

1. Introduction

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The grassland steppes of northern China and Mongolia have captured the world's attention for centuries. The dynasties, landscapes and herder lifestyles associated with these steppes have fascinated generations of peoples, spawning numerous legends and myths. While the dynasties, landscapes and lifestyles have changed through time, the grassland steppes still engross the world's scientific community, regional governments and broader populace. They continue to support the livelihoods of millions of herder households while supplying a range of environmental and ecological services.

In recent times, the grassland steppes have been under growing pressure from increased livestock numbers. The pressure to increase livestock numbers has impacted upon the condition of the grasslands, raising concern among grassland users and scientists and eliciting a variety of responses from the Chinese and Mongolian governments.

The grasslands of China and Mongolia are extremely diverse with many different types of grasslands. However large parts of the Mongolian and Chinese grasslands, and especially the Chinese grasslands in Inner Mongolia which are the focus of this book, are characterised by typical steppe and desert steppe. These grasslands are also under the most intense pressure from increased livestock numbers and their condition is the most vulnerable. The book focuses on these two types of grassland.

The pressures imposed on grasslands by herders and other grassland users are the result of various drivers and incentives. Some incentives may be direct policy instruments such as subsidies or taxes, while other incentives may be price or market related which in turn may be influenced by policy measures. The analysis in the book focuses on understanding these incentives and how they impact upon grassland use.

Grasslands and their underlying biophysical, environmental, production, market and household subsystems are complex systems. Without

an understanding of the complexities, the impacts of different incentives are difficult to determine in advance, with many policies having unintended and unforeseen consequences. The book seeks to unravel the complexities of these subsystems through an interdisciplinary approach. An understanding of these complexities and subsystems, and how these subsystems change in response to changing practices, incentives, policies or environmental and market conditions, is the basis for the more in-depth analysis of incentives in the book.

Although Mongolian and Chinese grasslands share common features, there are also many differences; some subtle and some much less so. The differences allow for a comparison of the pressures, impacts, drivers and responses between China and Mongolia, which in turn reveals useful insights on incentives influencing grassland use and management and the policies that impact upon these incentives. The aim of the book is to report on the similarities and differences through a comparative analysis of Mongolia and China, and to draw on the insights from the comparative analysis.

1.1 COMPARATIVE ANALYSIS

Several compelling reasons lend themselves to a comparative analysis of grasslands in Mongolia and Inner Mongolia. Many of the grasslands are contiguous and, as will be highlighted in Chapter 3, share common features. A large proportion of the herders also share a common ethnic background with common cultural and social aspects of their households. Furthermore the regions produce similar ruminant livestock products, while direct connections exist in some of these markets in China and Mongolia (Waldron et al. 2014). However while there are some common agro-ecological, socio-cultural and market characteristics, there are also key differences among the household, grazing and market systems that make for an insightful comparative analysis.

Foremost among the differences between the two countries are the policy settings and institutional arrangements, including grassland tenure, as will be described in Chapter 2. The use rights for most grasslands in China are contracted out to individual herders. While rights to winter shelters also exist in Mongolia, many grazing decisions including access to particular grazing areas are made on a more communal basis or governed by informal rules. The levels and type of support to herders varies markedly between Mongolia and China. The relatively smaller size of the ruminant livestock sector in the overall economy along with the much larger economy means that China has significantly more resources to invest in

grasslands and supporting herders. Furthermore Chapter 5 reveals how market segments and access to these market segments varies significantly between the countries, as do the transport infrastructure and supply chains linking herders to these market segments. For instance, disease protocols restrict movement of some meat and livestock from Mongolia into China, while Mongolia has special quota access to lucrative European markets for cashmere products. Factors related to agrarian transition and structural adjustment also lead to key differences between the countries.

The differences in otherwise similar agro-ecological and socio-cultural settings make for a fascinating comparative analysis especially when the focus of the analysis is on incentives. This is not to say that policies, incentives or livestock systems that seemingly have worked well in one country (say, livestock index insurance in Mongolia) can simply be transposed to the other country. They cannot. They are context specific with the key differences mentioned above necessitating the need for individual and tailored design of the policy instruments and incentives. Nevertheless the comparative analysis may reveal useful insights and lessons that warrant subsequent further context specific analysis, and especially if there is little prior experience of specific incentives, policy instruments or grazing or livestock practices. This is the intent of the comparative analysis in the book, namely in revealing knowledge about the systems, potential impacts and behavioural responses to assist in the process of strengthening incentives, rather than as a prescriptive treatise to be transposed to the other country.

