



Institutional change in social-ecological systems: The evolution of grassland management in Inner Mongolia



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ABSTRACT

Communities living in the grasslands of present day Inner Mongolia have experienced dramatic social, economic and ecological changes over the past millennium. More recently, these grasslands have undergone widespread degradation, raising concern for securing local herders' livelihoods. To understand these changes in ecological and welfare outcomes over long time scales, we define five broad periods of relative institutional stability over the past millennium, characterize social-ecological system during each period, and then assess major changes between these periods. Looking at changes in institutional contexts helps explain some of our outcomes of interest. We find that while much attention has been given to the change in grassland lease structures in China, the role of market integration and buffers against historically natural constraints on livestock production (e.g., protection from the winter months) have decoupled formerly tight local social-ecological links. This decoupling, along with weak land tenure security due to a complex and volatile policy landscape, suppresses local incentives for grassland conservation.

1. Introduction

Changing property rights and land tenure arrangements has been long advocated as an instrument for helping internalize environmental externalities, especially those that result from collective action problems, i.e., problems that can arise in situations where individuals must act together to achieve a common goal (Olson, 1965). In the canonical case, overgrazing the grassland commons is a rational response to private ownership of livestock but collective ownership of grass (Hardin, 1968). Privatizing the grassland area is proposed as a simple solution to this 'tragedy of the commons'.

Yet, at least in some places, privatizing the commons does not seem to preserve resources. For example, in Inner Mongolia, at least since the 1980s there has been widespread concern over grassland degradation attributed to overgrazing (Huang, 1989; Jiang, 1989; Liu, 1989; NRC, 1992; Thwaites et al., 1998; Xiao et al., 1995). In 1985 the Rangeland Law (草原法) established the legal basis for households to enter into long-term grassland contracts, effectively privatizing what were previously collectively held grasslands (Li et al., 2007a,b; Ho, 2000). However, as Fig. 1 shows, the pasture-raised livestock population has increased by a factor of 5 in the last 60 years, with dramatic growth in recent decades. Some local studies show even greater numbers than the

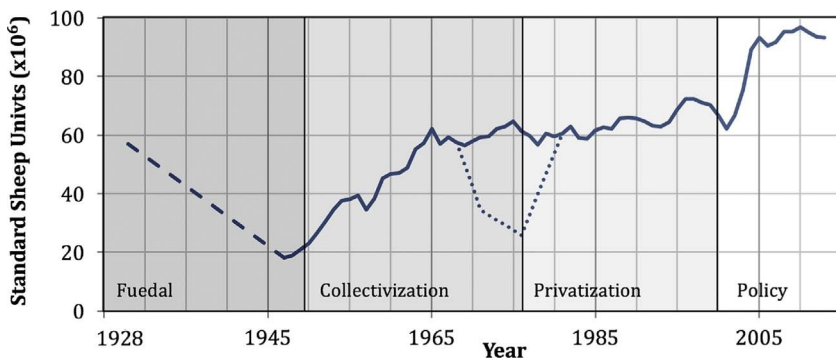
official trends suggest (Kolås, 2014). Livestock continues to increase, yet privatized grassland rights have been the norm for at least 20 years in Inner Mongolia. If overgrazing has been the main driver of grassland degradation, why have herders not responded by decreasing their stocking numbers and "solving" this tragedy of the commons?

One possibility is that degradation is not, in fact, as widespread as commonly thought. Some have suggested claims of degradation in the region may be overblown (Brogaard et al., 2005; Ho, 2001; Sneath, 1998), as has also been suggested in neighboring Mongolia (Addison et al., 2012). Still, the dominant view, especially among rangeland ecologists and government officials in Inner Mongolia, is that degradation is rampant, has been increasing over the past few decades, and is driven largely by anthropogenic sources (Briske et al., 2015; Piao et al., 2005; Wang et al., 2008, 2017; Yang et al., 2005).

To examine other possibilities for why livestock continue to increase in the face of degradation, we must look more closely at incentives for rangeland management decisions and the institutions that bound them. In trying to understand these issues, we develop a dynamic approach to analysing social-ecological systems (SES) that builds on SES theory (Berkes et al., 2002) and the SES framework (McGinnis and Ostrom, 2014). While the SES literature has advanced a broad discourse around the role of institutions in mediating outcomes in social-ecological

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and camels (Hu and Zhang, 2006; National Bureau of Statistics of China, 2015). Fig. 1 excludes pigs since they are usually not grassland-dependent.

systems, a range of other disciplines have also developed core ideas around institutional dynamics that have not been well integrated into the SES literature (Sjöstedt, 2015). Here we incorporate ideas of institutional change, drawing primarily from institutional traditions in sociology and history (Hall and Taylor, 1996), into the SES framework. Given the complex coupled nature of SES dynamics, looking at changes social-ecological dynamics, especially over longer time periods, may help us better understand some outcomes of interest.

