited number of private livestock¹. *Suuri* were organized into *kheseg* and *brigades*. The territory of a collective overlapped with the *soum* administration territory. Pasture use was under the control of the collective and rotations among seasonal pastures continued to be regulated (Davaadorj, 1989). At the beginning of the collectives, in order to reduce the detrimental effects of nepotism on state interest, there was an emphasis on creating production teams or *suuri* made up of unrelated people. As time went on, the collective system had to accept the tendency of herders to join related families

¹ *In forest steppe, steppe, high mountain regions, the permitted number of privately owned animals per household was 75 head, whereas in semi-desert and desert regions it was 100 head per family (History of Mongolian People's Republic, 1986).*

since the kinship network in nomadic people is important as ‘the basic matrix for cooperation’ (Ressel, 2005). Significant changes in pastureland management practice were introduced under collectivization such as investments in water supply, winter shelters, hay and fodder production, and transportation for making nomadic moves and species-specialization in livestock production at the herder camp level (Humphrey, 1978).

A large number of mechanical and motorized wells were developed. Moreover, in some areas water tanks for domestic and livestock use were trucked to remote pastures. Around 65% of the total area of Mongolia had available water for drinking and watering animals and in turn improved distribution of livestock across the landscape. A campaign encouraging herders to construct roofed wooden shelters to protect livestock from the danger of severe winter and spring months resulted in more herders returning to the same winter and spring locations every year. Collectives provided assistance by trucks for seasonal movements of households (Fernandez-Gimenez, 1999). In general, as a result of state collective social services the herders’ livelihood, education and health status improved. Thus, herders who met the production target for state collectives got paid more and there was no wealth differentiation among the herders (Ressel, 2005).

Huge investment, absolute state control and regulation of pasture management in the herding sector changed a nation of nomads into an agricultural industrial state and as a consequence traditional/informal institutions of pasture use were weakened (Mongolian Society for Range Management, 2009).

After the transition from a centrally planned to a market economy in 1990, the state collective livestock was privatized completely by 1993, but pasture land remained state owned. Herders became entirely responsible for their own herd management decisions, as well as production, risks and inputs (Fernandez-Gimenez, 2002). Thus the yield-focused production of the state collective system returned to family-based, subsistence-oriented herding with mixed types of animals (Mearns, 2004).

The privatization of state collective livestock provided an incentive for many Mongolians to turn to herding and the livestock sector experienced a sharp upturn. Many newcomers were workers of collectives in the *soum* center, e.g. those who lost a job but were provided with some livestock as a share of the former collectives. In addition, many of those who became unemployed due to the closing of factories in the city migrated to rural areas and became herders. As rural communities swelled in size, they also became more heterogeneous. The number of herder families doubled such that in 2007 there was a total of 172,000 herder families and the number of livestock increased from 23 million to more than 40 million between 1993 and 2007. Many newer herders joined the sector as a social safety net in the wake of de-collectivization and they had less knowledge and skills than those whose families had been herders for generations (National Statistical Office, 2007).

The gap between rich and poor herders started to increase in the years between 1993 and 1995 and since 1995 this gap has increased even more. One of the wealth indicators of herders is the number of livestock, which is related to their income. The statistical data from 2007 shows that the number of herder households owning only a few animals has increased; 46.7% of the herder households have less than 50 head of livestock and own only 11.5% of the total number of animals. A total of 35.1% of herders own more than 200 animals or 71.6% of the total livestock in the country (World Bank, 2006).

Weakened traditional regulatory institutions, the detrimental effects of newer herders who have less skill and knowledge about herding practices, coupled with free and uncontrolled access to resources due to weak and unclear formal regulations have in practice given herders the freedom to move anywhere. This has increased “trespassing” and out of season grazing of reserved winter and spring pastures, has resulted in more competition and more frequent conflicts, and has converting the herding system from a controlled pasture system to an open access system leading to overgrazing, a classic example of the tragedy of the commons (Hardin, 1968).

The open access system introduced with the adoption of a free-market economy combined with the increasing livestock numbers due to missing markets or marketing opportunities has resulted in significant deterioration of pasture land and the system is no longer sustainable.

2.3 Initiatives towards sustainable pasture use – Herder Group Approach

A three-year consecutive natural disaster (a *dzud*, in this case severe snow storms, cold and drought) from 1999 to 2002 resulted in national livestock losses close to 30% and significant loss of livelihood. Many of the less experienced herders, those who joined the herding sector later, lost most of their animals and became part of the marginal group of poor (Mau & Chantsalkham, 2006).

During these times, herders understood that cooperation is crucial to overcome harsh times and to improve their livelihood. Herder groups therefore evolved spontaneously in Mongolia throughout the late 1990s, in response to the need of herder communities to survive under changing ecological and socioeconomic conditions or driven by wish to improve their livelihood (Schmidt, 2006).

At that time the Government requested assistance from donor organizations to lessen the harm of *dzud*, to reduce the poverty, improve the livelihood of herders and reduce the environmental degradation. Most donor organizations provided their support in the form of training, skill development and provision of low-interest micro-credits to herders through herder groups (Mau & Chantsalkham, 2006). Donors saw the benefits of working with herder groups to reduce transaction costs and increase efficiency to provide support and involve herders who

live far from each other. As a result, about 15,954 rural families organized into 1,957 donor-supported herder groups. Where 206 herder groups are considered to be a business cooperative (11%), 355 herder groups are registered as NGOs (18%) and 1396 are classed as informal groups (71%) (Mau & Chantsalkham, 2006).

In general, the main impact of small herding group evolution in herder communities revealed that they were lacking in formal institutions to coordinate them. Herders also understood that they could reorganize themselves into collective action to improve livelihood to fill the vacuum left by the abolition of the state collective system. The experience of the last decade showed that relatively small voluntary herder groups could take over income generating activities and play other roles in the herding community but they have not had enough capacity or coordination skills as an organization to assume a leading role in addressing the crucial issues of management of the pasture land.

2.4 Current state role in land management

Administratively Mongolia is now divided into twenty-one *aimags* or provinces, each of which is sub-divided into *soum* (medium administrative unit) or sub-provinces, *soums* sub-divided into *bag* (smallest administrative unit). Each administrative level is headed by a governor who is nominated by an elected assembly-*khural* and formally appointed by the governor at the next-highest level. *Aimag* governors, for example, are appointed by the prime minister, while *soum* governors are appointed by the *aimag* governors.