1.2 THE CHALLENGE

The essence of the challenge confronting governments and society in China and Mongolia is to ensure that grazing systems secure the livelihoods of herders and other grassland actors in a manner that sustains the health of grasslands, which in turn supply a range of environmental services. The twin goals of improved herder livelihoods and healthy grassland condition do not necessarily align, and achieving desirable outcomes is compounded by the complexity of the grasslands.

In China concerns over the management and use of grasslands have manifested over a number of decades (Kemp and Michalk 2011). There has been an enormous investment in a range of programmes from pasture improvement to eco-compensation for grazing restrictions (Brown et al. 2013). Structural adjustment may eventually sort out the most pressing problems posed by grasslands as grassland actors adapt to changing opportunity costs and grassland productivity. However this may involve

a long transition and many vulnerable groups may not cope well with the transition. Thus attention to and investment in grasslands by the Chinese central government and local governments will continue. Nevertheless given the substantial investment of resources and policy attention, and the ever-increasing demands on such resources and attention, questions will continue to arise as to whether existing programmes are the most efficient in meeting the social objectives. This includes issues associated with the uniform nature of the payments, and the sometimes tenuous link between grassland user behaviour and the policy instrument. Furthermore questions arise as to how a more self-sustaining, facilitative environment for management of the grasslands can be implemented, rather than a more reactive, interventionist and short-term approach.

In Mongolia herders face significant challenges to their livelihoods, particularly in relation to *dzuds* but also animal diseases and other risks. In general the grasslands have been in better condition than corresponding grasslands in China as livestock numbers have been more in line with the capacity of the grasslands. But this is changing. Since the last major *dzud* in 2009–10, livestock numbers have risen dramatically, increasing from 50 million sheep equivalents in 2010 to 110 million sheep equivalents in 2017 (MONSIS 2019). The rise in numbers in some areas has exceeded the capacity of the grasslands, leading to a deterioration in their condition. Concern about livestock numbers and grassland condition has escalated in recent times not only among the government and Mongolian society in general but even among herders themselves. Thus the challenge for Mongolia is how to amend grazing strategies, incentives and livestock numbers in circumstances where there has not been close consideration to these matters previously, and where there is little experience to draw on of their impacts. The situation may be compounded by the incentives, a priori desirable in their own right, that target managing the risks to livelihoods of herders, including livestock index insurance, fodder reserves and reserve grazing areas for *dzuds*.

1.3 STRENGTHENING POLICY INCENTIVES

Anthropogenic factors can have a significant impact on grassland condition. Thus understanding the incentives that impact upon herders and other grassland actors is important. Historically grassland actors have shown their response to incentives; albeit to different incentives and at different points in time. In China, the desire to increase incomes and redress the imbalance between rural and urban incomes was strong among both herders and local leaders in the initial era of the People's Republic

of China. This was especially the case in areas where there was a large migration of Han Chinese into typical steppe and desert steppe areas in Inner Mongolia. Longworth and Williamson (1993) showed a strong relationship between population numbers and livestock numbers as herders sought to increase livestock numbers to raise their relative incomes. This was not without environmental impacts, especially as livestock numbers began to exceed the capacity of the grasslands. Furthermore it was a self-perpetuating cycle as herders increased numbers to maintain incomes on grasslands with declining productivity. These were not the only incentives at play. The central procurement era in China prior to the mid-1980s saw fixed price margins across different marketing stages and qualities of product, while the margins sought to support the incomes of herders who produced low quality product (Longworth and Brown 1995). Thus there was little or no incentive to change management practices to increase the quality of the products. Longworth and Brown (1995) describe fundamental marketing reforms in the mid-1980s, but these did little to alter the incentives as the plethora of private dealers and quasi-state agents purchased the ruminant livestock and ruminant livestock products such as wool on a mixed grade basis.

Many Chinese grasslands were seriously degraded by the mid-1990s, a situation apparent to local authorities (Longworth and Williamson 1993). Despite the awareness and notional rules relating to excess grazing, stocking rates continued to escalate. Following the fiscal reforms of the late 1980s (Findlay 1992), local governments in pastoral areas were under enormous pressure to promote local development and raise herder incomes. More importantly it was the time of the livestock revolution in China with active promotion of livestock industries, particularly beef cattle and sheep meat, under programmes such as straw for ruminants and structural rebalancing (Longworth et al. 2001, Box 2.1; Waldron et al. 2007). Thus while grasslands were already under intense grazing pressure and showing clear signs of severe degradation, the pressure and incentives to grow livestock industries and promote economic development was even greater. By the start of the 2000s, the severity and awareness of the degradation issue at the central level combined with a maturation of livestock industries saw more emphasis in dealing with grassland condition, both from an environmental perspective and from a livestock productivity perspective. A new grassland law in 2002 ushered in huge investments and programmes to deal with grassland problems.