This paper aims to contribute to the literature in two ways. Methodologically, we argue that looking at the changes in the institutional context (i.e., changes in the SES) deserves more scrutiny in explaining changes in social and ecological outcomes. Empirically, our approach reveals two major forces that seem to have allowed for continued increase of livestock in recent years. First, the use of forage from external markets and the ‘winterization’ of farms (e.g., storage for winter feed, reinforced winter barns) have “decoupled” the local social-ecological system by breaking the feedback between grassland health and herder welfare. Second, the current era of top-down policy implementation leaves herders with little assurance that investments in their land (i.e., reducing stocking rates now) will pay off in the future in the form of healthier grass. Numerous policies and limited-term contracts create a form of land tenure insecurity in which herders value near-term benefits over longer-term sustainable management. Both reasons diminish herders’ private incentives to conserve the grassland. We emphasize the joint role of trade through markets, and the dominance of policy in mediating the link between ecological and social outcomes. Understanding these multi-scalar rangeland and policy dynamics is a key challenge in building resilient social-ecological systems in grasslands (Dong et al., 2017, 2016).

In the sections that follow, we first give an overview of institutional theory as it relates to SES and institutional change. Section 3 describes our study area and analytic approach. Section 4 discusses the evolution of grassland institutions in the Inner Mongolian Autonomous Region (IMAR) of China from 1000 B.C.E to 2016 C.E, presenting hypotheses for how institutional changes relate to the social-ecological system. Finally, we discuss implications for current policy and potential ways forward for a more sustainable grassland system.

2. Institutional analysis and the environment

Given the inherent complexity and interdependencies in ecological dynamics, one individual’s interactions with the environment often affect the nature or quality of the environment for others. When individual choices impact society more broadly, institutions can help shape those choices, set norms, and enforce rules (Vatn, 2007). Institutional-analytic theory has developed somewhat organically in several fields of study (see Hall and Taylor, 1996), and thus we do not claim to cover all the nuance and complexity the topic deserves (cf. Jentoft, 2004). We start by viewing institutions through the lens of social-ecological systems, and along the way integrate several concepts

Fig. 1. Livestock population (in SSU) and institutional periods since 1928.

Notes: The dashed line represents the overall trend from 1928 to 1949 implied by the single estimate in 1928 (Chang, 1933) to the first record of the Peoples’ Republic of China’s statistical yearbook data in 1949 (National Bureau of Statistics of China, 2014). The solid line is from the PRC statistical yearbook (National Bureau of Statistics of China, 2014), and excludes pig production which is not typically dependent on grassland productivity. The dotted line is an estimated trajectory based on anecdotes of local-level proportions of livestock population change during the Cultural Revolution and the Great Leap Forward (Longworth and Williamson, 1993, p. 46; Sneath, 2000, p. 124).

Following China governmental standards, we report livestock in aggregate “standard sheep units” (SSU). China statistical yearbooks use a conversion ratio of 1 for sheep, 0.8 for goats, and 5 for cattle, horses,

from other fields.

2.1. Analyzing institutions

The “rational choice” school of institutional theory (Hall and Taylor, 1996), that is, transaction cost theory and new institutional economics (Ostrom, 1990; Paavola and Adger, 2005), has largely informed institutional analysis around environmental issues. Many environmental problems are public good problems that require collective action. Economic and game-theoretic approaches have lent insight to these issues, and form the foundation for this school of institutional thought (Mahoney and Thelen, 2010; Paavola and Adger, 2005; Young, 2002).

Within the rational choice school, and drawing on work primarily by Elinor Ostrom and colleagues, the social-ecological systems (SES) framework (Fig. 2) has emerged as a dominant perspective for diagnosing the sustainability of coupled human-natural systems. The SES framework provides a template for cataloguing the social and ecological components that make up an institutional setting, and their resulting social and ecological outcomes (McGinnis and Ostrom, 2014; Ostrom, 2007; Ostrom and Cox, 2010). The framework has been demonstrated by diagnosing (Ostrom, 2007) and re-diagnosing (Cole et al., 2014) the classic story of the tragedy of the rangeland commons, and is increasingly used to assess the role of contextual factors that relate to the sustainability of local institutions. To date it has perhaps been most often applied in marine settings (Basurto et al., 2013; Cinner et al., 2012; Leslie et al., 2015), but has also been used in the analysis of forest systems (Fleischman et al., 2010), nature based tourism (Blanco, 2011), and others (see Thiel et al., 2015 for a review) including closely related grassland systems (Addison and Greiner, 2016).

Institutions, as we refer to them, are “the rules of the game” in which actors make decisions (North, 1990). In the SES framework, institutions can help govern market interactions, but market forces are not institutions (Ostrom, 2005) (e.g., policies that provide incentives to produce forage are part of the institutional context, but market-driven rise in production and trade of forage is not). Similarly, climate,

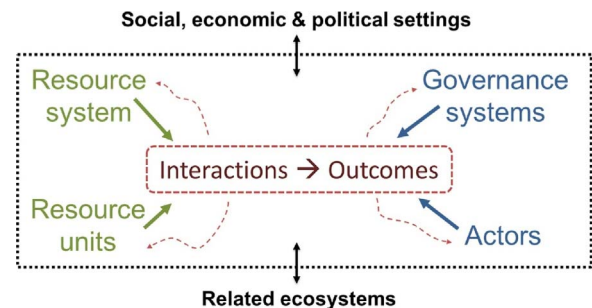


Fig. 2. The SES framework.

Notes: Direct effects are noted by solid lines; feedbacks are dashed lines. Adapted from McGinnis and Ostrom (2014)

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