At the *aimag* level, *aimag* governors and *aimag* governments are responsible for defining local policies and implementing government policies. The *aimag* services transfer government tasks to the *soums*, which themselves are barely able to serve at *bag* (smallest administrative unit) and herders' level, while *soum* governors also have the authority to define policies and implement specific activities for the *soum* (Sneath, 2003).

Since herding collectives, which were formal regulatory institutions for allocating and managing pasture use, were dismantled, the weakened traditional institutions have been unable to fill the void (Fernandez-Gimenez & Batbuyan, 2004). In this situation the Land Law, which was passed in 1994, authorized possession contracts (leases) over pastoral resources such as campsites and pastures. The actual implementation, leasing of campsites, began in 1998 (Sneath, 2003). Campsites have been allocated, but pasture has not. However these point locations entail an implicit right to pasture around the winter camp site (Sneath, 2003). According to the Land Law, *soum* governments have the power to control and regulate *soum* land, to allocate possession and user rights to citizens and to impose land fees on land possessors and users, while *bag* governors and *bag* public assemblies are in charge of regulating common land use, making seasonal schedule, allocating hay making areas and allocating winter and spring campsites not already possessed by others (Fernandez-Gimenez &

Batbuyan, 2004). But because of incomplete political, and almost no financial decentralization (Mearns, 2004), combined with lack of manpower, skills and sharing of some responsibilities with civil society institutions, the implementation of the Land Law is very weak at the local government level (Mongolian Society for Range Management, 2009). Today, each *soum* government has only one land officer and livestock specialist. The specialists cannot serve herders and work mostly at the *soum* center on reports and papers. Some of them have at the same time the duties of an environmental inspector. The way that the specialists work lead herders to think that they do nothing. Already 19 years have passed since the collapse of the state collective system, yet still, in practice; the ability of the local governments to fulfill their obligations is limited by lack of manpower and budgetary constraints. There is no extension organization to increase herders' knowledge and or make new technological improvements available to them. Only private units of veterinary services at the *soum* level provide some services through state subsidies (Mongolian Agricultural Sector Development Strategy, 2006).

3. COMMON POOL RESOURCE SYSTEMS AND HERDER INSTITUTIONS

Regulating access to Mongolian pastureland and adapting existing and instituting new rules among herders is a very important but complicated issue in the current changing socio-economic situation. Thus, rethinking of the common pool resources system itself and reflecting on experiences of commons in other countries dealing with resource use problems will be helpful for Mongolia.

Separation of concepts related to resource systems and those concerning property rights helps to understand common-pool resource problems better. Common-pool resources include natural and human constructed resources (Ostrom, Burger, Field, Norgaard & Policansky, 1999). Examples of common-pool resources include irrigation systems, fishing grounds, pastures, forests, water and the atmosphere. A pasture, for instance, allows for a certain amount of grazing each year without the core resource being harmed. In case of excessive grazing, however, the pasture may eventually degrade, leading to less pasture productivity, which then leads to soil erosion. If common pool resources are managed carefully the use can be extended, whereas without limiting and regulating the optimum amount of use and harvesting, this resource can easily be damaged, overused or polluted (Sterner, 2003).

1. Property rights arrangements have been classified into four broad types in relation to common-pool resources (Ostrom *et al.*, 1999).
2. State property; ownership is by national, regional, or public agency that can forbid or allow use by individuals.
3. Private property; individual has the right to exclude others and regulate resource use.

4. Common property has an identifiable group of users who share resources according to their own mutual regulations and who can exclude others.
5. CPRs (common property regimes) with open access, and uncontrolled access to use of resources.

In practice no single property regime works completely efficiently, sustainably and fairly in relation to all CPRs. Since Mongolia shifted into a market economy, the state has lacked the capacity to manage the private livestock of herders on its land. This mismanagement has led to unsustainable practices of pasture land use or open access and resource degradation (Mearns, 2004; Sneath, 2003). This in turn has created problems for the government, which will then have difficulties in supporting the herding families whose livelihood completely depend on this resource. In an efficient market economy, private ownership of economic assets is promoted, enabling government to collect taxes, allowing land owners to obtain credit using land as collateral, and stimulating land improvement that leads to increased productivity and land stewardship (Stern, 2003). This logic will be difficult to apply to the pasture land supporting the mobile herding system of Mongolia. In this climate, Mongolia might be able to learn from the experiences of other countries, especially about managing common grazing land successfully.

The approaches of many countries to nationalize ecosystem properties, taking land as state property in order to prevent degradation instead of managing it as a common pool resource, has often failed. Governments have often lacked both human and financial resources to effectively control and manage state-owned land. Another reason for their failure in sustainable land management is that by nationalization they fail to recognize and respect local traditional rights. For example, Nepal nationalized the forests in 1957, and this led to the negative impacts of deforestation because local people perceived that they were no longer owners of the forests. But in the last several decades, the role of forest management was given back to the community people and as a result reforestation activities have been implemented successfully (Ostrom *et al.*, 1999; Stern, 2003).

In many cases privatization of the right to use natural resources does not provide an appropriate solution. For example, when there are potential environmental hazards from joint pollution of several separate but neighboring entities, assigning responsibility, liability, and rights becomes problematic. Furthermore, the social welfare aspect is problematic in private property regime. Besides ecological concerns, social issues may arise if all the financially better off people manage to buy all the resource shares. Poor people have little property and mostly they benefit from common or open access systems. Supporting private property will widen the wealth gap, making the poor opposed violently to private property (Stern, 2003).

When resources are getting scarce due to overuse, then people may find ways to collaborate actively and develop a common property regime (CPR) to maximize their benefits. Through complex community norms and consensus decision making the common pool resource can

be protected and used appropriately. Individual behavior however, varies depending on the situation and circumstances. Generally there are three common behaviors of users of a CPR: i) Some behave in a narrow self-interested way, never cooperating but rather acting as free riders, ii) while others are selfish in certain situation and iii) thirdly, others are willing to initiate reciprocal cooperation in the hopes that others will return their trust (Ostrom *et al.*, 1999). So devising the rules to control the access to the resources and institute rules to resolve conflict between individual and collective rationality is a difficult task. Setting the limits too high would lead to overuse and eventually to the destruction of the core resource, while setting the limits too low would unnecessarily reduce the benefits obtained by the users (Sterner, 2003).