China's approach to dealing with agri-environmental problems was also changing. In the central planning and pre-2000s period, the approach was largely command and control (Rozelle et al. 1997). However China began to explore and develop more market-based incentive policies in the 2000s

to deal with agri-environmental problems (Zhang et al. 2010). This was most evident in the 'Grain for Green' programme (Bennett et al. 2008) that sought to provide incentives to convert cropping land to forestry and some perennial crops. However parallel programmes targeting grasslands, namely the 'Reduce Grazing Return Grasslands' programme (Brown et al. 2008, Chapter 4) were also implemented. This programme was the forerunner to the more formalised and widely implemented grazing bans, reward balance programmes and eco-compensation measures introduced in 2011 and which have continued largely unaltered in the 13th Five Year Plan and which are the focus of the Chinese analysis in this book. One incentive related issue associated with the current programmes is that herders see payments from these programmes as entitlements or welfare payments rather than as any specific link to environmental stewardship or grazing practices. Strengthening these incentives and making a stronger connection between the payments and herders' use of the grasslands is a goal of and challenge for policy makers.

Although the grazing restrictions and eco-compensation measures of the 2000s, along with the increased urgency and attention focused on the issue by governments, sought to control grazing pressure, other incentives also had a significant impact, highlighting the need for a holistic perspective of the incentives. Specifically, a dramatic increase in meat prices in 2007–08 and again in 2012–13 threatened to derail the measures designed to restrict grazing pressure by increasing the opportunity costs for herders to restrict their grazing and to comply with the programmes.

Similarly there is no shortage of examples about the impact of policies and incentives on grassland management and condition in Mongolia. Privatisation reforms, limited urban employment and laws supporting freedom of movement in the early 1990s led to many urban households shifting to the countryside to secure livelihoods, creating enormous pressure on the steppe grasslands in and around the urban centres and particularly Ulaanbaatar. Two decades later the urban–rural population flow has been reversing as herders and their children increasingly move into regional centres and the capital (Bukhbat 2017). With Ulaanbaatar's population now accounting for over a third of the country, this has created markets and market segments for various ruminant livestock products in the capital. In response many herders have sought to relocate to grassland areas closer to Ulaanbaatar to take advantage of the market opportunities, placing enormous pressure on these grasslands.

Other market related policies in Mongolia also impact upon herder behaviour and livestock and grazing management decisions. In the 2010s, a series of product market subsidies (wool, cashmere and skins) have distorted herder decisions, changing the mix of grazing livestock (see

Chapter 5). Policy related responses to *dzuds* or extreme weather events include livestock index insurance, fodder storage and rules relating to reserve grazing areas, and have also influenced herder behaviour. This book is about improving our understanding of these incentives and the factors that impact on incentives and the influence they exert.

1.4 AN INTERDISCIPLINARY APPROACH

The analysis of incentives and policies influencing grassland management in China and Mongolia reported in the book is based on an interdisciplinary approach, drawing on research from a large interdisciplinary and multi-country research project.¹ The project involves environmental, resource and agricultural economists, grassland scientists, rangeland ecologists, social scientists and bioeconomic modellers from China, Mongolia and Australia.

A highly simplified diagrammatic representation of the interdisciplinary approach is provided in Figure 1.1 along with a mapping to the book chapters. Previous and current incentives and policy measures designed to influence herder behaviour and livestock and grazing management practices are outlined in Chapter 2 along with the formal and informal institutions that impact upon the implementation of these policies. The behavioural responses of herders not only depend on the income impacts of the policies but also on how the policies impact upon livelihoods, household objectives, and the attitudes and perceptions of herders and other grassland actors, as discussed in Chapter 6. The behavioural responses are not just in response to specific grassland policies but also to market incentives, discussed in Chapter 5, which in turn can be targeted or influenced by government policies.

Grazing and livestock practices of herders impact on grassland ecology and productivity, including biomass production, species composition and vegetation cover. However grassland productivity also depends on the underlying biophysical relationships characterising particular grasslands as well as on climate, as outlined in Chapter 3. Well managed grasslands provide a variety of environmental services including vegetation cover to restrict dust storms, improved water quality through reduced run-off and sedimentation, lower greenhouse gas emissions and better biodiversity. The state of these current environmental attributes and services as well as the linkage between them are highlighted and discussed in Chapter 4. A bioeconomic model outlined in section 3.5 of Chapter 3 has been developed to model the relationships between grazing and livestock practices, grassland attributes and environmental services, and to estimate the opportunity costs for herders in changing livestock or grazing practices.

