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Grupo de Análisis para el Desarrollo (GRADE)

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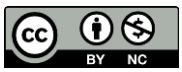

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Summary

This paper analyses how land tenure regimes of pastoralist societies living in the Andean *altiplano* have transformed over the last 50 years. It also discusses the implications of these transformations for the sustainability of resource management in these areas. Building on the framework proposed by Schlager and Ostrom (1992), this study employs a historical institutional analysis method to examine a specific case study: the land tenure regimes in the highlands of Caylloma Province in Arequipa, Peru. It considers changes to land tenure regimes and the main drivers and then explores the implications of these processes for the sustainability of resource management. The analysis identifies new land tenure regimes and considers their impact on the sustainability of the pastoralist way of life in the long term. Drawing on the research findings, a number of policy recommendations are suggested to mitigate these impacts for pastoralist societies.

Keywords: Land tenure regimes, pastoralist societies, Andean *altiplano*, sustainable resource management

The authors are senior researchers at GRADE.

Gerardo Damonte leads projects in three interrelated thematic areas: extractive industries and rural society, climate change, and water resources socio political issues.

Manuel Glave is a specialist in rural development, environmental and natural resources economy, peasant production systems in mountainous ecosystems and the analysis of public policies on agriculture and the environment.

Sandra Rodríguez is a research assistant at GRADE, specialising in issues of political ecology, conservation policies and rural development.

Andrea Ramos is a research assistant at GRADE working on projects related with rural development and agriculture; and natural resources, extractive industries and social conflict.

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Acknowledgements

Regional Evidence Papers are an output of the ELLA Programme. They contain an overview of regional evidence, as well as original data collection and analysis, on a particular research topic. A pair of Regional Evidence Papers are produced on each topic, one focused on Latin America and one on Africa, using a common research question and design. This Regional Evidence Paper is paired with a sister paper whose title is *The Evolution of Collective Land Access Regimes in Pastoralist Societies: Lessons from East African Countries*, authored by Tegemeo Institute of Agricultural Policy and Development, Egerton University in Kenya. Based on these two regional papers, a Comparative Evidence Paper is constructed, comparing the experiences of the two regions, in order to support inter-regional lesson-learning. All publications can be found in the ELLA programme website.

Executive Summary

Much has been said about the importance of pastoralist livelihoods for the effective and sustainable use of drylands around the world. Yet, pastoralist societies are experiencing more pressures to their way of life than ever before. These pressures and changing trends are jeopardising pastoralist livelihoods as well as the sustainability of dryland resources.

In the face of this challenging reality, this paper aims to analyse how land tenure regimes of pastoralist societies living in the Andean *altiplano* have transformed over the last 50 years. It also discusses the implications of these transformations for the sustainability of resource management in these areas, based on the premise that a better understanding of customary land tenure regimes can help to inform public policy and decision making.

There is a tendency amongst traditional pastoralist societies to treat grasslands as common-pool resources which are accessed, used and controlled collectively, usually under open access or communal land tenure regimes. The present analysis is based on the theoretical framework proposed by Schlager and Ostrom (1992) to distinguish between the diverse bundle of rights held by the users of common-pool resources. On this basis, a typology of land tenure regimes has been devised to analyse those present in Andean pastoralist societies.

Building on this framework, this study employs a historical institutional analysis method to examine a specific case study: the land tenure regimes in the highlands of Caylloma Province in Arequipa, Peru. First we explain changes to land tenure regimes and the main drivers. Next, we explore the implications of these processes for the sustainability of resource management. Caylloma Province was selected because it has a long history of pastoralist use and it is the subject of previous studies, thereby making it possible to analyse changes in land tenure regimes.

Findings show that land tenure regimes in pastoralist societies have changed over time in order to adapt to new environmental, political and economic conditions. In the case of Caylloma Province, the two main external drivers for change have been state intervention and market development.

The dynamics of change in land tenure are nonlinear. Despite changes in external conditions some resilient land tenure regimes have persisted over the last 50 years. Specifically, two types of resilient land tenure system have been identified: the Condominium (F/F) and the Communal Condominium (C/F). In both systems, operational level rights are held on a family basis which means that the legitimacy of any pastoralist's access to land is based on belonging to a family corporate group. Likewise in both systems, collective-choice level rights – pertaining to management, exclusion and alienation issues – rest in the hands of collectives: in the first case (F/F) a familial corporate group and in the second (C/F) a communal corporate group.

The analysis also shows that over the last two decades a growing tendency has emerged whereby family-based rights – from the extended to the nuclear family – have become more restricted at both operational and collective choice levels. In accordance with this tendency a new model of land tenure has emerged – the Individual regime (I/I) – under which operational and collective-choice level rights are held solely by the household. This paper argues that these new land tenure regimes will negatively affect the sustainability of the pastoralist way of life in the long term, unless the state intervenes. Otherwise, the social costs associated with these changes may continue to diminish the viability of pastoralism.

Based on these findings, it is recommended that government policies should (1) take into account the variety and complexity of customary land tenure regimes found in pastoralist societies; (2) recognise that despite their sensitivity to state intervention and market development, the communal and extended family land tenure regimes have demonstrated greater resilience because they better support pastoralist productive systems; (3) promote collective land tenure regimes by stimulating the formation of herders' associations as a way of improving access to collective pastures; (4) promote integrated programmes for improving alpaca genetics and supporting sustainable resource management practices; (5) invest in technological improvement to help herders cope with growing resource deterioration in the *altiplano*; and (6) be developed based on a clear understanding of how pastoralist activities impact on the environment and on how pastoralists, especially the poorest and most vulnerable, are being affected by climate change.

1 Introduction

Much has been said about the importance of pastoralist livelihoods for the effective and sustainable use of the world's drylands which cover approximately 40 per cent of total land surface. Globally, drylands provide livelihoods to some two billion people, 90 per cent of whom live in developing countries (UN 2011). Pastoralism is the principle production system exercised in drylands across the globe, largely because pastoralist practices maximise the use of scarce energetic resources through animal grazing while at the same time preserving ecosystem services. Yet pastoralist societies around the world are facing increasing pressures on their way of life. Although the drivers vary widely from region to region, they have generally resulted in a trend towards the commoditisation of the pastoral economy, the individualisation of land rights and declining livestock mobility. These trends not only jeopardize the sustainability of pastoral livelihoods, pushing pastoralists into the expanding pockets of poverty in urban areas, they also endanger the sustainability of resource management in drylands.

In the face of these challenges, this paper seeks to analyse how the land tenure regimes of pastoralist societies living in the Andean *altiplano* have transformed. It also discusses the implications of these transformations for the sustainability of resource management, based on the premise that a better understanding of customary land tenure regimes can help inform public policy and decision-making.

In recent decades, the governments of many developing countries and multilateral agencies have promoted land market liberalisation policies based on individual property rights, as part of a wider package of structural reforms promoted by the neoliberal agenda. It was believed that market forces were the key to increasing access to land and improving peasant and native people's livelihoods in these countries. These policies prioritised land titling (or land registration) as a means to guarantee land tenure security and, thus, improve rural livelihoods.

However, liberalisation policies have not delivered the results that were expected, especially among pastoralist societies (Fratktin and Mearns 2003). First, land liberalisation policies have led to land concentration and greater social inequality (Zoomers and van der Haar 2001; Löhr 2012; Ghimire 2001; Jansen and Roquas 1998). For example, marginalised poor communities demonstrate limited ability to participate in land markets (Löhr 2012) and have not necessarily benefitted from increased investment, production and access to credit (Atwood 1990; Deininger and Binswanger 1999; de Janvry and Saudolet 2001; Zoomers and van der Haar 2001; Place 2009; Obeng-Odoom 2012).

In contrast to the neo-liberal perspective, emerging literature suggests that maintaining collective land access rights can actually have positive effects on rural livelihoods. Communities with collective land access can benefit from economies of scale in production, spread the risks and avoid the costs of enforcing individual property rights (Nugent and Sánchez 1998; de Janvry and Sadoulet 2001). Additionally, collective land access can ensure better access to resources for the poor, as well as greater control over common resources and can lay the foundations for the development of mutual insurance regimes through cooperation (de Janvry and Sadoulet 2001; Zoomers 2001; Hvalkof 2008).

Collective forms of land tenure have been an essential component of pastoralist life in the rural Andes throughout history. In Peru, for example, more than 7,500 peasant and native communities maintain communal property and different sorts of collective use rights, controlling 21.5 per cent of the national territory and 60.5 per cent of the land used for

agricultural and livestock production. Discussions around the benefits of collective forms of land tenure have been at the centre of policy debates around rural and agricultural development throughout the twentieth century. After two decades of neoliberal reforms, the question of how to promote efficient and sustainable collective-based resource management is still being debated.

One of the gaps in this discussion relates to the impacts of promoting collective-based resource management on pastoralist communities, since there is limited information about their land tenure regimes and how these have changed over recent decades. Land policies have mostly been designed following international templates based on generalisations about the dynamics of the agricultural sector. Thus, in Peru, for example, no specific policies for pastoralist producers have been developed to date.

Even in the face of global pressure from liberalisation policies for the individualisation of land rights, pastoralist communities around the world have continued to maintain collective tenure regimes. In the case of the Andes, although evidence about changes in land tenure regimes can be found in some existing literature, land tenure has not been the focus of analysis in most previous studies, hence there is limited understanding about the causes and direction of this evolution. Land titling has been shown to enhance tenure security however it is necessary to first understand pastoralist land tenure regimes, and their drivers, in order to design and implement adequate policies that can enhance land tenure governance.

In this context, this study aims to contribute new evidence for policymaking by analysing customary pastoralist land tenure regimes and the ways in which they have changed over time. It is expected that by shifting the analytical focus from property to the customary regimes that actually define land rights in pastoralist communities, this study will be able to support policy making in two ways. First, by informing the design and implementation of specific land policies related to pastoralist communities. Second, it is expected that this study will provide information that will support state agencies to become more aware of the trends of change in land tenure regimes and the effects and sustainability of government policies in terms of pastoralist land access and livelihoods.

2 Research design and methods

2.1 Theoretical framework

Pastoralism is generally defined as the use of extensive grazing in rangelands for livestock production and is one of the main productive systems employed in the world's drylands, which often cannot be used for conventional agriculture due to their limited resources (Blench 2001; Weistreicher *et al.* 2006). Thus a pastoralist society or community can be regarded as 'a social group whose material and cultural reproduction is based on extensive traditional grazing' (Del Pozo-Vergnes 2004). The UNEP estimates that pastoralism is practiced by between 200 and 500 million people worldwide.[1]

There are a number of ways that pastoral societies can be categorised, the most important three criteria being: (i) degree of migratory mobility; (ii) environmental conditions; and (iii) livestock species. The most common categorisation is degree of mobility, which ranges from highly nomadic, through transhumant, to agropastoral (Arbos 1922).[2] According to

[1] UNEP webpage 'Sustainable Pastoralism and Post 2015 Agenda', https://sustainabledevelopment.un.org/content/documents/3777unep.pdf.