The “Tragedy of the Commons” occurs when there are no constraints on accessing the resources. There is now wide acceptance that managed commons, as compared to open access/unmanaged commons, do not have to be degraded and may be an effective method for managing resources sustainably (Williamson, Brunchkhorst & Kelly, 2003).

3.1 Australia

A common property regime has achieved an approach to sustainability, both environmentally and socially, in many areas of Australia (Williamson *et al.*, 2003). The principles of these common property institutions may provide tools which can realize the sustainability in rural areas of Australia. Individual farmers found out that collective use of the land is better suited for certain activities and removes pressure for individual landholders to conduct activities such as grazing, cultivation, cropping and haying independently on unsuitable locations. Thus, for instance, farmers in Tilbuster Valley in Northern New South Wales agreed to manage collectively the resources of their individual property. The general concern was for the long term future of the valley and its inhabitants. Farmers incorporated the private land with adjacent farm land into the operation of common land while retaining small areas, primarily the areas around each member’s home, for private use. Collectively these farming enterprises are more efficient and include potential for more suitable grazing and crop rotations. Members of the collective need to understand resource utilization and land tenure so that they can consolidate their herds and graze them across all the properties involved in the CPRs, as well as to make other efficient resource allocations across the whole collectively managed resource base (Williamson *et al.*, 2003).

CPR provides sustainable grazing. Designating a large area as common land provides the opportunity to greatly enhance ecological conservation. It allows the improvement of pasture condition through implementing a rotational grazing management plan for a wide common pasture area and through utilizing drought management. A communal grazing system required the herd and the open field to be managed as one unit (Williamson *et al.*, 2003).

The institutions provided for building collective responsibility, monitoring of activities and environmental condition of the sub-catchment, and self-regulation and adjustment are most important and also difficult to develop. In Australia, landholders have similar objectives and lifestyle goals, and the shared goal of long term commitment to their property brought them to agree to this type of institution. Another reason to participate in a CPR is to improve one's economic and financial status through sharing costs for managing the land.

3.1.1 Lessons for Mongolia

Private pastureland ownership demands precise management from the owner even in areas where such lands are vulnerable. A lesson for Mongolia from the Australian Tilbuster Commons is that communal management of grazing land is important for long term ecological and social sustainability. Since all herders in Mongolia have a similar herding lifestyle and want to have better pastureland and a better livelihood, mutually agreed institutional building based on traditional arrangements for pasture use is most needed and a crucial step to bringing needed management to the presently unmanaged situation.

3.2 Iceland

Agriculture in Iceland is mainly livestock production and most of the land is classified as rangeland (Barkarson & Johansson, 2009). The lowlands constitute the privately owned lands, while highlands are divided into "commons"-*afrettur* utilized by local communities for grazing animals. Sheep farming in Iceland is strongly linked with the country's culture and tradition (Pers.com, Aug. 2009).

Putting the sheep on the common grazing land in spring and rounding them up in autumn are big events in Icelandic farming (Pers.com, Aug. 2009) and these practices are strongly linked with Icelandic history and culture, as well as grazing management (Arnalds, 1999).

The effects of political decisions on common grazing land in Iceland during the course of the last 100 years are remarkable. In order to promote domestic food production as one solution to the country's economic problems during the 1940s, the government of Iceland implemented an incentive scheme with a set guaranteed price for sheep. This resulted in expansion of sheep flocks and sheep numbers peaked in 1978; the resulting overgrazing caused heavy damage, especially on the common grazing land. The number of sheep exceeded market demand and this put pressure on the government to change the policy and to reduce the subsidy. The government initiated a quota system and farmers had to buy quotas to graze sheep on their farm land and to have access to the common land as well. As a result, pressure for common grazing land decreased as the number of sheep declined by 50% (Arnalds, 1999; Barkarson & Johansson, 2009). A government subsidy program for draining wetlands for hay production also contributed to more hay being available for animals from private land, and this may also

have played a part in decreasing the grazing pressure, since it sometimes led to shorter grazing time on common land (Pers.com, Aug. 2009).

In 2000, a major policy reform linking subsidies with land use, both of farmland and of common land, was accomplished through an agreement between the Icelandic government and the Farmers Association, outlining the eligibility criteria (quality control) applied to agricultural subsidies (Barkarson & Johansson, 2009). The Soil Conservation Service (SCS), the state institution for land reclamation and restoration, was involved in a subsidy program through close cooperation with farmers to develop land use planning, land restoration work and to assess farmers' home fields and practices, and also relevant common grazing land. The SCS work helped the farmers to obtain subsidies. Close cooperation between SCS staff and farmers, including frequent visits to farmers to advise on grazing management, and at the same time learning from farmers with local knowledge, contributed to successful results on land healing (Per.com, Aug. 2009).

3.2.1 Lessons for Mongolia

The experiences of the Icelandic government on incentives and subsidy programs show that these types of schemes can be powerful tools to influence land use and land management. Linking farm subsidies to land condition and management is more environmentally sound and strategically important for long term sustainability. The training and education program at the same time provided by relevant professional organization like SCS increased effectiveness, the relevance of the subsidy program and sustainability of the results.

At the moment, the number of herders (about 366,000 herders, about 172,000 herder families) in Mongolia is much higher compared to the farmers in Iceland (about 3000 farmers). Due to interdependent pasture use feature the proposed Mongolian incentive should be more focused on herders' group collaborative work towards improving pasture condition.

The lessons that Mongolia can learn from Iceland include: i) to develop a subsidy program to change unsustainable practices into a more managed common system, ii) involvement of related organizations which could provide appropriate training, education programs in terms of pasture management and improvement, iii) strengthening organizations led by herders themselves, like the Herders' Association, iv) improving livestock quality and breeding techniques, and v) finding alternative income sources and importantly strengthening ecotourism (Arnalds, 1999). Creating incentives encourages herders also to change their behavior (Info Resources Focus, 2008) in order to achieve the agreed goals of the Pasture User Group (PUG) members.

One important lesson for Mongolia is how Iceland has involved the farmers themselves in participating in conservation.

3.3 Key herding strategy in Mongolia

Understanding key herding strategy is most important for managing pastures jointly in the present changing socioeconomic situation.