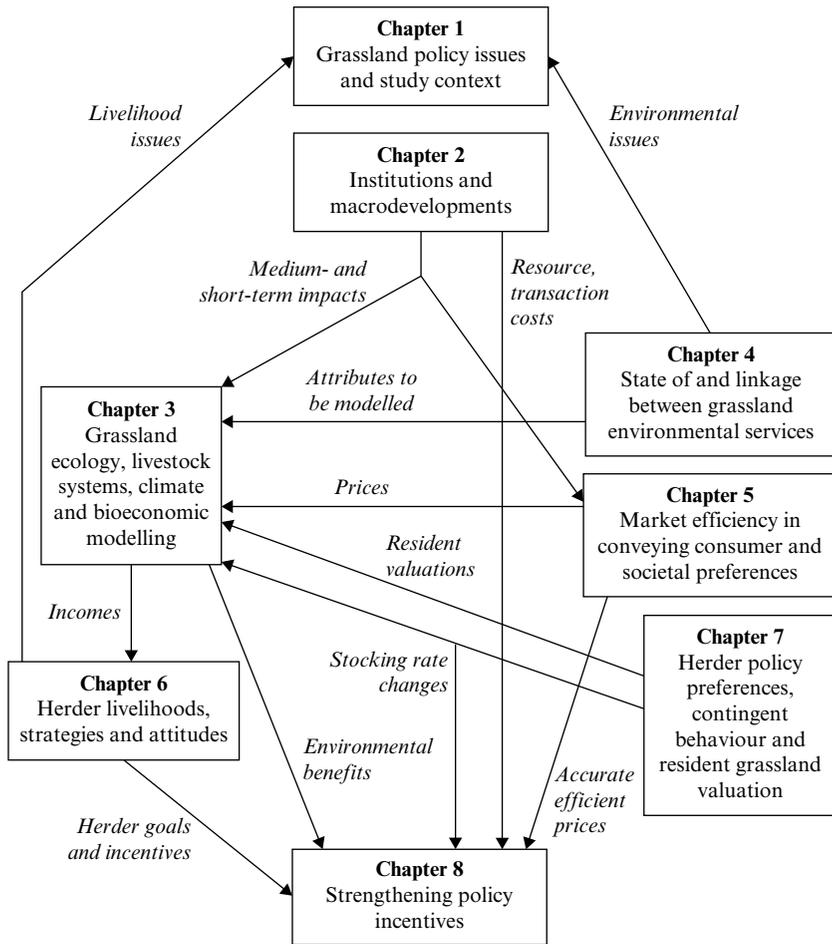


Figure 1.1 Interdisciplinary approach

While herder attitudes to changing institutional settings and policies are described in Chapter 6, the behavioural response of herders in terms of changes in their livestock numbers is an empirical matter. Choice modelling and contingent behaviour analyses reported in Chapter 7 reveal herder preferences for particular policies, along with their behavioural responses to changes in these policies. Choice modelling is also used to estimate resident valuations on changes in grassland attributes and environmental services. The model described in Chapter 3 (section 3.5) is then used to estimate the change in grassland attributes associated with changing

livestock numbers. When combined with residents' valuations of changes in grassland attributes and scaled accordingly, the analysis can reveal the environmental benefits arising from changes in grassland policies.

The behavioural responses of herders and value of environmental benefits of changing policies identified in Chapter 7, combined with an estimate of the transaction costs and political feasibility of implementing these changes discussed in Chapter 2, are used in Chapter 8 to discuss the effectiveness of alternative policies in achieving the desired environmental and livelihood goals. This discussion of how incentives for improved grassland management and herder livelihoods can be strengthened also draws heavily on the discussion of herders as agents of change in Chapter 6, and on the biophysical and land management impacts described in Chapter 3.

1.5 SCOPE OF THE STUDY

A plethora of grassland types exist in China and Mongolia. However as mentioned above, the focus of the analysis in this book is on the typical steppe (steppe in Mongolia) and desert steppe, and details about these grassland types appear in Chapter 3. There are other interesting grassland types for comparative analysis, including the transhumant mountain systems in north-west China and south-west Mongolia, and the systems in the Gobi Desert in both Mongolia and China (see Addison 2012). The issues, challenges and systems for these grassland types and pastoral systems, while fascinating in their own right, differ to those in the typical and desert steppe. However a single monograph cannot do justice to a comparative analysis of all systems and so the focus is on the main grassland types, namely the desert and typical steppes.