[2] Nomadism involves the movement of pastoralists through vast extents of land in order to accompany their herds during migration. Transhumance is the regular movement of herds between fixed points to exploit seasonal availability of pasture. In mountain regions this movement is vertical. Agropastoral communities complement livestock

Galaty and Johnson (1990) a key distinction between pastoralist models relates to the environmental conditions in which they are practised, be it plains, desert, tundra or mountain. Regarding livestock species, pastoralist systems can be divided between those which are essentially based around a single species and those based on the integrated production of several species (Blench 2001).

In America, a distinction can generally be made between those areas where pastoralism developed after the European conquest, such as in North America and South American lowlands, and those areas where pastoralism was developed by Amerindian peoples in the pre-Columbian era, such as the Andean highlands or *altiplano*. Andean pastoralism can be categorised as mountain pastoralism and is characterised by vertical stratification of resources by altitude (Gil Montero *et al.* 2009). Living in this environment, Andean mountain herders are transhumant, moving their animals from lowlands to highlands depending on the seasonal availability of pastures. Given that vital resources such as water and pastures are unevenly distributed across this territory, controlling dry season pastures is an essential strategy for the sustainability of pastoralism in the *altiplano*. Residential mobility is somewhat lower in the Andes than in the other regions of the world (Orlove 1982). Andean pastoralism can be considered a multispecies type that involves the raising of a mixture of alpaca, llama and sheep. On the other hand, there is an increasing tendency to specialise in alpaca production to supply the wool industry.

A common trend amongst traditional pastoralist societies around the world is that grasslands tend to be treated as common-pool resources that are accessed, used and controlled collectively, usually under open access or communal land tenure regimes (McCarthy *et al.* 2000). As drylands tend to be too fragile and too variable to be used intensively, pastoralists develop tenure arrangements that allow an extensive mode of production while avoiding the concentration of access to unequally distributed resources. Currently, pastoral societies around the globe are under increasing pressure (Blench 2001; Salzman 2004). Historically, government responses to these pressures focused on the privatisation of communal resources (Blench 2001). However, as other studies have shown, the fragmentation of rangelands complicates the sustainable management of resources (Fratkin and Mearns 2003; Scoones 1995, 1996; Lane 1997).

2.2 Research questions and objectives

The general research question of this study is:

> *How have land tenure regimes changed in pastoralist societies and what are the implications for the sustainability of natural resource management amongst pastoralist societies*?

This general question is complimented by the following four context-specific research questions:

a. What have been the principle characteristics of pastoralist land tenure regimes in the Andean *altiplano*?
b. What changes and consistencies can be observed in these land tenure regimes over time?
c. What are the main drivers for changes in pastoralist land tenure regimes?
d. How sustainable are current pastoralist land tenure regimes in the Andean *altiplano*?

management with agricultural activities; a combination that restricts their degree of mobility. Agropastoralists tend to have smaller flocks as they no longer solely rely on livestock.

2.3 Analytical framework

The unit of analysis of this study is the regimes that govern land tenure in pastoralist societies in the Andean *altiplano*, with a focus on the 50 years between the launch of the Agrarian Reform in the 1960s and present day. The case study of the Caylloma Province in Arequipa, Peru has been selected in order to contextualise the analysis.

The general approach to this study is framed by the extensive literature on common property regimes from different disciplines, mainly economics, political science and anthropology. Specifically, this study is guided by the leading work of Ostrom (1990), Schlager and Ostrom (1992), Ostrom, Gardner and Walker (1994), and their institutional approach to analyse how commons are governed and under which conditions they can function efficiently and sustainably.

The following section provides: (i) definitions of key concepts; (ii) a typology of land tenure regimes; (iii) an explanation of the methods used to analyse processes of change; and (iv) criteria adopted for assessing the implications of changes on sustainable resource management.

2.3.1 Key concepts

Land tenure regimes are institutional configurations that establish the relationship among people, as individual or groups, with respect to land. These institutions function on the basis of a set of rules, rights and duties. Rules are defined as 'generally agreed-upon and enforced prescriptions that require, forbid, or permit specific actions for more than a single individual' (Schlager and Ostrom 1992). Rules produce rights – understood as the particular actions that are authorised – and concomitant duties or associated responsibilities.

A property right is the authority to undertake particular actions relating to a specific domain – in this case land. The fact that there are a variety of property rights that can be held by different people or groups has given rise to the concept 'bundle of rights'. This bundle is generally simplified by identifying use, control and transfer rights (FAO 2002). However, this paper follows the more complex conceptual schema for arraying property rights regimes proposed by Schlager and Ostrom (1992) which distinguishes between the diverse types of right that may be held by the users of common-pool resources.

According to Schlager and Ostrom (1992), individuals engage in both operational (OL) and collective-choice (CCL) levels of action and each level of action is governed by a set of rules. Concerning common-pool resources, the most common operational level property rights are 'access' and 'withdrawal'. Operational rules are changed by collective-choice actions which are undertaken within another set of rules. Whereas operational rights refer to the capability of exercising a right, collective-choice rights refer to the capability of defining future rights to be exercised. In other words, collective-choice rights refer to the authority of devising future operational level rights. In relation to common-pool resources, collective-choice level includes the rights of management, exclusion and alienation. The right of management authorises its holders to devise *how, when* and *where* a resource will be used, in other words, to devise operational level withdrawal rights. On the other hand, the right of exclusion authorises its holders to define *who* will access resources, in other words, to devise operational level access rights. The right of alienation acts upon the collective-choice level itself, and refers to the capacity of its holder to transfer (sell or lease) the rights of management, exclusion, or both. A summary of this bundle of rights can be found in Table 2.1 below.

Table 2.1 Bundle of rights

Operational level (OL)	*Access (A)*	The right to enter a defined physical property
	Withdrawal (W)	The right to obtain 'products' from a resource
Collective-choice level (CCL)	*Management (M)*	The right to regulate internal use patterns and transform the resource by making improvements
	Exclusion (E)	The right to determine who will have access right, and how that right might be transferred
	Alienation (Al)	The right to sell or lease either or both of the above collective-choice rights

Source: Authors' own elaboration, based on Schlager and Ostrom (1992).

2.3.2 Typology of land tenure regimes

Based on Schlager and Ostrom's definition of bundle of rights, Villaroel *et al.* (2014) developed a framework to analyse the use of land and water resources within a pastoralist Aymara *ayllu* – a traditional form of organisation that governs decisions around regional land use – in Sajama, Bolivia. Having identified that each of these rights can be held on an individual, family or communal basis, Villaroel *et al.* develop models of what they call 'local territorial management', defined as systems of collective control and regulation of individual and collective access to and use of natural resources.

With these typologies in mind, land tenure regimes can be defined as systems of individual or collective control and regulation (collective-choice level rights) of individual or collective access and use (operational level rights) of land. Based on this definition, a conceptual matrix has been designed for this study to provide a typology of land tenure regimes that combine both levels of action and land rights held on an individual, family, communal or external basis. The category 'individual' refers specifically to the household whereas 'family' refers to the nuclear (first degree) and extended (from the second degree onwards) family. The category 'community' refers to formal institutions that group pastoralist families and 'external' refers to an agent outside the household, family or community that exerts its power over them, for example, a *hacienda* owner.

This matrix, shown in Table 2.2 below, is highly simplified and is intended as a heuristic device for exploring variation. Each land tenure regime (LTR) can be analysed by identifying the rights it contains, as shown in Table 2.3 for three types of LTR. Table 2.3 also shows that for certain LTR, it is possible that a specific type of right is shared between the family and the community (F+C), or that a household is granted right of withdrawal by an external agent (I+E).

Table 2.2 Types of land tenure regime (LTR)

	Operational level rights		
Collective-choice level rights	**Individual (I)**	**Family (F)**	**Community (C)**
Individual (I)	Individual/individual		
Family (F)	Family/individual	Family/family	
Community (C)	Community/individual	Community/family	Community/community
External (E)	External/individual	External/family	External/community

Source: Authors' own elaboration.

Table 2.3 LTR characterisation

Bundle of rights	Land tenure regimes		
	Family/family	Community/family	External/family
Access	F	F	F
Withdrawal	I	F	I+E
Management	F	F+C	E
Exclusion	F	F+C	E
Alienation	F	C	E

Source: Authors' own elaboration.

2.3.3 Analysing change

Using a historical institutional analysis method (Greif 1998; Mahoney and Thelen 2010; Thelen 2003) this study intends to identify the processes and drivers of change in the land tenure regimes of Caylloma Province in Arequipa. The analysis covers a period of 50 years, dating back to the 1960s when the Agrarian Reform was launched in Peru until present day. In order to contextualise these changes, the study provides a brief description of the historical background to the case study using secondary information such as historical studies and ethnographies.

To analyse changes over time, the temporal framework is divided into specific periods with each period encompassing a combination of land tenure regimes different to the previous one. The aim is to explain the rationale behind these institutional changes based on primary information gathered through quantitative (analysis of census data) and qualitative methods (semi-structured interviews and focus group discussions), and secondary information, specifically ethnographical studies and reports published by the Peruvian government and non-governmental organisations (NGOs).

A second objective is to understand the linkages between these changes by identifying the main drivers. Furthermore, this study aims to understand how these drivers function in combination, since they may not induce changes independently of one another.

Table 2.4 below presents the dynamics of these changes by connecting the types of land tenure regimes found in a specific period of time to the subsequent period with an arrow. By means of providing an example, Table 2.4 shows that the land tenure regimes found in the first period are C/I and F/F. In the subsequent period, the land tenure regime F/F evolves simultaneously into two different types of land tenure regimes – I/I and C/C – while the land tenure regime C/I remains constant.

Table 2.4 Dynamics of change in LTR

Operational level

Collective-choice level	Individual	Family	Community
Individual	I/I		
Family		F/F	
Community	C/I		C/C
External			

Source: Authors' own elaboration.

As each dynamic of change is identified, the explanation will be expanded using Table 2.3, showing in detail how the basis of each bundle of rights has been modified.

2.3.4 Assessing sustainability

This study assesses the sustainability of pastoralist land tenure regimes in institutional terms and taking into account the implications for natural resource management. For assessing institutional sustainability, the institutional features that lead to a regime change will be identified. This assessment is only carried out for the land tenure regimes present in the 50-year period covered by this study, since insufficient information exists for previous periods.

2.4 Data collection methodology

2.4.1 Case study

This study analyses the land tenure regimes found in the highlands of the province of Caylloma, located in the southern Peruvian region of Arequipa. This case study was selected for the following reasons:

1. Caylloma province is home to the largest number of alpacas in Peru. This figure stood at 312,525 in 2012 representing 8.48 per cent of the national total (IV CENAGRO;[3] INEI 2012).
2. Caylloma is the Peruvian province with the largest area of pastures, totalling 848,761 h.a (IV CENAGRO; INEI 2012)
3. Caylloma has a long history of pastoralist production and links with the wool export market. It is therefore considered one of the most important regions for pastoralist production in the Andean *altiplano.*
4. Secondary data are already available since some ethnographic and other technical studies have already been carried out on several pastoralist communities in this province.
5. The territorial characteristics of the province are not uniform, and different types of land tenure regimes have existed over time and currently exist side by side. This provides the opportunity to analyse a variety of land tenure regimes in the *altiplano* and how they coexist in the face of different conditions.

