



Climate adaptation, local institutions, and rural livelihoods: A comparative study of herder communities in Mongolia and Inner Mongolia, China



Jun Wang^{*}, Daniel G. Brown, Arun Agrawal

School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI, USA

ARTICLE INFO

Article history:

Received 7 October 2012
Received in revised form 21 August 2013
Accepted 28 August 2013

Keywords:

Climate adaptation
Local institutions
Rural livelihoods
Herder communities
Mongolian grasslands

ABSTRACT

Climate variability has been evident on the Mongolian plateau in recent decades. Livelihood adaptation to climate variability is important for local sustainable development. This paper applies an analytical framework focused on adaptation, institutions, and livelihoods to study climate adaptation in the Mongolian grasslands. A household survey was designed and implemented in each of three broad vegetation types in Mongolia and Inner Mongolia. The analytical results show that livelihood adaptation strategies of herders vary greatly across the border between Mongolia and Inner Mongolia, China. Local institutions played important roles in shaping and facilitating livelihood adaptation strategies of herders. Mobility and communal pooling were the two key categories of adaptation strategies in Mongolia, and they were shaped and facilitated by local communal institutions. Storage, livelihood diversification, and market exchange were the three key categories of adaptation strategies in Inner Mongolia, and they were mainly shaped and facilitated by local government and market institutions. Local institutions enhanced but also at times undermined adaptive capacity of herder communities in the two countries, but in different ways. Sedentary grazing has increased livelihood vulnerability of herders to climate variability and change. With grazing sedentarization, the purchase and storage of forage has become an important strategy of herders to adapt to the highly variable climate. The multilevel statistical models of forage purchasing behaviors show that the strategies of livestock management, household financial capital, environmental (i.e., precipitation and vegetation growth) variability, and the status of pasture degradation were the major determinants of this adaptation strategy.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

Grasslands occupy about 50% of Earth's terrestrial surface (and 38% of the Asian continent). They are generally characterized by single-stratum vegetation structures dominated by grasses and other herbaceous plants. They provide about 70% of the forage for domesticated livestock globally (Brown and Thorpe, 2008). In the semiarid and arid grasslands of the world, such as Africa and Inner Asia, migrations over long distances have been a particularly important livelihood adaptation strategy of pastoralists living with a highly variable climate and vegetation productivity (Fernandez-Giménez and Le Febvre, 2006; Humphrey and Sneath, 1999; Mwangi, 2007). For centuries, traditional institutions like flexible

property boundaries and reciprocal use of pastures have allowed pastoralists to use pastures efficiently and to cope with frequent climate hazards. Those institutions have evolved over centuries and are well suited to the biophysical characteristics of the local environment. Grasslands are the dominant ecosystem types on the Mongolian plateau, including most parts of Mongolia and the Inner Mongolia Autonomous Region (IMAR), China. About 84% (1.26 million km²) and 66% (0.78 million km²) of the total areas of Mongolia and Inner Mongolia, respectively, are classified as grasslands (Angerer et al., 2008; Zhang, 1992). Similar to other traditional grazing systems, herders on the Mongolian plateau have adapted to the highly variable climate by altering their mobility patterns, shifting livelihood strategies, varying herd compositions, and undertaking market activities (Fernandez-Giménez, 1997; Humphrey and Sneath, 1999; Williams, 2002).

Climate on the Mongolian plateau is continental with cold winters and warm summers. Drought and Dzud (severe winter snowstorms) are the major types of climate hazards on the Mongolian plateau (Martin, 2010). In recent decades, climate on

^{*} Corresponding author at: School of Natural Resources and Environment University of Michigan, Ann Arbor, 440 Church Street, Ann Arbor, MI 48109-1041, USA. Tel.: +1 734 276 5048; fax: +1 734 936 2195.

E-mail address: junw@umich.edu (J. Wang).

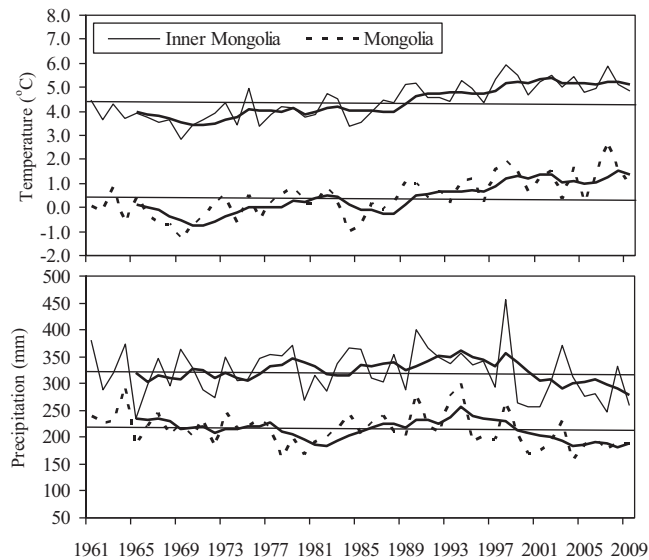


Fig. 1. The temporal variability of annual mean temperature (a) and annual precipitation (b) in Inner Mongolia and Mongolia with multi-year means and five-year moving averages (1961–2009).