For most of Mongolia the harshness of the climate, the unpredictability of the weather and pasture productivity, and periodic droughts followed by hard winters (severe snow storms and cold called *dzud*) imply that a nomadic or semi-nomadic extensive herding system remains the most economical and viable option for producing livestock and livestock products (Jigjidsuren, 2005). In winter months from November until March herders stay at their winter camp-site, mostly in front of a big mountain as a shelter from heavy wind and snow storms. They use mostly snow water, but in some areas use well water for both livestock and household consumption during the winter (Davaadorj, 1989). Spring camp is also important because it is the critical time when the livestock bear their young. Typically weather conditions in spring are unstable, so most spring camps are located close to winter camps, whereas in the summer months, herders camp near natural water sources (rivers, lake or springs) and make use of pasture far from the winter pasture. Wells may be used throughout the year, but are especially important through dry spring and autumn seasons (Jigjidsuren, 2005). Thus, sustainable pasture-land management is achieved by seasonal use and ensuring that those pastures are used or grazed only in those seasons (Mearns, 2004).

In response to changing pasture, or weather conditions, herders move in critical situations all or part of their herd and household to more reserved pastures traditionally called *otor*. They differ from seasonal moves in that they are not regular and repeated and usually do not include the entire herd and household (Mongolian Society for Range Management, 2009). During socialist times, there were large areas of inter-*aimag* and inter-*soum* reserve pastures established by special government resolution (Davaadorj, 1989). These have played a very important role in preventing livestock from *dzud* and drought. In most *otor* areas houses or *gers* (traditional round transportable felt tents) were built with wells for arriving herders. Cultural events were frequently organized for herders. Social and health services were relatively good (Davaadorj, 1989). However, after 1990 the system of reserve pasture areas collapsed. As a result reserve pasture areas, where water sources are available, were occupied by herders. The re-establishment of inter-*aimag*, inter-*soum* and within the *soum*, *otor* pasture areas is a very essential task for pasture land management (Mongolian Society for Range Management, 2009).

3.4 The Pasture User Group (PUG) System

The rangeland specialists distinguish two different pasture systems. The equilibrium system defines areas with more or less regular climatic conditions, where normally the quality of pasture land can be controlled by the number of livestock. In non-equilibrium zones highly

variable climatic conditions are more important for the quality of the pasture than the number of livestock. These are areas in which movements of livestock can not follow regular patterns and have to be organized according to the availability of fodder, which is different from year to year. Pasture User Groups (PUG) have been successful in the mountains, forest steppe and steppe regions of Mongolia where equilibrium pasture systems of mixed equilibrium-disequilibrium systems prevail, rather than the disequilibrium pasture systems of the desert steppes or desert areas. This study therefore concentrates on one of the first three ecological zones, the steppe.

Pasture User Groups (PUG) consist of the traditional herders in a particular territory (often within a *bag*) who through customary law have the exclusive right to manage the pasture area in their traditional grazing area. They are inclusive groups and no traditional herder in the area can be excluded from participating. PUGs on their own can facilitate seasonal rotations, resting of pastures and other technical means of pasture management, and incorporate these into Pasture Management Plans (PMP). They can also facilitate and negotiate seasonal and permanent movement in and out of the PUG area. However, in order to negotiate the definition of PUG areas and boundaries among different PUGs, they need to form an Association of PUGs (APUG) at a higher level, most often the *soum* level, and negotiate the territorial allocations with the support of the *soum* government. Another essential task for PUG pasture land management is setting reserve pasture – *otor* for critical times during drought and *dzud* before defining PUG boundaries. These in turn will have to collaborate with PUGs to set aside and enforce the *otor* areas. One of the problems in reintroducing reserved pasture areas will be that in many parts of the country the level of pasture land degradation and the animal pressure are so high that most years will be considered as crisis years where access to reserved pasture land has to be allowed.

4. CASE STUDY SITES AND METHODS

As previously explained, Mongolia is divided into twenty-one *aimags* or provinces, each of which is sub-divided into *soum* or districts (sub-provinces), and *soums* are sub-divided into *bag*.

The case study is drawn from fieldwork conducted in *Undurshireet soum* of *Tuv Aimag* (province) in central Mongolia (Fig. 3). The *Undurshireet soum* is located in a steppe ecological zone about 200 km from the capital Ulaanbaatar. The total territory of the *Undurshireet soum* is 243,220 ha administratively divided into 3 *bags*. A total of 586 households live in this *soum* and 340 of them are considered herder households (Undurshireet soum government office, 2008). *Undurshireet soum* borders one *soum* of the *Bulgan* province, five *soums* of the same or *Tuv* province. One of the biggest rivers which starts from the east *Khentii* (from the east part of the country) mountain range flows through the *soum*. Thus herders traditionally graze their animals along both sides of the river during summer and autumn. Winter pastures are far

from the river or open water resources (it is frozen in winter time and also cold), often at a higher elevation in the mountains or foothills where there is protection from wind in sheltered valleys or canyons. In spring 2007, with the support and facilitation of the Green Gold Program, herders in this *soum* negotiated and mutually agreed on splitting the *soum* territory into 9 parcels according to natural features of the landscape, traditions of pasture use, and the possibility of flexible seasonal movement, and accordingly formed 9 groups called Pasture User Groups (PUG) (Table 2). PUG boundaries are not fenced fence, but are determined by natural objects like mountains, valleys and rivers. The pasture area of each PUG (Table 2) was calculated with the support of the *soum* land officer and numerous representative herders from all PUGs by using a *soum* map with a scale of 1:100,000.

In January 2009, I conducted two focus group discussions with thirty-one member herders of two PUGs (*Berkh* and *Ikh amni*) and informal interviews with three herders of other PUGs (*Bayanbulag*, *Muurs*, *Uuliin khaant*), a *soum* governor and two *bag* governors. The focus group discussions and interviews were conducted according to a set of guiding questions prepared in advance, but discussion was not limited by these questions. A questionnaire with six questions with answer options was also distributed to and completed by the herder members of two PUGs right after the focus group discussions (Appendix 2). Interviews focused on herder's perceptions and attitudes on cooperating in a PUG and whether cooperation and a herders' self-regulation organization could change the open access situation and help to improve the economic and social condition of the herders in PUGs. The objective of the survey was to document and find out about successes and lessons learned about the PUG approach and to develop recommendations for future PUG improvement.