2.4.2 Data collection

This study mainly follows a qualitative approach for two reasons. First, qualitative data are required to grasp the rationale behind the establishment and evolution of land tenure regimes. Second, there is insufficient statistical data available for carrying out a robust quantitative analysis. As such, quantitative data from secondary sources have been used to contextualise the case study and complement the qualitative data collected.

Initially, more than 50 studies on Andean pastoralist societies in Argentina, Chile, Bolivia and especially Peru were reviewed. Simultaneously, four academic experts on land issues were interviewed, together with six government specialists from different divisions of rural development and livestock management within the Peruvian Ministry of Agriculture (MINAGRI).

During the second stage of data collection, a weeklong fieldwork visit was conducted in Arequipa and Caylloma province. In Arequipa, secondary data were collected from regional government agencies and NGOs working in the area. Likewise, interviews were conducted with three regional government officials, two NGO specialists on the pastoralist area of Arequipa, two representatives of the biggest Peruvian fibre exporter companies, and the head of a cooperative of herders from Caylloma province.

In Caylloma, qualitative instruments were used to collect primary data. Data sheets were completed specifying herd and pasture management practices within 16 pastoralist

[3] Peruvian National Agricultural Census.

households. In addition, 17 semi-structured interviews were carried out with herders, and eight focus group discussions were held in Callalli (2), Caylloma (3) and Imata (3) districts. All non-referenced information comes from these primary sources.

3 Regional evidence synthesis

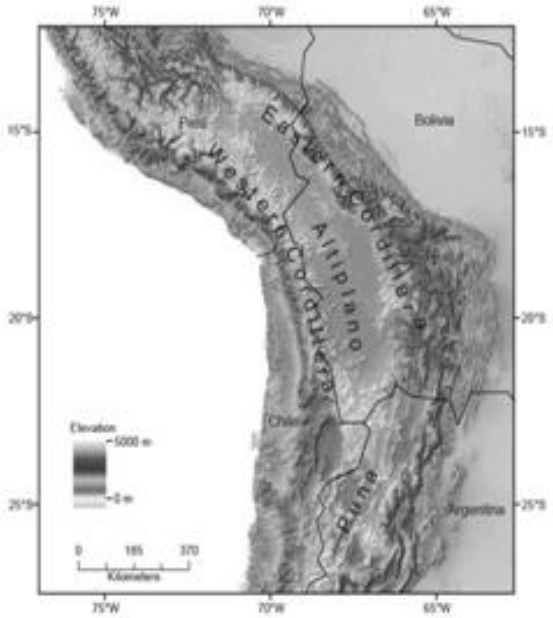
This paper focuses on a highland plain in the central Andean region of South America known as the *altiplano* which includes parts of Peru, Bolivia, Chile and Argentina (see Box 3.1 and Figure 3.1). Most of the traditional pastoralist societies in Latin America have lived on the *altiplano* since pre-Columbian times, although there is evidence of the existence of other pastoralist societies in the region such as in northern Brazil (Blench 2001), the Eastern part of the Colombian Cordillera (Etter and Villa 2000) and in the Cordillera of Merida in Venezuela (Molinillo and Monasterio 1997). Pastoralist communities in the *altiplano* are comparable with traditional pastoralist communities in other parts of the world since they have maintained some collective land rights under customary land tenure regimes, which have been developed in order to adapt to semi-arid environments and global changes. Thus, lessons learned from the experiences of *altiplano* communities can support better understanding of other pastoralist communities across the region and around the world.

Box 3.1 Regions of the *altiplano*

- Western Bolivia: La Paz, Cochabamba, Chuquisaca, Oruro, Potosí and Tarija
- Southern Peru: Puno, Arequipa, Cusco, Moquegua and Tacna
- Northern Chile: The highlands of the Tarapacá, Antofagasta and Atacama
- Northwestern Argentina: Jujuy, Salta, Tucumán, Catamarca, La Rioja and Santiago del Estero

Sources: Civallero (2012); Ministerio del Interior y Transporte de Argentina (n.d.); Faúndez and Escobar (2007).

Figure 3.1 Map of the *altiplano*



Source: Authors' own elaboration, by Karla Vergara (GRADE), based on data from Jarvis *et al.* (2008) (http://srtm.csi.cgiar.org).

3.1 Overview of the *altiplano*

The *altiplano* covers around 250,000km² and reaches over 3,500 m.a.s.l. The region is dominated in the west by the massive peaks of active volcanoes reaching heights between 5,000 and 6,000 m.a.s.l. (Browman 1983; Gade 1999). The Atacama Desert lies to the south-west, in Chile, while in contrast the humid Amazon rainforest is to be found in the east.

The climate in the *altiplano* is characterised by a long dry season, irregular precipitation and low temperatures with frequent frosts creating severe limitations for agriculture and as a consequence, hindering economic development (Sumar 1998). The *altiplano* ecosystem can be described as an Andean dry steppe where grasses predominate (Cueto *et al*. 1985), which, according to Tosi (1960), includes two types of vegetation: subalpine desert scrub and alpine humid tundra. Three main types of native pastures of different quality can be found: *tolar* (dry with low heather-like vegetation), *pajonal* (fairly dry with tall grasses) and *bofedal* (wet with grasses and herbs) (Mocaer 2006).

Throughout the *altiplano* there are marked differences in precipitation between the more humid north and the more arid south. Thus, in the northern regions a greater density of both human and animal populations can be found, as well as high altitude production of crops such as potatoes and quinoa. In contrast, in the south, village settlements are rare and the population is more disperse and mobile (Gil Montero 2009).

Currently, the *altiplano* is home to 17 million inhabitants, the majority of whom live in Bolivia (40.4 per cent), followed by Argentina (28.9 per cent), Peru (23.8 per cent) and a smaller proportion in Chile (6.9 per cent). The regions with the highest percentages of population are La Paz (39.6 per cent) in Bolivia; Puno (31.4 per cent), Cusco (29.0 per cent) and Arequipa (28.5 per cent) in Peru; Tucuman (29.5 per cent) and Salta (24.3 per cent) in Argentina; and Antofagasta (42 per cent) in Chile.

With regards to the distribution of the population by geographic area, Table 3.1 below shows that overall 30.3 per cent live in rural areas. In particular, parts of the *altiplano* belonging to Peru and Bolivia are home to the highest percentages of rural population at 38.4 per cent and 37.9 per cent, respectively. In contrast, in Argentina and Chile the highland population lives mostly in urban areas. This panorama is constantly changing due to the permanent migration of working-age adults to urban areas in recent decades (Mocaer 2006).

Table 3.1 Population by geographic area in the *altiplano*

Country	Urban population	%	Rural population	%
Argentina	3,981,292	81.06	930,120	18.94
Bolivia	4,265,862	62.10	2,603,788	37.90
Chile	1,118,303	95.02	58,611	4.98
Peru	2,490,007	61.60	1,552,454	38.40
Total	11,855,464	69.74	5,144,973	30.26

Sources: Authors' own elaboration, based on INDEC (2010); INE Bolivia (2012); INE Chile (2002); INEI Peru (2007).

This territory is home to an important sized indigenous population estimated at 6,277,106 people, representing 36.9 per cent of the total population of the *altiplano*, as shown in Table 3.2 below. However, the indigenous population is only significant in Bolivia and Peru, where it represents 52.8 per cent and 59.4 per cent of total population in the *altiplano*, respectively. These numbers are only an estimate because the definition of 'indigenous population' varies between countries.

Table 3.2 Native population in the *altiplano*

Country	Indigenous population	%
Argentina [1]	173,436	3.53
Bolivia [2]	3,624,358	52.76
Chile [3]	79,857	6.79
Peru [4]	2,399,455	59.36
Total	6,277,106	36.92

Notes: [1] Indigenous people are considered those who recognise themselves as indigenous descendants or people who belong to an officially recognised indigenous or native community (INDEC 2010); [2] Anyone belonging to any of the indigenous or native communities (INE Bolivia 2001); [3] Anyone belonging to any of the indigenous or native communities (INE Chile 2002); [4] In Peru, the indigenous population is considered as those people living in a household whose head is a native speaker of an indigenous language, such as Quechua, Aymara, or any other native language (INEI 2007).

The majority of the production systems in the *altiplano* are mixed crop-livestock. Livestock plays an important role in the sustainability of these heterogeneous production systems because it is less susceptible to widespread climatic risks than crops. Furthermore, animals represent the main economic asset and work as a capital fund, an important source of food, traction, fertiliser, and as a means of transport to link with local markets. As a consequence, the main source of income for families living in the *altiplano* is pastoralism with mixed herds of South American camelids, sheep, cattle and goats (Kuznar 1991). Yet while some families can breed different livestock species, cultivate land and produce dairy, those living at the highest altitudes can only rely on camelid herding.

Camelids can be found in all the countries of the *altiplano*. As shown in Table 3.3 below, domesticated animals (llamas and alpacas) far outnumber wild species such as vicuñas and guanacos. Comparing these figures with those estimated by the Camelids Census of 1990 (for Argentina and Peru) and of 1989 (for Bolivia and Chile), it can be observed that the total population of alpacas has increased by 34.4 per cent, llamas by 30.2 per cent, vicuñas by 135.1 per cent and guanaco by 10.3 per cent. The increase in the population of wild camelids is related to improvements in conservation policies (such as the creation of nature reserves and hunting bans) applied as a response to dangerous reductions in numbers during the early 1960s as a result of indiscriminate hunting for fibre and to free-up pastures (in areas where wild camelids coexisted with other livestock) (Lichtenstein 2009).

Table 3.3 Population estimates for two wild and two domesticated species of camelids in Peru, Bolivia, Chile and Argentina

Country	South American camelids			
	Alpaca	Llama	Vicuña	Guanaco
Argentina	less than 1,000 [1]	161,402 [2]	127,072 [3]	401,612 [4]
Bolivia	373,907 [5]	2,628,091 [5]	112,250 [6]	54 [7]
Chile	26,147 [8]	48,989 [8]	27,921 [9]	27,150 [9]
Peru	3,685,516 [10]	1,192,953 [10]	208,899 [11]	3,810 [12]

Notes: [1] Subsecretaría de Ganadería de Argentina (2008); [2] INDEC (2002); [3] Secretaría de Ambiente y Desarrollo Sostenible de Argentina (2008); [4] Estimation of the density of guanacos in Patagonia. Amaya *et al.* (2001); [5] INE Bolivia (2008); [6] Censo Nacional de Vicuñas (2009) in Maydama (2012); [7] Scherf (1997); [8] INDEC Chile (2008); [9] Parraguez *et al*. (2004), in Quispe *et al*. (2009); [10] INEI (2012); [11] MINAGRI (2012); [12] Censo Nacional de Guanacos (CONACS) (1996) in INEI (2014b).

