The risky business of designing land tenure policy in the Gobi Desert

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Abstract

Pastoralists need to manage the feed gap risk that climatic/forage resource variability presents. We use the PHYGROW model to better understand interactions between this variability and the effectiveness of a geographically fixed pastoral community management area (CMA) in the Gobi Desert. The model shows significant intra- and inter-annual forage variability within sites, as well as significant variation between sites. Interviews with 9-Erdene members, and others, indicate that 'rule breaking' through departure of pastoralists and livestock from the area during frequent poor forage years is common, although other CMA institutions that maximise livestock body condition have been maintained. There is significant risk that designing and adequately policing geographically fixed pastoral systems at this scale will facilitate overgrazing and reduce livelihoods. The provision of financial and in-kind support that provides more diverse, affordable and accessible risk management options to pastoralists may be more effective at promoting good rangeland condition than further effort to closely define the boundaries of household grazing lands.

Introduction

Land tenure policies have been recognised as a significant driver of pastoralist decision-making in arid rangelands e.g. Productivity Commission (2002). Pastoralists need to respond to the feed gap risk that extreme climatic and resource variability presents within the constraints imposed by prevailing land use institutions. Here the Mongolian Gobi Desert's

9-Erdene community management area (CMA), which has a geographically defined boundary, is used to demonstrate how significant spatio-temporal forage variability can interact with areal restrictions to increase the risk of pastoralists experiencing significant forage feed gaps. This paper gives interim results of PhD research, and as such offers a 'snap-shot' only.

Materials and methods

The 9-Erdene CMA (Fig. 1) was selected in 2009 as interviews with NGO officials suggested that the group was functional and well-established, thus likely to have experienced more climatic variation than other such areas. Whilst more detailed socioeconomic surveys will be made during the 2010 field season, semi-structured, informal interviews with pastoralists, local officials, non-government organisations and researchers were undertaken between 2007 and 2009. These interviews elicited CMA geographical size, age and establishment information, formal and informal institutions governing pastoralist movements and the type and level of 'rule breaking' of such institutions.

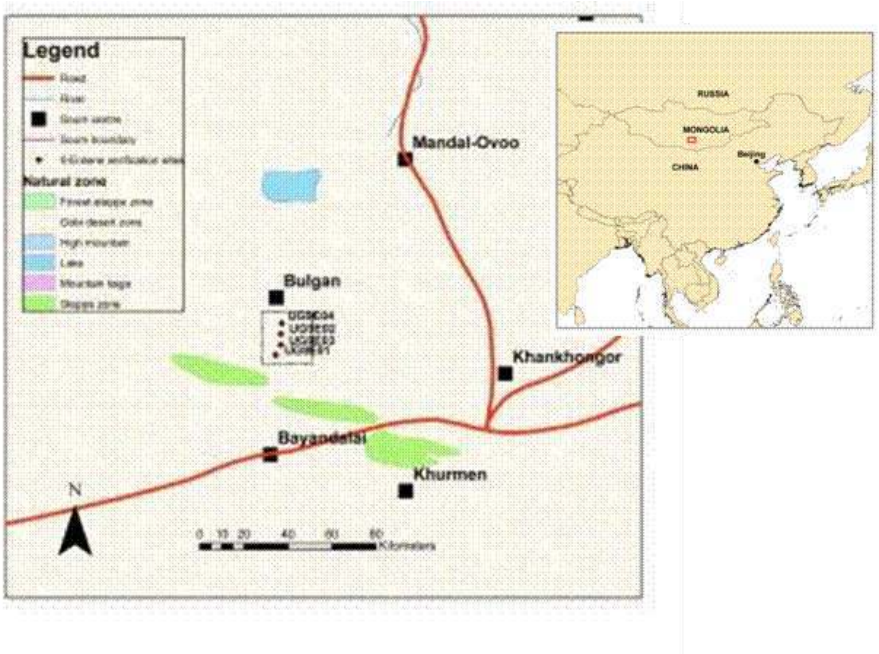

Fig. 1. 9-Erdene CMA location, including the four sites where the PHYGROW model was verified. The photo is of verification site UG9E01, June 2009.

PHYGROW (Texas A & M University), a forage model linked to real-time climate data, was utilised to better understand spatial and temporal variations in forage availability within

9-Erdene. Four sites were selected within the CMA to be at least 5km apart and at different altitudes to maximise variability captured by the model. Aspect, slope, altitude, % bare ground, % litter, % vegetation cover, and the non-woody clipped, oven-dried and weighed vegetation of ten 0.5m^2 quadrats per site were verified in the field as per Rowan (1995). This field data complemented a combination of remotely sensed data, the literature, local and international expert knowledge and pre-existing soil maps (source: Institute of Geoecology, Mongolia) to inform other parameters.