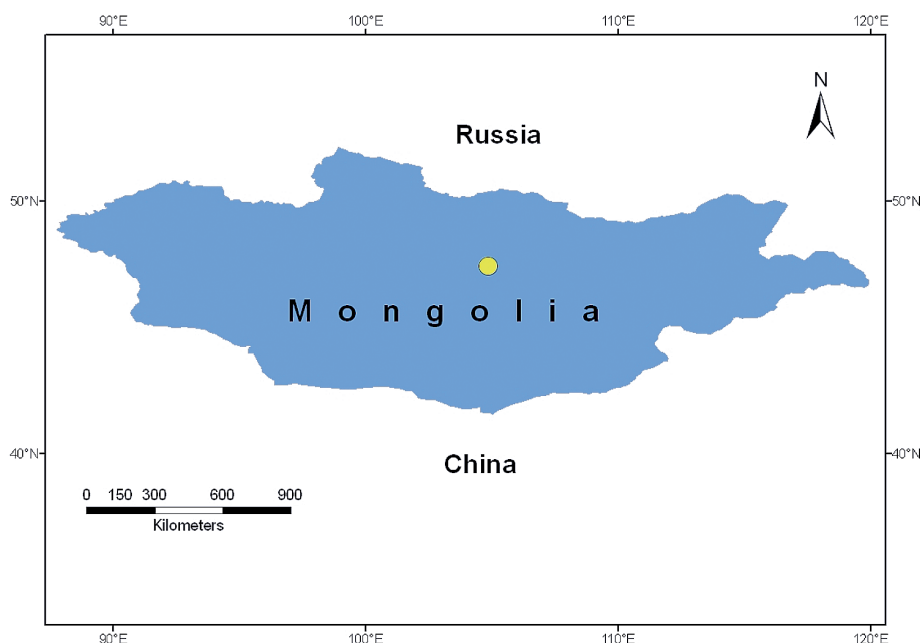


Fig. 3. Case study area in Mongolia.

Table 2. Information about Pasture User Groups (PUG) including number of families, their members, total number of animals, pasture area size (hectares) in Undurshireet soum, Tuv province, Mongolia. (Source: Green Gold Pasture Ecosystem Management Program, 2008).

PUG name	No. of families	No. of members	Total no. of animals	No. of camels	No. of horses	No. of cattle	No. of sheep	No. of goats	Pasture area (ha)
Ovoon Nuruu	23	86	6973	0	634	356	3432	2551	8000
Uuliin khaant	20	58	4221	0	303	252	1441	2225	16800
Bayan-bulag	26	90	8251	0	601	328	3833	3489	15040
Ikh Amnii	38	112	12247	28	1138	554	5902	4625	12560
Teseqt	20	70	14661	0	796	489	7681	5695	14400
Zuulun	32	32	10060	5	1810	503	3683	4059	30300
Berkh	45	176	10714	0	1040	665	5612	3397	46600
Sant	53	181	13892	7	1549	737	6077	5522	49800
Muurs	47	47	15391	3	1153	485	7809	5941	49720
Total	304	1087	96410	43	9024	4369	45470	37504	243220

5. RESULTS AND DISCUSSION

The process described here involved analysis with substantial input from stakeholders, where local herder communities revealed the lack of formal institutions to regulate pasture management and recognized the need for collective action by all to manage essential resources pastureland for the improvement of their livelihood. The interviews and discussions provided a number of stories that gave more depth to the situation in Mongolia, and how conditions are viewed by those that use the land. For example, one elderly herder said that actually the situation before 1921 and/or before the cooperative movement was very different from today's situation. Today, the number of both animals and herder families has increased, so it has become very hard to find empty pasture. "Before we had very few Mongolians and very few animals, so we had enough pasture to rotate and rest etc. That system cannot be applied today but very sophisticated thinking must be applied to adjust to today's situation." (Pers.com. with herder in mountain zone, 2008).

The interviews revealed that the main causes of pasture degradation in the case study *soum* was the same as for other parts of the country: unsustainable use of pasture resulted from

weakened traditional institutions and without formal regulation, combined with increased livestock numbers. Besides, being close to the city and the main road, was a magnet for many herders to come with a large number of animals from outside or other *aimag* and *soum* and thus to exacerbate land degradation. From September 2007 to June 2008, 57 herder families from 7 *soums* of 2 *aimags* stayed in the *soum* territory and grazed 65,141 animals. This number of animals is equal to 55% of total *soum* livestock (Undurshireet *soum* government office, 2008).

5.1 Delineate and allocate PUG territories, a necessary condition to control open access

Depending on the rain and climatic condition of the year, pasture productivity differs from year to year, which leads to shifting of the grazing territories. This requires herders in all PUGs of the *soum* to participate in development of a pasture management plan, both for its own PUG and at the *soum* level. So, during the planning process boundaries between the PUGs in some *soum* territories need to be permeable but organized by the herders themselves. Association of PUG at the *soum* level plays the main role in this issue.

The early summer of 2008 in the southern part of the *soum* area was dry and had less rain. This made it complicated to follow the pasture management plan and graze animals within the boundary. Herder groups in the southern part of the *soum* territory moved to the north to graze their animals. Almost all herders in the *Tesegt* PUG and the *Bayanbulag* PUG moved to the north of the *soum* into *Uuliin khaant* and *Ovoon Nuruu* PUGs territories and grazed their livestock from mid-April to the end of August or until they had a rain and the pasture condition of their own PUG territory improved.

After 2 years of working communally to manage their pastureland, herders in the *Ovoon Nuru* and *Uuliin Khaan* PUGs negotiated to join into one group and again delineate the PUG boundary. The herders explained this decision by saying it reduced conflict regarding pasture use and also improved regulation. But one challenge was that this change required strong leadership and management to encourage and involve all the PUG herders in the activities.

With two years' experience herders in this *soum* had seen that it was appropriate to use pasture within the determined boundary (75.9%) but nevertheless securing the possibility to move. Also herders should be actively involved in determining the boundary of the pasture that they use in order for the PUG activities to be successful (63%).

According to the calculation of *Berkh* PUG herders, about 30% of PUG territory was used by outside herders. One herder that was interviewed described how they approached this issue: "Several herder families from *Buren soum* are staying at our PUG territory as an *otor* during this winter. But when summer starts, some representatives of our group will ask these herders to move from our territory and we would like to use this area for hay collecting purpose. If

one herder went there and asked them to move, definitely we will have conflict. But if several of us went there together then these herder families will answer differently and probably we will have less conflict.” (Pers.com, Jan 2009).