In the *altiplano*, the living conditions of herders are rather precarious, natural resources are often damaged by over-exploitation, particularly overgrazing, and a shrinking population of animals per family prevents them from reaching the means necessary for subsistence

(Yeckting 2008). Another unfavourable aspect faced by these families is the increasing climatic phenomena of drought and frost. Against this backdrop, an increasing number of pastoralists are trying to provide better living conditions for their families from beyond their communities, that is, in nearby towns and cities, where they migrate temporarily or permanently searching for additional income and better education.

3.2 Pastoralist societies in the Andean *altiplano*

Pastoralism in the South American region was virtually ignored until the 1960s since it was believed that this production system could only be found in the 'Old World'. And while now it is known that South American pastoralism is extremely ancient (Rick 1980), in comparison with other regions, publications on Andean pastoralism are few and far between.

In South America, pastoralism is concentrated in the semi-arid Andean region ranging between 3,700 and 5,000 m.a.s.l. Although this habitat is not uniform, two major zones can be distinguished where this type of herding is practiced: (i) the central and southern Peruvian highlands; and (ii) the Bolivian *altiplano*, the north of Chile and the north-west of Argentina.[4]

3.2.1 A brief history of Andean pastoralism

The pioneering work of Flores Ochoa (1968) and Nachtigall (1966) ended the myth that exclusively pastoralist Andean societies did not exist. In the same way, historical and archaeological research (Rick 1980) demonstrated that contemporary pastoralism was an echo of a native culture tightly linked with camelid herding, and not merely a cultural borrowing from European traditions. Indeed, the Andean highlands are now recognised as one the most important centres of mammal domestication in the world (Browman 1989; Mengoni and Yacobaccio 2006).The native people of the Andes domesticated the vicuña and the guanaco (around 5,000 and 7,000 years ago respectively), and subsequently developed llama and alpaca from these species through selective breeding.

In the *altiplano* a wide range of ethnic and linguistic variety exists. The people living there had been conquered by the Incas probably just a few decades before the arrival of the Spanish (Pärssinen 2003). During Inca rule, pastoral communities of the *altiplano* were obliged to designate herds to the Inca and the Sun God, as well as for special lineages and individuals. These animals were used for wool and meat, as means of transportation and for military purposes. Successive conquest and civil wars dramatically affected the inhabitants of the region, resulting in considerable population migration and resettlement (Gil Montero 2009).

With the incorporation of the Andes into the Spanish empire, the regions where pastoralists lived turned into the very centre of economic and political activity and herding populations became indispensable economic agents (Gil Montero 2009). It was in the *altiplano* where the main economic activity of the *conquistadores*, mining, was carried out. The two new mining centres – one in the central Peruvian highlands and the other in the Bolivian *altiplano* – not only depended on the herding population to work in the mine shafts and transport minerals and other supplies to and from mining areas, but also for their production of wool. With the establishment of mines came the founding of cities and towns where the colonial authorities resided. These cities also depended on pastoralists to transport much of their food and supplies. Even after the decline of mineral production, these urban centres continued to be dependent on indigenous producers since herders' caravans continued to provide the principal means of transportation until the twentieth century.

[4] Another type of pastoralism can also be found in the central-north of Chile and south Argentina. However, these areas cannot be considered '*altiplano*' for geographical reasons. Furthermore, pastoralists herd different animal species there, specifically goats and sheep.

The early republican period is characterised by the development and expansion of private estates known as '*haciendas*'. In a context where indigenous lands lacked any formal institutional recognition, increasing demand over land caused by the intensification of population growth and market expansion, resulted in the retreat of indigenous territories in favour of Creole families.[5] In what are nowadays the southern Peruvian highlands and the Bolivian *altiplano*, this expansion was driven by the steadily growing importance of alpaca fibre for the exportation market. Emerging for the first time in 1834, this market was consolidated throughout the nineteenth century and remained the main productive sector of the Peruvian south until 1960 (Flores Galindo 1993 [1977]; Thorp and Bertram 1985).[6] In this sector, the encroachment of *haciendas* into indigenous territory was chosen as the principle strategy for responding to increasing demand rather than investment in technological transformation. Unlike other industries, such as sugar cane production in northern Peru, the expansion of this commercial capital did not lead to the modernisation of livestock production or the transformation of relations of production. On the contrary, its expansion strengthened a low productivity and low profitability regime of land and labour exploitation called *gamonalismo* (Valdivia 2013; Yepes 1979; Thorp and Bertram 1985).

During the mid-twentieth century, rural areas were profoundly transformed by a wave of agrarian reforms implemented across the region. In the *altiplano*, all the countries except for Argentina launched agrarian reforms as government policy during the 1950s and 1960s. According to some authors (Browman 1982, 1984; Gómez 1977; Mejía 1977), despite its 'modernising' features, the production model proposed by the reforms did not change the fundamental forces of the agricultural structure and the social relations of production persisted, or in other words, the state supplanted the *hacendado*. In Bolivia and Peru, this situation led to the collapse of the proposed production models and successive land invasions since 1977. On the social front, however, the reforms had significant impacts beyond the redistribution of land, such as providing official legitimacy to traditional forms of social and political organisation at the local level in Peru and Bolivia, for example, peasant communities and *ayllus*.

Until the 1990s, the governments of Bolivia and Peru focused on implementing protectionist policies for the fibre sector. For example, during the 1970s, both governments tried to intervene in the wool market through the creation of social properties in the case of Peru, and a national enterprise in the case of Bolivia, to buy wool and improve the price. Although weak and ineffective, the policies implemented in these two countries went considerably further than what had been developed in Chile and Argentina. After the 1990s, the approach of government policies towards pastoralist societies changed. With the advent of the neoliberal era, the focus on implementing policies to boost productive capacities was abandoned. Instead, as Valdivia (2013) explains, pastoralist spaces are no longer considered part of agricultural development policy; nowadays they are included within poverty relief programmes.

3.2.2 Pastoralist economy and production

Andean pastoralism represents a cultural adaptation to the ecological conditions of the *altiplano*, a semi-arid grassland ecosystem that can support grazing animals yet is poorly suited to agriculture (Browman 1974; Flores Ochoa 1975). This adaptation process is marked by limited technical development and high dependence on forage, which is why Andean camelid herders are considered pastoralists before breeders (Charbonneau 2009).

[5] This process was even more aggressive during the first century of republican rule, as indigenous land was not officially recognised until 1925 (Sendón 2008).

[6] In Bolivia, the wool market system appears to have developed as an adjunct to the southern Peruvian one. Therefore, there was no economic centre – such as Arequipa – developed around the wool market in Bolivia.

The pastoralist system is based on an interdependent double-pronged strategy: specialisation and articulation (Flores Ochoa 1975; Browman 1974; Custred 1977). The main strategy consists of maximising scarce energetic resources through animal grazing. Pastoralists have developed specific knowledge and technology to herd animals to use their fibre, meat, skins, stools, etc. This is linked to the second strategy which involves economic linkages with agricultural valleys to obtain other products, mainly food. This strategy is achieved (1) through the direct control of agricultural valleys, following a verticality principle found in mountain societies and described by Murra (1975) as the 'vertical control of a maximum of ecological belts'; or (2) through participation in non-mercantile and/or market systems of exchange. It is these inter-zonal linkages which enable pastoralists to reside permanently in these high mountain regions.[7]

Both strategies require a high degree of mobility, considered by many authors as the structural principle around which pastoral families are organised (Custred 1977; Charbonneau 2009; Medinaceli 2005; Lanata and Valdivia 2009). Accordingly, two types of mobility scheme can be identified as: (1) mobility for production; and (2) mobility for exchange. Both are integrated into a pattern of resource use shaped by seasonal changes in the availability of pastures, as well as daily and annual cycles of herd management.

Mobility for production refers to what most authors call transhumance. Since pastoralism is an extensive mode of production based on natural forage, pastoralists move with their herds guided by the seasonal availability and quality of water and pastures.

Mobility for exchange refers to what some authors understand as inter-zonal exchange mobility (Flores Ochoa 1975; Custred 1977; Medinaceli 2005). Pastoralists engage in long-term (more than one month) and medium-term (1–3 days) trips to the agricultural valleys in order to exchange products through barter and, to a lesser extent, money. These trips can be categorised according to their purpose (Concha 1975). The first type of trip is the preliminary one, which enables herders to acquire specific products (such as salt, coca leaves, alcohol, pepper and fruit) that will later be exchanged in agricultural communities where they are highly valued. The second type is the core exchange trip to communities located at mid and high-altitude where maize, potato and *chuño* (dried potato), the food staples on which their subsistence for the entire year depends, are produced. These products are exchanged for the herders' own production (fibre, fresh and dried meat, leather) as well as for the items acquired on their preliminary voyages. Through the core exchange trips, herders play a vital role as social and economic intermediaries linking one region to another, and facilitating not only the transfer of products but also the exchange of information between highland and lowland territories (Gomez 1977; Lanata and Valdivia 2009; Medinaceli 2005). They are 'space weavers' as Lanata and Valdivia (2009) call them.

Their participation in the inter-zonal exchange system implies that pastoralists are only partially linked to the market (Valdivia 2013). This means that only some of the inputs required by herders come from the market, with other elements coming from a non-mercantile system of exchange. Consequently, as pastoralists participate simultaneously in two economic spheres, it can be said that their livelihood strategies are *doubly determined* (Golte and de la Cadena 1983). Many authors highlight the ongoing participation of herders in the barter system, as a means to access goods that would be otherwise unaffordable, thereby guaranteeing stability and low risk (Casaverde 1977). In other words, despite the expansion of the capitalist fibre market, pastoralists have continued to maintain the barter system for their own convenience. In fact, Valdivia (2013) believes that capitalist fibre market expansion has been possible thanks in part to pastoralists' participation in another economic sphere.

[7] In the words of Custred (1977) 'the primary livelihood subsistence strategy of herders has to be defined as grazing-trade'.

Mobility patterns also influence pastoralist forms of social organisation. First, extensive modes of production are associated with dispersed settlement patterns. Second, given that transhumance responds to vertical stratification of resources by altitude (Gil Montero *et al.* 2009), mobility is also linked to pastoralist families' strategy of multi-residence in order to maximise access to resources. Dispersed settlement and multi-residence patterns have resulted in the absence of pastoralist villages. This context renders family as the basic social and economic unit, and social organisation as predominantly based on kinship bonds rather than on the individual's belonging to a bigger political group, such as a community or *parcialidad* (Custred 1977; Charbonneau 2009). Furthermore, the modalities of mobility for exchange determine differentiated labour supply during the year, concentrated in the months of December and January when productive tasks – such as controlled breeding, shearing, curing scabies and preventing diarrhoea – are performed.