Results

The 9-Erdene CMA, established in 2002 by the Initiative for People Centred Conservation of the New Zealand Nature Institute, covers 367km^2 (NZNI, 2006). Most pastoralists have rights over winter/spring shelters that are recognised legally. It is unclear whether winter/spring shelters are transferrable either under national law or group conventions, although evidence from similar CMAs indicate pastoralists are increasingly gaining rights over multiple shelters to sub-lease during times of limited forage elsewhere (Addison, unpublished). Similarly, whilst exclusivity is implied with group membership, exclusivity under national law is unclear and group boundaries are porous in reality. Pastoralists in this area currently manage climatic risk through mobility, alternative incomes (Upton 2003) and livestock banks.

Modelled forage availability shows significant intra- and inter-annual variability (Fig. 2). A late summer/autumn peak is consistent each year but the magnitude of the peak varies significantly. Despite significant inter-annual variability in precipitation over winter/spring, forage is much less variable during this period because temperatures are too low to support plant growth, irrespective of precipitation levels.

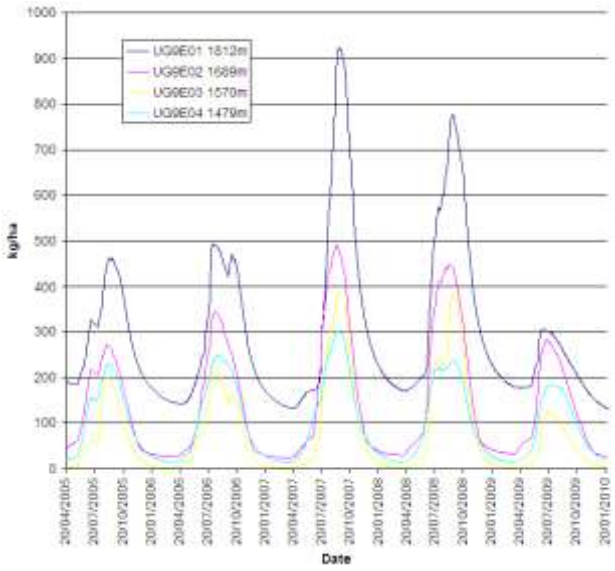

Fig. 2. Simulated total standing crop (kg/ha) at four sites, with altitudes, within 9-Erdene. 'Buffering risk' is further explained in the text.

'Buffering risk' (Fig. 2) is a comparative estimate of the maximum potential forage available to pastoralists if they can freely move within 9-Erdene, with interviews suggesting pastoralists largely follow this pattern. In winter, pastoralists generally stay in camps protected from wind e.g. UG9E01, moving in summer to areas with water and cooling winds e.g. UG9E04. Pastoralists return to the same winter camp in most years, but show much more variability in camp selection in summer, both within and between years. In low forage years (like 2009) pastoralists also move out of the CMA altogether, breaking group agreements. Pastoralists also cite receiving other non-member pastoralists from outside the geographically constrained 9-Erdene area when there is a lack of forage in surrounding areas, such as in the 'dzud' years of 2000/2001 (Upton, 2003). By following this pattern, the more rainfall-dependent, short-term vegetation pulses of the plains are utilised in the more variable summer, resting the more perennial and shrub-like forage utilised over winter. Available forage is therefore greater following the 'buffering risk' pattern (with occasional migrations outside the 9-Erdene area) than if a pastoralist was to stay all-year at any one site, other than the high altitude UG9E01. Staying full-time at high altitude sites is likely to degrade the pastoral resource held in common, however, so group members have maintained the CMA practise of an annual meeting to set group departure dates from winter/spring camps.

Discussion

Whilst Ostrom (2008) warns that there are no 'optimal' rules applicable to common pool resources, she suggests that CMAs can be effective if they are tailored to specific resource attributes. Many of the critical enabling conditions for sustainability of the commons, synthesised by Agrawal (2003), are not met in the non-equilibrium 9-Erdene CMA. However, the forage resource is neither predictable nor immobile, nor does it have a well-defined boundary. Given the frequent 'rule breaking' of the CMA boundary during low forage years, it is likely that there has been a mismatch between the spatio-temporal scale of the forage resource and the areal extent of the CMA. That 9-Erdene is one of the few functional CMAs left in the area suggests that the group has gained value from being selective in the aspects of the formalised system it has adopted, retaining specific aspects of the CMA, like spring/winter leaving dates, whilst dropping unhelpful elements, like fixed boundaries. It is probable that the latter do not support the aim of fattening livestock over summer/autumn to help withstand the long winter.

The lag-time between rainfall-mediated vegetation pulses and the build-up of significant grazing pressure in non-equilibrium rangelands is greater in mobile systems, and/or where livestock numbers are not maintained through artificial waterpoints or supplementary feeding during poor rainfall seasons (Vetter, 2005). This lag-time is nearly non-existent in the geographically constrained 9-Erdene. The adequately policed restricting of pastoralists to such areas therefore increases the risk of overgrazing, particularly of high value, summer-available species like *Allium sp* and, ultimately, a decline in livelihoods. These are key concerns of both governments and multilateral organisations that, understandably, face difficulties in designing suitable programmes and policies for the region. However, the provision of financial and in-kind support that provide mores diverse, affordable and accessible risk management options to pastoralists are likely to be more effective in the short to medium term than further effort to enforce the temporal and spatial boundaries of household grazing lands.

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