However, the herders also said that currently they do not have the capacity to facilitate/negotiate the large scale movements of animals within a *soum* territory that originate from a different *soum*. The leader of one PUG said: “We think that if PUGs have the status of a legal entity, they have official rights and legitimate authority to set rules for the use and management of pastures.” (Pers.com, Jan 2009).

Defining the pasture boundary is a first step to reduce the detrimental effect of the open access situation and is also the single defining characteristic of “common property institutions” (Ostrom, 1990). The two years’ experience of the case study site demonstrates that this approach can help herders to have real ownership and management over the resources they are using together, while an effective awareness program and proper facilitation is important to avoid conflicts in defining the boundary appropriately. Association of PUG members plays an important role in integrating all PUG pasture management plans with a *soum* plan and to regulate and resolve conflict related to pasture use.

Because *Undurshireet soum* is closer to the central market, competition for and conflict over overgrazed land has increased and the rate of out-of-season trespassing from outsiders has been high, although in case of a climatic disaster, such as drought or severe winter storm (*dzud*), herders in less affected areas accept herders who have migrated and allow access to their pasture, including reserve pasture, with the expectation of reciprocal treatment if circumstances are reversed in the future. In this way another essential management strategy of *reciprocity* (Fernandez-Gimenez, 2002) will be taken into account and used to find a solution to pasture management in the changing socioeconomic conditions.

But then how can this reciprocity strategy of inclusion be balanced with the need to secure the exclusion resource right of PUGs?

One possible way to achieve a balance between exclusivity and reciprocity in pasture use is to stipulate a hierarchy of access rights and costs associated with them (Fernandez-Gimenez, 2002). As Niamir points out (1995), usually there is already an informal norm for priority of use, even in systems of porous social boundaries. Those for whom the area is home territory have priority.

In *Undurshireet soum*, PUG herders can graze animals fully and freely in the territory of the *soum* according to the pasture management plan in an organized way, whereas herders who have migrated from different *soum* as an *otor*, or are escaping from disaster affected areas, are required to contribute to the PUG pasture management measures. The box below shows one example of how herders have attempted to address this dilemma.

Example: Muurs PUG herders' initiative, Undurshireet soum, Tuv aimag

According to the calculation of *Muur*' PUG herders the cost of a bale of hay locally was 2500 (Mongolian Currency) MNT. So, the price of 1 kg hay is 100 MNT. If a sheep eats about 1.5 kg of grass a day, the cost for grazing a sheep per day equals about 150 MNT. Then PUG herders could ask for a contribution from the outside herders who had migrated, according to the above calculation. The total contribution is thus the cost to graze a sheep per day multiplied by the total number of sheep and the number of days their animals grazed (Interview note with herders, February, 2009).

The herders of *Muurs* PUG has calculated the potential contribution from migrating herders. They thought this calculation fair enough and that it would not hurt the outside herders unduly to pay it. This has not been implemented yet throughout the *soum* but the herders are planning to introduce the idea at one of the *bag*'s public meetings.

Thus, introduction of a contribution system for pasture management while attempting to keep reciprocal treatment (Fernandez-Gimenez & Le Febre, 2006) could in a certain way play a role in changing the open access regime and at the same time avoid failure of the common property regime as well. Also it could encourage PUG attempts and activities to maintain sustainable pasture management. Of course, allowing migrating herders access to the PUG pastures will depend on the pasture condition and carrying capacity of the PUG pastureland.

Some researchers who are working in the nomadic and pastoralist area may argue that this action may change completely or abolish the reciprocal strategy of the traditional pastoral society. In the medium term it can help to change the open access system and to contribute to restriction of the number of animals, but it is difficult to predict now the long term ecological and socioeconomic impact of this idea.

PUG leaders and members of the *Undurshireet soum* initiated, with the support of *soum* government officials, the re-allocation some 84,000 ha out of 243,000 ha areas for *otor* grazing for both local and outside herders during harsh climatic disasters. The *otor* reserve pasture comprises areas not close to the *soum* centre and water availability is dependent on water wells. PUG herders wanted to have a stronger official right to enforce the rules so they requested an approved decree from the *soum* governor to follow the *otor* movement regulation. PUG herders decided to be actively involved in the actual implementation and gave a herder family the role of monitoring the grazing practices of those who live close to the *otor* area of certain PUGs. The idea is that the income from the fines collected from the people who are breaking the rules will be sent to the PUG fund and the fund will pay those carrying out the monitoring for their work.

5.2 PUG operational rule and annual pasture use plan

In herding, seasonal rotation is the main pasture use technique to maintain the pasture itself and provide long term use. This is necessary to ensure proper resting of the pasture areas during the year (Fernandez-Gimenez, 2002). Due to the absence of a formal regulatory entity to govern pastureland, weakened traditional institutions, herder communities in *Undurshireet soum* lack coordinated expectations of each others' behavior regarding pasture use. Herders lacked confidence that other herders would respect norms of seasonal pasture use. Some herders preferred staying close to the winter pasture to protect them and ended up grazing out of season. Additionally, herder families with few livestock who do not have the means to move, stay year around at the same places and degrade the pasture. Working as a group and helping each other, all members of PUGs rest or reserve winter and spring pasture all together. Mutually agreed PUG operational rules and an annual pasture use plan have helped herders to rest pasture all together, as the following quote from a herder demonstrates:

“First year herders did not understand well and also did not pay attention to PUG by-laws. We just follow the GG suggested by-law. But we realize that if do not have a good by-law any PUG activities will not be successful. Our *Berkh* PUG herders all agreed to move from winter pasture to spring pasture and that no family will stay behind. We all agreed that we have to move at the same time. Also we are expecting that if the *soum* authority pays attention to our work they will support us.” (Pers.com, Jan 2009)

In 2008, 80% of all PUG herders in the case study area rested winter and spring pasture throughout the *soum*. In addition collective monitoring of winter and spring pasture has improved and kept down out-of-season grazing by outside trespassers and group members who break the group rules.

As a result of the group approach, reserving winter and spring pastures improved and consequently, the vulnerability of herders to non-growing season or bad winter difficulties was reduced. However, the next concern or challenge of the PUG herders is summer and autumn pasture condition. Because of water shortage and overstocking most PUG herders stay and graze their animals along the river throughout the summer without any rotation of this pasture for many years. This leads to deterioration of productivity and degradation of pastureland near the river. One *Ikh amnii* PUG herder said: “However much we want to rotate and rest summer and autumn pasture and move to remote pastures, because of water well shortage we do not go there and instead stay along the river, crowded during the whole summer and autumn time.” (Pers.com, Jan 2009)

According to herders' estimation of two PUGs interviewed, 10–30% of PUG territory is severely degraded (Table 3).