While limiting the scope, there are good reasons for focusing on typical and desert steppe. First, these grassland types represent key grassland areas that support the livelihoods of a large proportion of overall herders. Second, these grasslands are or have been the most degraded of the grasslands, the typical steppe grasslands in particular. The Han population resettlements into grassland areas in Inner Mongolia in the 1950s and 1960s were often in the typical and desert steppe areas in Inner Mongolia, and the combination of greater human population and corresponding livestock population pressure as well as more crop cultivation led to increased grazing pressure and decline in grassland condition. Similarly the movement of households to the countryside in the early 1990s in Mongolia often occurred in typical steppe areas. The historical legacy still impacts upon human population and grazing pressures in these areas,

while current forces such as the lure of the more lucrative Ulaanbaatar market continue to impose pressures on the typical steppe grasslands surrounding the capital.

NOTE

1. The primary information and analysis drawn upon in the book is from research done as part of a collaborative research project entitled 'Strengthening Incentives for Improved Grassland Management in China and Mongolia' and funded by the Australian Centre for International Agricultural Research (ACIAR), ACIAR project ADP/2012/107. The project involves grassland scientists and economists from The University of Queensland; Charles Sturt University; Australian National University; James Cook University; the Research Institute of Animal Husbandry and School of Economics and Business at Mongolia University of Life Sciences; the College of Economics and Management and College of Grasslands, Resources and Environment at Inner Mongolia Agricultural University; and the Institute for Grassland Research at the Chinese Academy of Agricultural Sciences.

REFERENCES

- Addison, J. (2012), 'Institutional settings, herder livelihoods and rangeland condition in the Gobi Desert', PhD thesis, St Lucia: University of Queensland.
- Bennett, J., X. Wang and L. Zhang (2008), *Environmental Protection in China: Land-Use Management*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.
- Brown, C.G., S.A. Waldron and J.W. Longworth (2008), *Sustainable Development in Western China: Managing People, Livestock and Grasslands in Pastoral Areas*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.
- Brown, C.G., S.A. Waldron and J.W. Longworth (2013), 'Adaptation to changing institutional, market and biophysical environments: the case of China's grasslands', in *Proceedings of 22nd International Grassland Congress – Revitalising Grasslands to Sustain our Communities*, Sydney: New South Wales Department of Primary Industry, pp. 1819–25.
- Bukhbat, D. (2017), 'Rural–urban migration in Mongolia', MA dissertation, University of Gottingen.
- Findlay, C. (1992), *Challenges of Economic Reform and Industrial Growth: China's Wool War*, Sydney: Allen & Unwin.
- Kemp, D. and D. Michalk (eds) (2011), *Development of Sustainable Livestock Systems on Grasslands in North-western China*, ACIAR Proceedings 134, Canberra: Australian Centre for International Agricultural Research.
- Longworth, J.W. and C.G. Brown (1995), *Agribusiness Reforms in China: The Case of Wool*, Wallingford: CAB International.
- Longworth, J.W. and G.J. Williamson (1993), *China's Pastoral Region: Sheep and Wool, Minority Nationalities, Rangeland Degradation and Sustainable Development*, Wallingford: CAB International.
- Longworth, J.W., C.G. Brown and S.A. Waldron (2001), *Beef in China: Agribusiness Opportunities and Challenges*, St Lucia: University of Queensland Press.

- MONSIS (Mongolian Statistical Information Service) (2019), 'MONSIS Database', Mongolia National Statistics Office, accessed May 2019 at www.1212.mn.
- Rozelle, S., J. Huang and L. Zhang (1997), 'Poverty, population and environmental degradation in China', *Food Policy*, **22** (3), 229–51.
- Waldron, S.A., C.G. Brown and A. Komarek (2014), 'The Chinese cashmere industry: a global value chain analysis', *Development Policy Review*, **32** (5), 589–610.
- Waldron, S., C. Brown, J. Longworth and C.G. Zhang (2007), *China's Livestock Revolution: Agribusiness and Policy Developments in the Sheep Meat Industry*, Wallingford: CAB International.
- Zhang, B., W. Li and G. Xie (2010), 'Ecosystem services research in China: progress and perspective', *Ecological Economics*, **69** (7), 1389–95.