3.3 Land tenure regimes in the Andean *altiplano*

With resources distributed non-uniformly across the territory and different demands and needs within each herd (varying according to the animal species, breed, age and sex), there is a defining need for pastoralists to access diverse pastures throughout the year as a strategy to guarantee self-sufficiency and as climate risk management tool (Villaroel *et al.* 2014). This need is satisfied by rotation through several *fundos* during the annual cycle. Access to these diversified *fundos* is guaranteed by a combination of individual, family and collective property rights, or what the literature calls *mixed systems* (Villaroel *et al.* 2014).

Within systems of mixed property rights the rules that govern access to pastures, property and inheritance respond to a complex interaction between individual, family and communal logic. Literature suggests that in these mixed systems, individual rights are predominant for property and herd management; family-based rights have a defining importance in mediating access (Sendón 2008; Casaverde 1985; Postigo, Young and Crews 2008); while community-based rights play a central role in the administration of resources and herds (Browman 1974).

The basis of kinship solidarity in pastoralist societies is the relationship between siblings. In accordance, the rights to access, use and control over land are distributed among them. Siblings and their nuclear families form corporate groups that share common access to a specific portion of land. In some cases, these corporate groups consist of more than two adult generations (second-degree relatives). Each *fundo* has a set of shareholders ('condominium owners' in the words of Casaverde 1985) and, accordingly, each herder holds shares in many *fundos* within their community. Even in the case of privatised *fundos*, the right to access and use is shared by a long chain of kinship groups (Casaverde 1985; Valderrama 2012).

This system permits collective access to different types of pastures while at the same time avoiding land fragmentation. These two characteristics are central for the sustainability of the extensive mode of production practiced by pastoralists. Yet, in order to maintain the balance, the system needs to control the pressure on land. This is achieved by placing restrictions on the *transfer* of access rights and by restricting the *time* of access and use conceded to each shareholder.

The first strategy is closely linked to the principle of patrilineality. Land access rights are principally transferred by inheritance and marriage. However, in order to maintain the productive unity of the pastures (and sometimes even the herds), access rights are only bestowed to male heirs, while women access land through marriage. In some pastoralist communities, inheritance is even more restricted where only one son, usually the youngest, will inherit access rights (shares in different *fundos*) of the father. At the same time, the

patrilineal principle dictates access to pastures according to their quality. Access to non-irrigated land is open to first-degree relatives by blood or marriage, while access to irrigated pastures – or *bofedales* – is restricted to blood relatives of patrilineal descent. Thus *bofedales* come to be associated with a specific family. Despite this, restricting access is not enough to avoid overgrazing.

Since maintaining the productive unit of land is a priority, pastoralists fragment the time of access to and use of a specific plot, instead of dividing up the space of the plot itself (time fragmentation instead of land fragmentation). For this reason, Valderrama (2012) calls them *'parceleros del tiempo'* (time partitioners). In order to maintain the equilibrium of this system, a central figure of authority exists called *kapaqkamachiq* or *titular* (Valderrama 2012) – usually the oldest of the shareholders – responsible for monitoring compliance to rules, defining graduated sanctions for non-compliance and mediating conflict between resource users.

Finally, the community plays a central role in the administration of resources in order to avoid overgrazing. First, the community can have a say in herd management, for example, by setting an upper ceiling on absolute animal numbers or on the animals each family can own. If a family has surplus animals and decides not to sell them off, it will have to buy grazing rights from neighbours with lower quotas. Community control can also be imposed over the time (months, weeks or even hours a day) of grazing allowed by each family. Second, the community also has a degree of control over families' access to land. For instance, in some communities, livestock owners have to pay a form of rent, known as *derecho de herbaje,* to the community for their household to have a right to use community pastures (Postigo *et al.* 2008). Where the community is the private owner of the land, exchange and alienation rights can also be restricted to families. Thus, if the head of the household wants to rent or sell his plot of land, the community can impose restrictions over the buyer's profile (i.e. it can only be another community member – or *comunero*) and has to collectively approve this decision in a general assembly.

3.3.1 Andean pastoralist land tenure regimes

To characterise the typology of land tenure regimes found in Andean pastoralist societies, this study employs the repertoire of concepts set out in the methodology section which are based on a systematic literature review. Table 3.4 below shows the types of land tenure regimes that can be found in Andean pastoralist societies.

Table 3.4 Types of land tenure regimes in Andean pastoralist societies

	Operational level rights		
Collective-choice level rights	Individual (I)	Family (F)	Community (C)
Individual (I)	I/I Individual		
Family (F)		F/F Condominium	
Community (C)	C/I Fragmented Community	C/F Communal Condominium	C/C Communal
External (E)		E/F External Condominium	

Source: Authors' own elaboration.

Table 3.5 LTR characterisation amongst Andean pastoralist societies

Bundle of rights	Land tenure regimes					
	I/I Individual	C/I Fragmented Community	F/F Condominium	C/F Communal Condominium	E/F External Condominium	C/C Communal
Access	I	I	F	F	F	C
Withdrawal	I	I	I	F	I+E	I+C
Management	I	I	F	F and/or C	F+E	C
Exclusion	I	I	F	F and/or C	E	C
Alienation	I	C	C	C	E	C

Source: Authors' own elaboration.

In the first land tenure regime, Individual (I/I), both the rights at the operational and at the collective-choice level are held by the household. If an individual holds a complete set of rights, he is considered, according to the conceptual framework of Schlager and Ostrom (1992), as an 'owner'. This model is usually associated with the existence of individual private property. It seems to be the general land tenure regime in Argentina (Göbel 2002), although it can also be found in other Andean pastoralist countries.

In the second regime, Fragmented Community (C/I), a household has access, withdrawal, management and exclusion rights. However, the community retains the alienation right, meaning that the household cannot sell or lease the rights of management or exclusion. This model can be found in those communities where land has been parcelled, yet community members cannot rent or sell their land to non-members. This model can be found in Chile, Bolivia, and to a lesser extent in Peru.

Condominium is an *emic* category relating to pastoralist groups in Arequipa, Peru, that refers to the system of collective family access and, at the same time, to the *fundo* accessed by many shareholders. This paper refers to this concept to describe the third land tenure regime (F/F). In this model, access, management, exclusion and alienation rights reside with the (nuclear or extended) family while the withdrawal right is held by the household.

The Communal Condominium (C/F) refers to a land tenure regime where access to land resides in the (nuclear or extended) family, while withdrawal rights are held by the household. However, in contrast with the F/F model, and depending on the specific case, the collective-choice level rights of management and exclusion are shared between the family and the community. Thus, for example, the community can have the right to take decisions associated with family herd management such as setting ceiling numbers of animals. In other cases, community members gain their right to use communal pastures by paying an annual rent to the community and must continually renew their access and use rights through participation in collective tasks. The community has the power to legitimise its members' rights to use communal pastures or exclude them from use if it considers them to be at fault. This model can be found where communal institutionalism has a long historical presence in places such as Ayacucho, Cusco and Puno in Peru.

Under the fifth regime, External Condominium (E/F), the family's right of access is mediated by an external agent. Similarly, withdrawal rights are not exclusive to the household. Collective-choice rights are all under the control of the external agent. This type of local land management was found under the *hacienda* regime. After the expansion of *haciendas* into indigenous land, herders maintained access to the hacienda land in exchange for (unpaid) labour, including taking care of the hacienda owner's animals.

Finally, under the Communal regime (C/C) the community has a degree of control over the operational level rights (access and withdrawal), and exclusive control over collective-choice level rights (management, exclusion and alienation). This model can be found in the enterprises established during the Agrarian Reform in Peru which aimed to create associative forms of production, namely the Agricultural Societies of Social Interest (*Sociedades Agrícolas de Interés Social* or SAIS) and the Agricultural Production Cooperatives (*Cooperativas Agrícolas de Producción* or CAPs).[8]

3.4 General trends of change

Since this article focuses on explaining changes in local land tenure regimes, it is necessary to briefly present the general trends of change found in Andean pastoralist societies as identified in previous literature. This section does so by outlining the environmental, economic, social, state-led and institutional drivers of these trends.

First, several authors identify an important shift in the pastoralist productive system. Extensive land use brings about higher labour productivity and remains in place as long as the provision of resources within a particular territory (land productivity) permits. Some authors suggest that the imbalance between land productivity and labour productivity could be an important reason why pastoral systems have persisted (Gil Montero *et al.* 2009). Nonetheless, literature suggests that processes of land use intensification are taking place as a result of demographic pressure and growth in livestock numbers; a situation worsened by the declining availability and quality of resources, mainly water and pastures. Valdivia (2013) suggests that pastoralist societies have reached the limits of the sustainability of their modes of production. Similarly, Villaroel *et al.* (2014) argue that these conditions have led to a sustainability crisis, which have resulted in the fall of livestock productivity.

This situation pushes families to search for new productive strategies. One of them is the incorporation of fodder production in order to complement grazing during the dry season. Another strategy is generating new sources of income, mainly through the sale of manual labour. This diversification aggravates a general reduction in the availability of labour for productive tasks associated with pastoralism. Thus, some pastoralist communities (or families) have resorted to restructuring or formulating new arrangements for land access and use that require less family labour. For instance, the delimitation of grazing territories and even the fencing of prioritised resources, such as *bofedales* (Villaroel *et al.* 2014).

A second trend of change indicated by the literature is the decreasing importance of mobility, so often mentioned as the defining characteristic of pastoralist societies (Concha 1975; Charbonneau 2009; Göbel 1998). This is both a direct and indirect result of changes in the economic relationships produced by the expansion of the market economy. First, the multiplication of unpaved roads and the popularisation of motor vehicles have transformed the directionality of exchange trips from exclusively descending mode trips, meaning that herders came down to lowlands in order to access products, to the increasing importance of ascending mode trips, where traders from lower down in the valley organise weekly fairs in the highlands. Second, the growth of urban centres increases the demand for agricultural

[8] The main difference between the two lies in their institutional design. The CAPs were formed by a number of members who had equal share of the profit. SAIS, on the other hand, employed a mixed model that could include natural or legal persons as members with distinct responsibilities and rights. For example, some peasant communities could be members of the SAIS and depending on their productive role they could have a share of part of the profits without having to participate in productive tasks (Sánchez and Lovón 1991). Browman (1983) describes the SAIS as 'a form of compromise between full-fledged co-operative like the CAP and the previous land-holding system. Highland livestock haciendas had been surrounded by semi-autonomous herding communities. The *hacendados* relied upon these communities for their seasonal labour needs, and in return allowed these communities to graze private livestock on part of the *hacienda* lands. The SAIS was a special kind of cooperative to join these two disparate groups, with a governing council formed by representatives from the surrounding communities, the full-time herding employees (the former *hacienda* employees) or *socios*, and the government technicians and managerial personnel at the SAIS'.

products. This stimulates the incorporation of agricultural peasants into the market economy, adding economic value to their products and giving them access to money needed to participate in the market. This implies a gradual reduction in the economic importance of inter-zonal exchange, the basis of the interdependence between agricultural and pastoralist economies (Concha 1975). As a consequence, the geographical area travelled by herders shrinks every year as their economic role is replaced by other traders, or their products are in lower demand from coastal or Andean peasants, who, in turn, increase the value of their own production – matching barter to market equivalents – rendering it unaffordable for herders. The reduction of mobility is accompanied by an escalation of sedentarisation processes outside the *fundos* or *estancias* (ranches), which has given way to the creation of new urban centres around pastoralist production spaces. While the concentration of houses around new urban centres has been propelled by the market, it has also been maintained by families' desire to access public services, particularly education for their children (Charbonneau 2009).