Table 3. Pasture condition of two Pasture User Groups' areas according to member herders' estimation. (Source: Focus group discussion with PUG member herders, February 2009).

Pasture condition	Berkh PUG (%)	Ikh Amnii PUG (%)
Not degraded	60	60
Degraded	30	10
Severely degraded	10	30
Total	100	100

Herders observed and expressed the opinion that the main signs of pasture degradation were sand movement, sand piles around the bushes, Brandt's vole increase, spreading of unpalatable plants such as *Artemisia frigada*, *A. adamsii*, *Salsola colina* and *Stipa krylovii*. The above discussion demonstrates that herders have traditional knowledge to assess pastureland condition and they have even known the causes of degradation.

Herders developed sketch maps by themselves. They marked all winter and spring camps, areas where migrated herders from outside are staying and also discussed pasture condition all together and marked by different colors. This helped herders to assess together which areas are degraded, and to what degree. According to herders, a rangeland study should be conducted to determine pasture conditions.

In summary, the most important step is to change the open access situation and regulate resource use, but the second most important step is to develop mutually agreed pasture use rules, an annual pasture use plan and to develop a sketch map of the area.

5.3 Local government perception and support to PUGs

The research on the case study site also showed that close collaboration is needed between PUGs, APUGs and the *soum* government (land, environmental, agricultural officers, *soum* Governor, and *soum* Assembly). While PUGs can reach agreements on the allocation of rights and PMP within and among themselves, these require official endorsement, and in the case of rights, official allocation of these rights. Where PUGs and APUGs are unable to reach agreement on boundaries and PMPs, the *soum* government can facilitate reaching agreements. They can also help negotiate movements inside and between *soums*, with the protected area administration, and set aside reserve pastures (*otor*), etc. Only the *soum* government can allocate rights and is the only entity that can take ultimate responsibility for enforcement of rights and management plans.

Since herders have organized themselves, *bag* governors prefer to organize *bag* public meetings at the same time as the PUG members' meeting. This reduces the costs to distribute announcements to herders and to arrange time to organize a meeting. This was confirmed in

an interview with an official who stated: “We like to participate in PUG meetings and share and introduce what activities local government are planning to implement, and on the other hand to know what activities PUG herders are implementing, how to support and cooperate with them, since it is our job.” (Pers.com, Jan. 2009)

Local authorities have started realizing that supporting the local initiative of PUGs is important and facilitates delivery of state services and solving critical problems of pastureland degradation.

One trend observed was that herders from the same PUG are supporting the election of educated herders to the local civil representative assembly. They think that through the voice of the elected person in the public assembly meeting their PUG pasture management plan can be implemented successfully. So, two PUG leaders voted for a member of a *bag* public assembly in October 2008 and they won, and one PUG leader was elected as head of a *bag* public assembly.

This bottom-up approach motivates local government to cooperate with herders. Local government has a positive attitude about PUG initiatives and is willing to cooperate and support PUG activities and formalize it through developing and approving decrees.

6. RECOMMENDATIONS

The analysis in this paper points to several factors necessary to keep in mind for future policy decision making, if Mongolia is to succeed in moving towards more sustainable land use practices. These factors are summarized below, as they apply to the different actors.

6.1 For PUGs

Recent success stories show that under given conditions the PUG approach promoted by the Green Gold program (GG) can be introduced quite quickly and smoothly. It seems that the herders have a natural understanding and propensity to organize themselves in groups and to share the available land fairly among themselves. The PUGs, have successfully handled various activities from the simple to the complex, including setting up PUGs, developing and approving Pasture Management Plans, allocating and delineating natural pasture boundaries, assigning clear tasks to each level of herder organizations and PUG by-laws, having a transparent and democratic leadership system, and clearly defining the benefit sharing systems, and more.

However, the PUGs still need to be able to handle more complex tasks to strengthen financial accountability as herder organizations, to ensure financial sustainability, to have clear operational manuals, improved conflict resolution mechanisms and to improve market access for herders.

PUGs need to develop effective rules and regulations that clearly articulate how to enforce collective decisions of PUG members regarding pasture management. The groups also need good leadership, and democratic mechanisms for renewing leadership.

There is a need for a thorough study on pasture management of herders in relation to their wealth status and to examine in more depth whether the PUG approach can strengthen vertical and horizontal social networks and in this way help in building trust between groups. The results from this study will help to design and facilitate activities related to strengthening the financial status of the PUGs.

At the moment there has been no careful study on pasture conditions and no restoration work has yet been started in heavily degraded areas. PUG herders have the skills to conduct studies of pasture condition and to monitor PUG pastureland areas. The use of their skills will help to conduct restoration work efficiently and to assess PUG management as well.

6.2 For Government

Local authorities already have sufficient legal rights to allocate winter/spring campsites, and pasture use rights in the winter and spring camp areas. However, these rights are not yet shared with the territory-based Pasture User Groups that so far lack legal recognition. Neither the *soum* governor nor the PUGs have the formal rights to delineate and enforce their entire territories. Therefore one of the necessary conditions to reduce or eliminate the open access issue is missing. PUGs need enhanced legal rights and collaboration from local government authorities to introduce binding rules and enforce the decisions in their pasture management plans.

Currently, PUGs are not legal entities. If they are given official status and the right to govern pastureland they will have better tools to manage their pastureland effectively.

Decentralization, particularly financial autonomy of rural government, training of rural government staff and change in the selection criteria for rural government staff are factors that will have to be addressed at the national policy level.

There is a need for the government to consider developing different small grant project schemes focused on helping PUGs to improve pastureland condition and at same time to improve the livelihood of members of the group.

This approach has to be tested at the larger or *aimag* level in order to provide long term sustainability of the success acquired at the *soum* level and improve pasture condition throughout the country.

7. CONCLUSIONS

The hypothesis to be tested by this study was as follows: A territory-based approach to organizations of herders into Pasture User Groups is the most promising approach to change the present open access situation into a communally managed sustainable resource use system.

In a context where unsustainable grazing patterns have complex and interlinked social, economic and ecological causes, no solution is simple and any approach must allow flexibility and adaptability from site to site.