the Mongolian plateau has been getting warmer and drier (Fig. 1). Climate dynamics affects rural communities through changes in both mean values of key climate variables and their variability (Lemos et al., 2007). Between 1961 and 2009, annual mean temperature increased about 2.1 °C in Mongolia and about 2.0 °C in Inner Mongolia, and annual precipitation decreased about 7.0% in Mongolia and about 6.6% in Inner Mongolia (Wang et al., 2013). The frequencies of climate hazards in Mongolia have increased since the early 1960s (Fernandez-Giménez et al., 2012; MMS, 2009). The worst droughts and Dzuds that Mongolia experienced in recent decades were in the consecutive summers and winters of 1999, 2000, 2001, and 2002, which affected 50–70% of the total territory. About 12 million livestock perished in that period (Wang et al., 2013). The 2010 Dzud was the worst ever, resulting in the death of about 8.5 million livestock or 20% of the 2009 national livestock populations in Mongolia (Vernooy, 2011). Pasture degradation has further increased livelihood vulnerability of the natural-resource-dependent herders in Mongolia and Inner Mongolia. The results of large-scale field ecological surveys show that the average grassland biomass productivity in Inner Mongolia and Mongolia decreased from 1871 to 900 kg/ha and from 804 to 369 kg/ha, respectively, between 1961 and 2010 (IMIGSD, 2011; IOB, Mongolia, 2011). Poverty has been prevalent in herder communities of Mongolia and Inner Mongolia (Coulombe and Altankhuyag, 2012; Griffin, 2003; Mearns, 2004; Nixson and Walters, 2006; Olonbayar, 2010; Zhang, 2007).

Future climate scenarios project that in the next 30 years annual mean temperature on the Mongolian plateau will increase 0.4–1.6 °C, especially in summer and autumn (0.8–1.6 °C), and there will be no increase of annual precipitation in most parts of the Mongolian plateau (Tang et al., 2008). IPCC AR4-A1B future climate scenarios (mean projections of 21 models, Christensen et al., 2007) show that comparing the end of this century (2080–2099) with the end of last century (1980–1999), the average winter temperature on the Mongolian plateau will increase 3–5 °C; the average summer temperature will increase 2.5–4 °C; the average winter precipitation will increase 5–30%; and the average summer precipitation in most parts of the Mongolian plateau will increase 5–10%. The livelihoods of herders on Mongolian plateau will be more vulnerable to future adverse climate conditions.

Vulnerability, social adaptation, and adaptive capacity are interrelated concepts used in the analysis of the potential effects of climate and other stressors on local communities and their potential responses to them (Adger, 2006; Eakin, 2005; Smit and Wandel, 2006; Turner et al., 2003). Humans have constantly adapted to changes in the conditions and dynamics of the climate they experience. Social adaptation to climate change can happen at multiple scales (Adger et al., 2005). Adaptation can result from top-down changes in policies and institutions and bottom-up household-level autonomous responses (Agrawal, 2009). The effectiveness of social adaptation depends on a variety of environmental and social contextual factors that are both internal and external to local communities. Research based on extensive case studies shows that local institutions play a key role in shaping livelihood adaptation strategies of rural communities and households to climate change (Agrawal, 2010). Institutions include both formal laws and policies and informal norms that structure human interactions and govern interactions between human and environment (North, 1990; Ostrom, 1990). Local formal institutions are the instruments of national policies and institutions, and they can also evolve locally to structure human interactions. Local institutions can either enhance or undermine adaptive capacity of rural communities for climate change (Adger, 2000; Li and Huntsinger, 2011). To reduce climate-related vulnerability, it is important to understand how local institutions have shaped climate adaptation, and how local institutions can enhance adaptive capacity of rural communities for future climate change.

Agrawal (2010) argued that in the context of climate as a major stressor on rural communities, local institutions can influence rural livelihoods and their adaptations in three major ways: (1) they shape the impact of climate change on rural communities; (2) they shape the ways that rural communities respond to climate change; and (3) they are the intermediaries for external support to local climate adaptation. External interventions that facilitate climate adaptation can work through provisions of information, technology, finance, and leadership. In the framework focused on adaptation, institutions, and livelihoods developed by Agrawal (2009), local institutions were classified as local public/governmental, private/market, and civic/communal institutions. Livelihood adaptation strategies in the context of climate risks to livelihoods are assigned into five major types: (1) mobility, which pools climate risks across space; (2) storage, which pools and reduces climate risks over time; (3) livelihood diversification, which reduces climate risks across assets owned by households or collectives; (4) common pooling, which pools climate risks across households in local communities; and (5) market exchange. All of these adaptation strategies can only work in certain formal (e.g., property rights) and informal (e.g., trust and reciprocity) institutional arrangements, i.e., adaptation never occurs in an institutional vacuum. Based on the framework focused on adaptation, institutions, and livelihoods (Agrawal, 2009), we analyze the interactions among climate-related vulnerability, livelihood adaptation strategies, local institutions, and external interventions related to the herder communities of Mongolia and Inner Mongolia, China.

Social institutions related to livestock grazing have changed dramatically on the Mongolia plateau over the past decades (Neupert, 1999; Sneath, 1998; Upton, 2009). Mongolia and Inner Mongolia experienced social transformations from traditional “communal” forms of ownership to collective economies during the early 1960s and late 1950s, respectively. They also experienced privatization in the early 1990s and mid-1980s, respectively (Fernandez-Giménez, 1997; Jiang, 2005; Wang et al., 2013). In Mongolia, pastures are managed under a combination of customary rights and formal-use rights. Due to the lack of effective resource institutions, conflicts related to pastures use have

Download English Version:

<https://daneshyari.com/en/article/10505040>

Download Persian Version:

<https://daneshyari.com/article/10505040>

[Daneshyari.com](https://daneshyari.com)