Finally, some authors also consider alterations in cultural values as import drivers of change. For example, discriminatory views represent pastoralist families as marginal and backward. The cultural value of pastoralism gets so denigrated that young people are discouraged from assuming it as their own and without recruitment the pastoralist way of life is unable to reproduce (Salzman 2004).

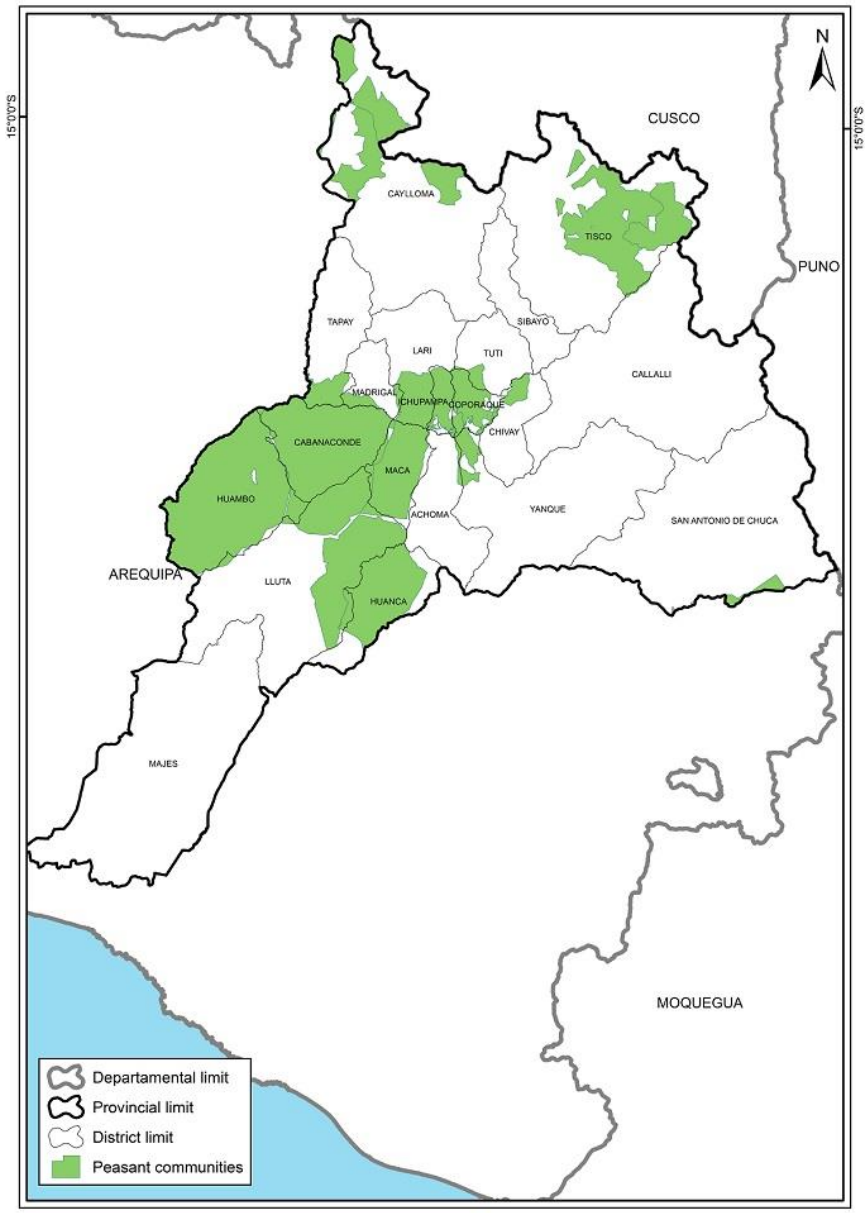
4 Case study: Historical institutional analysis of land tenure regimes in Caylloma

Caylloma is a province in the Arequipa region of southern Peru (see Figure 4.1). Residents, mostly farmers and herders, are clustered in 20 districts in the Colca River Valley. Pastoralism in this region relies largely on family labour for raising camelids, sheep and cattle. According to the 2012 National Agricultural Census, 4,013 of 16,630 agricultural households herd alpaca, representing 24.13 per cent of all households in Caylloma. Sales of alpaca fibre and meat constitute the primary sources of income for these families.

This section explores the rationale behind changes in local land tenure regimes in Caylloma over a 50-year period, ranging from the launch of the Agrarian Reform at the end of the 1960s until the present day. To do so, the study identifies the drivers that, over time, have promoted and triggered these changes. These drivers can be classified as: (1) external demographic pressure; (2) internal demographic pressure; (3) state-led intervention; and (4) market expansion. Although this study focuses on a recent period, it is worthwhile briefly reviewing the history of Caylloma between the seventeenth and mid-twentieth century in order to appreciate the context around this case study.

The information presented in this section has been drawn from secondary and primary data sources. Secondary data have mainly been collected from academic literature and census databases. In addition, some secondary data have been collected from fibre exporters, local and state officials and technical experts. Primary data have been collected using qualitative instruments such as semi-structured and focus group discussions during a weeklong fieldwork visit. All the non-referenced information comes from these primary sources.

Figure 4.1 Map of Caylloma Province



Source: Authors' own elaboration, by Karla Vergara (GRADE).

4.1 Caylloma before the Agrarian Reform

At the beginning of the seventeenth century, Caylloma started to gain importance in the region due to the discovery of mineral deposits within its territory. Mining activity drove an influx of labour from nearby valleys together with the Spanish elite, invigorating the province and playing down the importance of lower-altitude areas. However, this influx of foreign population occurred at the same time as a strong migration by native populations to Arequipa city as a result of the abuse generated by the mining *mita.*[9] After the abolition of mining *mita* in 1720, Caylloma experienced an uninterrupted increase in population. At the end of the eighteenth century, mining activity in Caylloma fell into crisis due to social unrest, radical changes within the institutionality of the Viceroyalty, and the shortage of *azogue* (mercury). This crisis caused the Spanish population to relocate from Caylloma to the Colca

[9] 'A forced labour system instituted by the Spanish government in Peru and Bolivia in 1573 and abolished in 1812' (Dell 2010).

Valley. Consequently, Caylloma remains a province with a predominantly native population (Manrique 1985).

Although the mining crisis caused the fragmentation of the Southern Andes, with the rise in international demand for sheep wool and alpaca and llama fibre the region became reintegrated economically and commercially. The industrial revolution that took place in England during the nineteenth century generated significant demand for fibre from the growing textile industry; demand that began to be met by Andean countries. Even though Peruvian exportation of sheep wool stagnated at the time of the crisis experienced in the British capitalist system in the 1870s, the sale of alpaca and llama fibre took off in the 1880s. Unlike sheep wool, global demand for alpaca and llama fibre was mainly supplied by Peru and Bolivia, hence demand for fibre was not damaged by the crisis. Furthermore, at the end of the Pacific War, the construction of the Southern Railroad in 1986 facilitated the expansion of trade in alpaca and llama fibre (Manrique 1985; Gómez 1976).

In this context, a group of *gamonales* (sometimes referred to as *mistis)*[10] emerged who started to gain economic and political power through their participation as intermediaries in the wool and fibre industry. In Caylloma province, the *mistis* began to gain access to land in the high-altitude areas through marriage bonds with local women or by buying meadows (as is the case of Mariano Apaza, the largest landowner in Caylloma). High international demand for fibre generated huge pressure for control of the highlands and in response local communities sought to secure their lands through property titles. The practice of land delimitation produced conflict between owners, sometimes resulting in legal disputes. Local owners considered *mistis* as 'godparents' hoping to obtain protection and aid from them in the judicial disputes. However, the *mistis* took advantage of these bonds, together with their Spanish proficiency and their legal and business expertise, in order to appropriate the lands (Manrique 1985; Markowitz 2006).

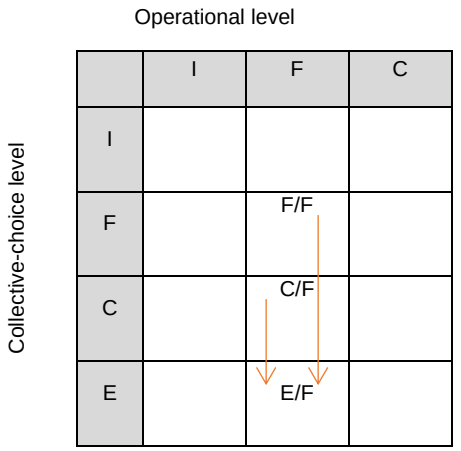
Unlike in other wool and fibre producing areas, land concentration into large *haciendas* by *mistis* only occurred in Caylloma over the last quarter of the nineteenth century. It should be emphasised that with territorial concentration the *mistis* not only gained access to land but also to labour, since the former land owners could remain on their lands if they paid the landowner rent in the form of labour, by grazing the *mistis'* herds, carrying out productive tasks, such as shearing, and participating in other collective jobs. In return, the herder could retain access to grasslands for grazing his livestock and could live in the cottage or family home, eventually receiving payment for his labour in livestock heads (Manrique 1985; Markowitz 2006; Gómez 1976). This type of herder has been given the name *'huaccha',* a landless herder that exchanges his labour in order to access grassland for his own herds. Their animals are known as '*huaccha livestock'.*

From the nineteenth century to the first half of the twentieth century – before the establishment of the Agrarian Reform – there was a gradual change in the land tenure regimes in the Caylloma province, mainly as a result of the intensification of international demand of alpaca and llama fibre. Originally, there were two types of land tenure regimes where operational-level rights were held on a family-basis: the Condominium (F/F) and the Communal Condominium (C/F). However, while access rights were held by the extended family, withdrawal rights were held by the household. The full set of collective-choice rights (management, exclusion, and alienation) were held by the extended family under the F/F regime. The rights of management and exclusion were shared by the extended family and the community, while the right of alienation was held solely by the community under the C/F regime. With the expansion of *haciendas* these two land tenure regimes transformed into an

[10] '*Gamonal*' is a category associated with a long history of abuse of Peru's indigenous population. *Gamonales* are often compared to feudal lords and 'emerged as an economic and political power in the highlands during the colonial period (…)' and managed to maintain the control until the 1960s (González 2010). *Misti* is translated by 'white race man' and in this case indicates someone originating from outside the community.

External Condominium (E/F) regime, in which collective-choice level rights were alienated from the family or the community. Although access rights continued to be family-based, withdrawal rights became partially controlled by external agents, specifically the *hacendado*.