This study of the steppe zone has shown many encouraging signs that the hypothesis is correct. It is clear that the herders as well as the local authorities are aware that the large number of animals and inappropriate herd composition and inappropriate management practices are leading to degradation of pasture. They are aware that major changes in the herding practices are necessary to address these issues. Defining pasture boundaries is therefore a first step to reduce the detrimental effect of the open access situation and is also a single defining characteristic of “common property” institutions (Ostrom, 1990). Setting aside pastures for use in non-growing harsh times, which is one of the main norms of pasture use in Mongolian herding, actually implies an exclusion paradigm (Upton, 2005). Breaking this norm due to dismantled formal regulation and the weakening of informal institutions after the state collective collapse led to a changed resource use regime from communal to open access. Therefore, a bottom-up approach with external facilitation to restore essential norms of pasture use in Mongolia could play a main role to change and thereby to improve the resource use regime. A contribution system that adapted the reciprocity (Fernandez-Gimenez & Le Febre, 2006) norm by PUG herders can contribute to improve livestock quality and decrease the number of livestock in the medium term.

The experience from the case study site has showed that territory based herders' joint efforts to improve pasture resources helped local government to take appropriate measures and find and implement solutions for the pasture management problem and related conflicts, which are the most difficult task for local authorities at the moment. However, strengthening community institutions so they will be self-sustaining is a time consuming process that requires both technical and financial support. In order to build up well functioning CPR institutions, future studies of the design principles of PUG institutions in relation to resource condition need to be carried out.

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APPENDICES

APPENDIX 1

Glossary

<i>Aimag</i>	The largest administrative unit. Mongolia is divided into 21 aimags.
<i>APUG</i>	Associations of pasture users group.
<i>Bag</i>	The smallest administrative unit. Soums are divided into bags.
<i>Dzud</i>	A generic term denoting a natural disaster during which livestock are not able to graze. There are different types of dzud, including one which involves formation of a layer of ice over grazing land, often exacerbated by severe snowfall.
<i>GG</i>	Green Gold program.
<i>Ger</i>	Transportable felt tent used as a dwelling by nomadic herders.
<i>Khot ail</i>	Primary unit of herding society composed of cooperating households who customarily camp together and jointly possess winter/ spring shelters and associated sets of pastures.
<i>Khural</i>	General term for elected assembly or parliament.
<i>HG</i>	Herder group.
<i>MSRM</i>	Mongolian Society for Range Management.
<i>NGO</i>	Non-governmental organization.
<i>NSO</i>	National Statistical Office.
<i>Negdel</i>	Collective farm.
<i>UNDP</i>	United Nations Development Programme.
<i>Otor</i>	Reserved pasture land; going on long treks in search of better pasture land.
<i>PUG</i>	Pasture users group.
<i>PMP</i>	Pasture Management Plan.
<i>Soum</i>	Sub-province, below aimag level.

APPENDIX 2

I. Interviews conducted by the author in Undurshireet *soum*. January 2009

1. Focus group discussion with thirty-one member herders of two Pasture User Groups
2. Interview with three representative herders of three other Pasture User Groups
3. Two *bag* governors
4. *Undurshireet soum* governor

II. Guiding questions used in focus group discussions and interviews with herder members of PUGs in January 2009

What is the level of change in characteristics of key sites and reserves existing within the PUGs areas?

What is the perceived change in abundance and diversity of key vegetation within the PUGs areas over the last two years of the project implementation?

To what extent is local herding and grazing management knowledge sought for among the PUG herder members to make management decisions about the pasture?

What kind of management practices and social mechanisms have been devised that are adapted to the characteristics and dynamics of the ecosystem?

What are the formal and informal rules and norms that foster trust, reciprocity and mutual support within the members of PUGs?

To what extent have participation, negotiation and the capacity for conflict management developed in the communities with PUGs?

To what extent have PUG members been able to strengthen their sustainable pastureland management practices that provide collective benefit to all the members?

What are the mechanisms developed among PUG members to prevent opening new avenues for fraud and misapplication from local authoritative individuals and government officials?

How are institutions constituted?

What governance structure is appropriate for PUGs?

What legal structure is appropriate for PUGs and what alternatives exist?

How are members kept accountable? How is compliance enforced?

**III. Questions asked by herder members of two PUGs in focus group discussions.
January 2009**

Questions	Answer option	Percentage (number)
1. Is it suitable to let the herders use pasture determined by certain boundaries but assuring possibility to move?	1. Yes	75.9 (24)
	2. No	12.9 (4)
	3. Not answered	11.2 (3)
	Total	100 (31)
2. Who should determine the pasture boundary?	1. <i>Soum</i> governor	37.0 (11)
	2. Herders themselves through open discussion and meeting	63 (20)
	Total	100 (31)
3. What should determine a pasture boundary	1. Possibility to migrate	27.8 (9)
	2. Solidarity of herders living together within the boundary area	62.9 (19)
	3. Not answered	9.3 (3)
	Total	100 (31)
4. Which way is appropriate to determine pasture land boundaries?	1. Considering winter-spring pasture	24.1 (7)
	2. Considering summer-autumn pasture	5.6 (2)
	3. Considering four seasonal pastureland	62.9 (19)
	4. Not answered	7.4 (2)
	Total	100 (31)
5. How can herders living within a pasture boundary area cooperate on appropriate pasture utilization?	1. Everyone living within the pasture boundary area should become a member of the pasture use unit without exemption.	22.2 (7)
	2. Regulation and rules need to be developed and approved by Pasture User Group with all members meeting and put into effect.	59.3 (18)
	3. Not answered	18.5 (6)
	Total	100 (31)
6. How can herders in a PUG resolve conflict if a household within a pasture use boundary, herding more than 1000 animals, doesn't want to join the group, but over-use the other herders' pasture and breach interests and rights of other herders living in the area?	1. Through discussion and negotiation among member herders	57.4 (17)
	2. By the decision from <i>bag</i> meeting	22.2 (7)
	3. By the decision of <i>soum</i> governor	9.3 (3)
	4. Not answered	11.1 (4)
	Total	100

IV. Interviews conducted by the author in Iceland, August 2009

1. Interview with eight farmers in Egilsstadir, eastern part of Iceland.
2. Interview with four district officers of the Soil Conservation Service of Iceland.
3. Interview with two workers with the Farmers Association, one worker with the Forestry Association of Iceland.