Figure 4.2 First dynamic of change: the expansion of *haciendas*



Bundle of rights	LTR transformation		
	Before		After
	F/F	C/F	E/F
Access	F	F	F
Withdrawal	I	F	I+E
Management	F	F+C	E
Exclusion	F	F+C	E
Alienation	F	C	E

Source: Authors' own elaboration.

4.2 The Agrarian Reform (1960s–70s)

In the first instance, the 1969 Agrarian Reform expropriated the estates of the large *haciendas* and then did the same with the small and medium-size plots of land that were not managed directly (land with absentee landlords that were worked by *huaccha* herders). These large areas became the property of enterprises with associative forms of production. In addition, an Integrated Rural Settlement Project (Proyecto Integral de Asentamiento Rural – PIAR) was instigated in Caylloma involving 310 small and medium properties that were managed indirectly and four former *haciendas* of Apaza that later took the form of two SAIS – Pusa-Pusa and KuskaSayarisum – and two CAPs – Huisca and Ayavirini.

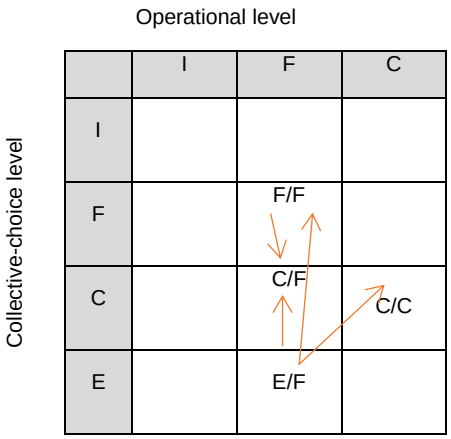
The PIAR Caylloma incorporated 1,186,300 hectares and was distributed as follows: 310 small and medium properties with no direct management representing 39.8 per cent of the total, the four former *haciendas* of the Apaza representing 4.7 per cent of the total, 8,521 small landholdings with direct management (smallholders) representing 15.4 per cent of the total, 10 rural communities with 10.1 per cent of the total and public lands which represented 29.9 per cent of the total. The SAIS Pusa-Pusa was formed by the *haciendas* that previously belonged to Apaza and some of the small and medium properties without direct management. One major issue faced by the SAIS was that the herders refused to be partners because this implied their *huaccha* herds would be taken away from them and absorbed by the SAIS in order to become agricultural labourers. It also meant having to undergo a new class of *hacendado*: the rural enterprise (Gómez 1976).

While the Agrarian Reform achieved the expulsion and dismantling of the highlands landlord class, it did not succeed in transforming the system of land use. Large units were transferred to peasant cooperatives that did not respect traditional forms of cooperation (Toro *et al.* 2001; Browman 1984).

It can thus be stated that the Agrarian Reform produced two patterns of transformation. First, the land tenure regime of the *haciendas* (External Condominium E/F) was dissolved in order

to make way for the formation of (1) enterprises with associative forms of production (SAIS and CAPs), with a land tenure regime based on operational and collective-choice level rights held on a community-basis (C/C), (2) peasant communities, with a Communal Condominium (C/F) land tenure regime, and (3) Condominiums under which operational and collective-choice level rights were made on a family-basis (F/F). The second pattern of transformation saw the Condominium regime (F/F) evolve into Communal Condominiums (C/F) which entailed the creation of peasant communities. Two important characteristics of these process are that, firstly, the external control of collective-choice level rights was eliminated, and, second, that while withdrawal rights were retained by the household under the C/F regime, they continued to be partially controlled under the C/C regime (by the associative mode of production instead of the *hacienda*).

Figure 4.3 Second dynamic of change: the Agrarian Reform



Bundle of rights	Land tenure regimes transformation			
	Trend 1		Trend 2	
	F/F	C/F	E/F	C/C
Access	F	F	F	F+C
Withdrawal	I	I	I+E	I+C
Management	F	F	E	C
Exclusion	F	F+C	E	C
Alienation	F	C	E	C

Source: Authors' own elaboration.

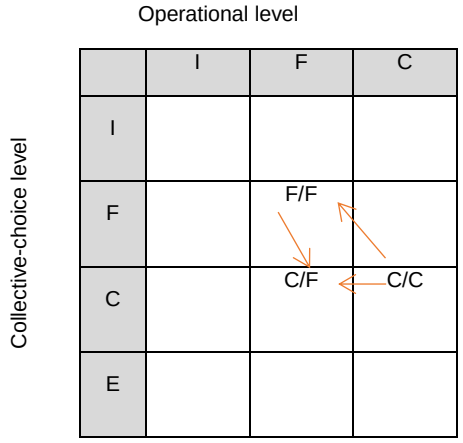
4.3 Agrarian Reform crisis (1970s–80s)

The Agrarian Reform did not establish a new productive structure since the peasant enterprises reproduced the order of the *haciendas*: they had the best pastures, concentrated land due to demographic pressure, privileged partners who had more livestock with permanent jobs while pastors without animals were forced to undergo a similar kind of slavish relationship to that established by the *haciendas*, but now with the rural enterprise (Gómez 1976; Markowitz 2006). Also, there were problems between SAIS and rural communities because the SAIS appropriated better quality pastures that previously belonged to the peasants and were taken away by the landowner Apaza.

During this period, two trends of change in land tenure regimes can be identified. First, as a consequence of the failure and dissolution of the associative modes of production (SAIS and CAPs), land tenure regimes were reorganised into the Condominium (F/F) and Communal Condominium (C/F) types. The inadequacy of the SAIS and CAPs seems to have resided in their attempt to control operational-level rights, especially the withdrawal right.

Simultaneously, peasant communities continued to provide a convenient institutional arrangement for securing land tenure, and as such transformations from the Condominium (F/F) land tenure regime to the Communal Condominium (C/F) can be observed.

Figure 4.4 Third dynamic of change: the collapse of associative modes of production and the perseverance of the peasant community



Bundle of rights	Land tenure regimes transformation			
	Trend 1		Trend 2	
	C/C	F/F	F/F	C/F
Access	F+C	F	F	F
Withdrawal	I+C	I	I	I
Management	C	F	F	F
Exclusion	C	F	F	F+C
Alienation	C	F	F	C

Source: Authors' own elaboration.

4.4 Current situation (from the 1990s onwards)

In the late 1980s, a scenario came about in which rural communities (mostly formed after the Agrarian Reform in order to secure land) coexisted with extended family condominiums. Rural communities had an arrangement whereby the rights of access and withdrawal were held by the family, while the collective-choice level rights were held by both the family and the community. On the other hand, in the condominiums the rights of access and withdrawal were controlled by the individual household while the collective-choice rights were held by the extended family. As described by Valderrama (2012), condominiums were composed of extended families within which processes of fusion or fission between households unfolded according to pastoral activities. As explained previously, each household held shares in several condominiums where they had the right to graze their animals for a specific period of time. This type of land tenure regime used the strategy of 'partitioning time' instead of land in order to maximise access by households to pastures.

However, at present a very different scenario is to be found in which condominiums are controlled by nuclear families as result of an intense process of land fragmentation. This fragmentation has continued to the point that in some cases the owners now hold individual access to and control over the land. On the other hand, rural communities with family access and community control of land still exist in Caylloma province. Although processes of land fragmentation can be observed in some of these communities, there is no case of the community having been divided into condominiums or individual properties.

From the 1990s, evident changes occurred in the way that the residents of Caylloma controlled and accessed land, with a clear trend towards the individualisation of property and land fragmentation. There are four interrelated factors that appear to be driving this change: (1) increasing deterioration of pastures due to climate variability; (2) growing alpaca population; (3), the expansion of highways and roads; and (4) changes to rules regarding the inheritance of land.

While Caylloma province, particularly the *puna* or upper basin (above 4,000 m.a.s.l.), has always been characterised by a cover of low-quality natural pastures and unproductive areas (with crags, perpetual snow, streams, etc.) (Gómez 1976; Toro *et al.* 2001), its residents state that in recent decades the climate has become more variable. This has resulted in the presence of extreme weather events (for example, more frost and snow in the dry season and severe but scattered rains in the rainy season) and reduced availability of water

resources. Therefore, people's ability to anticipate and cope with extreme weather has been reduced. Likewise, the reduction in water availability and the presence of more extreme weather contribute to the deterioration of pastures in both quality and quantity.

Simultaneously, the residents of Caylloma recognise the presence of incentives for alpaca grazing in this period. As recorded in the National Agricultural Census (IV CENAGRO, INEI 2012), in the highlands of Caylloma the total number of alpacas between 1994 and 2012 increased by 103.4 per cent (from 132,315 to 269,193 alpacas), the Agricultural Units (AU)[11] with alpacas rose by 51.1 per cent (from 2,119 to 3,201 AU), and the number of alpacas per AU incremented by 42.9 per cent (from 60 to 85 alpacas on average).

There seem to be three factors driving alpaca population growth: (1) international demand for alpaca fibre (especially Suri alpaca); (2) government and NGO support for alpaca grazing; and (3) the increased presence of peasant patrols. For decades there has been considerable demand for alpaca fibre, however at present, unlike in the nineteenth century, there is more competition, with more countries producing it and more substitute products such as synthetic fibre. Several alpaca herders remember that in the late nineties the price of alpaca fibre reached its peak (about US$10 per pound), generating an increase in the number of alpacas that the AU held amongst their livestock.

Furthermore, in 1985, DESCO[12] initiated an intervention in Caylloma with the start of the Colca Valley Rural Development Programme (*Programa de Desarrollo Rural en el Valle de Colca* – PDRVC) which for the first five years focused on boosting the productivity of herders through consolidating the livestock production circuit with a focus on strengthening producer organisations. DESCO promoted the formation of an association of alpaca herders, the Alpaca Herders Association of Caylloma Province (*Asociación de Criadores de Alpaca de la Provincia de* Caylloma – ADECALC), which was active during the 1990s until it disbanded in 2000 as a result of mismanagement. During a second phase, the main actions of DESCO focused on genetic improvement, technology transfer, capacity building and the development of new products and markets. Also, before the 1990s, there was strong support from the government to improve the production and marketing of alpaca fibre. Interventions by the government and DESCO boosted the number of alpacas and AUs that herd alpacas in Caylloma province (Toro *et al.* 2001). Finally, some herders mentioned that in the first half of the 1990s peasant patrols were established in response to a lack of security in the area and it was this organisation that was responsible for a reduction in livestock rustling, thereby enabling farmers to expand their alpaca herds.

The sharp deterioration of pastures as a result of climate variability combined with the large increase in numbers of alpacas intensified the problems of overgrazing in Caylloma. The deterioration of pastures from overgrazing caused conflicts between members of the condominiums as this was put down to some members having more animals than the rest, thereby jeopardising the sustainability of the natural resources.

Moreover, both of these factors contributed to land fragmentation, which began with breaking from extended family and the subsequent formation of nuclear family condominiums. With this structural change, the family strategy of 'parcelling the time' became unfeasible; hence families began to parcel out the pasture instead. Nuclear family condominiums are usually composed of parents and sons (each representing a separate household with economic independence) or of siblings sharing decisions around access to and control of land but possessing their own herds.

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11 Agricultural Units is a term used by the CENAGRO to define agricultural land which is occupied as a unit for the purposes of agriculture.

12 *Centro de Estudios y Promoción del Desarrollo* – Centre for Development Studies and Promotion in Peru.

Two types of nuclear family condominium can be observed in Caylloma: those with sufficient natural resources (water and pasture) to ensure the sustainability of the condominium, and those with insufficient natural resources that have consequently been divided into parcels.

In the second case, three strategies are employed to deal with the scarcity of natural resources. First, access to pasture and water can be gained through the rental or purchase of land (although cases of buying are still rare). Second, the parents or a sibling can be left in charge of the herds while the other family members migrate to the city to work in other activities and support the family economically. Those family members who migrate return at certain times of the year to assist with livestock activities. Third, one of the siblings stays and continues grazing while other family members sell the parcel of land that corresponds to them and migrate permanently to the city.

This second type of nuclear family condominium marks the end of the condominium and the start of individual property. In Caylloma, there appears to be a clear trend towards individual control over and access to land, although this change is incipient. If land management is individual, two scenarios can unfold. Either the individual property has sufficient natural resources to maintain the herd and enable the owner to live off this activity or the individual property has insufficient natural resources because the process of land fragmentation reached its limit. In the second instance, three further scenarios can be observed: (1) the owners rent or buy land to access pasture and water for their herds; (2) the land is so fragmented that the owner has to sell it or rent it and migrate to the city to work in other activities; or (3) the owner sells the land and becomes a *huaccha* herder.

The development and improvement of the road network in Caylloma brought about significant reductions in transaction costs. Towards the second half of the twentieth century major roads were built, helping to link Caylloma to the wool production circuit and facilitating the formation of major population centres. Fairs and markets, as well as public services such as schools and health posts, were all established in these new centres. The construction of the Chivay–Arequipa road (as well as additional roads linking Chivay with other valley towns) helped transform Chivay into a major distribution centre. In 1950, Callali town became an important centre for trade because of its proximity to the fibre production sites (Manrique 1985). Highway development has also led to the formation of secondary sites for fibre commerce and has facilitated the establishment of a direct relationship between the livestock area of Caylloma and the city of Arequipa. Home to the main buying, processing and exporting fibre houses in the country, Arequipa is the principle trade centre of the region. Since the 1980s, trade fairs have been operating in secondary wool trading sites throughout the province, such as the fairs in Chichas, ChalhuancaIchuhuayco and Challuta, where fibre and meat are purchased for subsequent sale in the city of Arequipa (Toro *et al.* 2001).

Increasing market linkages have triggered changes in consumption patterns amongst herders who now prefer to consume industrialised goods and demand more public services. The problem is that dependence on these goods makes them more vulnerable to services inflation. These changes in consumption patterns ultimately led to the monetisation of the local economy, so as the herders became more dependent on the market they also became more vulnerable to price changes. To cope with this vulnerability and to satisfy the new type of consumption, some condominium members were forced to work in non-pastoralist activities, thereby accelerating the migration process based on the perception that ‘you cannot make a living from alpaca herding’. This new view around pastoralism not being profitable enough to generate sufficient income led the younger population to migrate to the cities in order to access basic and higher education. This explains the aging of alpaca herders in the highlands of Caylloma, since it is the older people who stay in the condominium to take care of the herds of the younger family members.

Finally, one of the most important drivers that explains changes in land tenure regimes is the transformation of inheritance rules. In order to maintain the productive unity of land, access rights (shares in different *fundos*) were only inherited by male heirs – in some cases by only one (Valderrama 2012). Nowadays, however, both sons and daughters are demanding equal inheritance rules, which may imply the further fragmentation of land. In some cases, they may migrate and abandon pastoralist activities; hence plots of land may be perceived as capital to be invested in their new way of life. However, it is important to mention that some of the herders that decide to stay are considering re-establishing inheritance restrictions in order to avoid further land fragmentation by the younger generation.

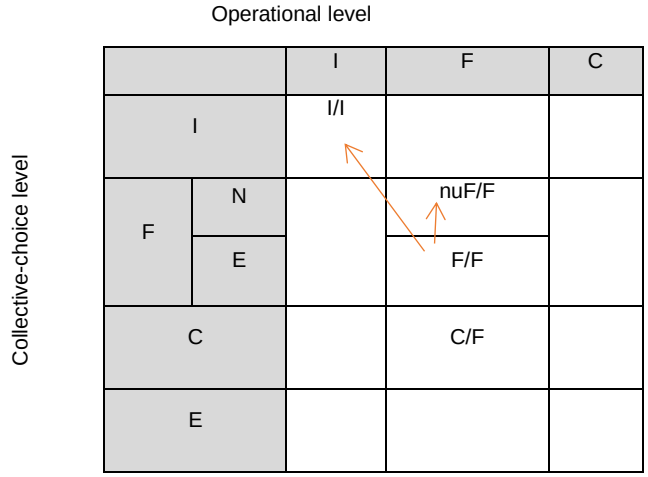
Overall, two patterns of change can be observed regarding the transformation of land tenure regimes during this period. First, within the Communal Condominium type, there is a tendency to restrict family-based rights – from the extended to the nuclear family – in both operational and collective-choice levels.[13] Second, this tendency is more acute within the Condominium type. Alongside greater restriction, a new model of land tenure appears: the Individual regime (I). Under this new land tenure regime, only the household holds operational and collective-choice level rights.

In summary, an exploration of the drivers of change in land tenure regimes illustrates that in the case of Caylloma Province the trends are non-linear. Before the Agrarian Reform, the family and communal control of land switched to external control due to increasing international demand for alpaca and llama fibre while land access continued to be on a family basis. The Agrarian Reform changed both control over and access to land leading to collective management. In this case, the driver was state intervention.

With the crisis of the Agrarian Reform, land management returned to its original state before the development of the *haciendas*. The right to access land access was held by the family once again and control rights returned to the family and community. These changes can be explained by the victory of internal organisation amongst pastoralists over the state which was responsible for imposing the Agrarian Reform. Finally, at the beginning of the twenty-first century pressures emerged that now appear to be driving pastoralists in Caylloma towards the individualisation of land management, although changes in access and control are still incipient. The principal factors behind this are international demand for alpaca fibre, NGO and government programmes promoting alpaca raising, the emergence of peasant patrols, the construction of roads and changes in inheritance rules.

[13] Nuclear family rights were not differentiated from extended family rights previously since in earlier land tenure regimes rights were held on the basis of the extended family.

Figure 4.5 Fourth dynamic of change: restricting family-based rights and the appearance of the individual land tenure regime



Bundle of rights	Land tenure regimes transformation				
	Trend 1		Trend 2		
	C/ex F	C/ nu F	F/ex F	F/nu F	I/I
Access	F	F	F	nuF	I
Withdrawal	I	I	I	I	I
Management	F	nuF	F	nuF	I
Exclusion	F + C	nuF + C	F	nuF	I
Alienation	C	C	F	nuF	I

ex = extended / nu = nuclear

Source: Authors' own elaboration.

4.5 Assessing institutional stability and sustainability of resource management

Two types of land tenure regime have persevered over time in Caylloma: the Condominium (F/F) and the Communal Condominium (C/F). Yet despite their durability over decades, these regimes seem to be facing a crisis under present conditions. Two main factors appear to explain this: the congestion of condominiums and the loss of labour force.

As the density of herders using the condominiums increases due to changes in inheritance rules, the strategy of fragmenting time instead of land in order to maintain productive unity seems to have reached its limits. Climatic variability and water scarcity worsen this situation, and the overexploitation of resources propagates. This increases conflict between users and contests the authority of the *kapaqkamachiq* – or 'titular' – to resolve and mediate conflicts, monitor compliance of rules and establish sanctions for non-compliance.

At the same time, due to increasing dependence on the market and changing cultural values, herders migrate for long periods to sell their labour in agricultural camps or in the city of Arequipa, while the youngest members of the family migrate to access education with many of them expecting to abandon pastoralism in the future. This has diminished the labour force available to carry out pastoralist activities. Thus, restricted access to the condominiums

from the extended to the nuclear family seems to be simultaneously increasing users and reducing the availability of labour.

One of the advantages of the Condominium (both F/F and C/F) types was that they guaranteed many users access to different types of pasture (grassland and *bofedales*), an essential condition for sustaining a multi-species mode of production. Different species have different requirements regarding pastures, and even within single species, individual animals demonstrate different preferences depending on certain characteristics such as sex and age. Thus, pastoralist modes of production rely on livestock mobility between available pastures. This has been a central risk management strategy for pastoralists (Browman 1984) and seems to have been the main reason behind the resilience of these regimes. These types of regimes have also acted as a social safety net for poorer households, providing forms of mutual assistance and spreading risk. If these regimes vanish and the state fails to replace this safety net function, environmental risks and vulnerability are likely to increase for poor pastoralist households.

Now that the productive unity of the land has been disrupted, access to different pastures for some users will be restrained. This is likely to increase inequality, whereby access to various types of pastures will only be attained by concentrating land, leaving families incapable of reproducing their pastoralist way of life. Besides this, increased differentiation in the wealth of pastoralists expands the divergence of interests between the rich and the poor, thus weakening compliance with rules and customs regarding pasture use and management.

Finally, the Condominium regime involved the collective evaluation of resource capacity required to maintain herds, with access and withdrawal rights distributed in accordance. The new model that restricts the number of users accessing pastures or individualises access eliminates these community mechanisms thereby posing a potential threat to the sustainability of pastoralism in the region.

5 Conclusions

This section of the study provides responses to the research questions that guided the analysis. First, land tenure regimes in pastoralist societies are local customary institutions that function on the basis of a bundle of individual and collective rights over land. They have changed over time in response to several drivers in order to adapt to new environmental, political and economic conditions. The two main external drivers for change have been identified as state intervention and market development. State-led agrarian reform has had an impact on reinforcing collective land control. The reforms recognised ancient forms of collective land tenure and enabled the creation of new peasant communities. In addition, the reforms promoted associative modes of production and collective-land tenure regimes. However, during recent decades the state has oriented its policy in a different direction, limiting interventions in local production management to some isolated projects focusing on pastures and genetic improvement of livestock, while at the same time facilitating development and expansion of public assets (infrastructure, telecommunications and services) and markets as per the new liberal policies in place. In this new context, the state no longer promotes productive organisations tied to collective land tenure regimes.

Market expansion also appears to be an important driver. The expansion of the alpaca fibre market during the last century created a new source of monetary income for mountain herders, while increasing pressure over their land from external agents. More recently, the expansion of road networks and the popularisation of motorised vehicles had a decisive (direct and indirect) impact on the pastoralist household economy. Pastoralists have become increasingly dependent on market transactions, while their participation in the barter system

has been significantly reduced. The herders' economy has thus become more dependent on cash income. As a result some producers have sought to increase their monetary income through agricultural work or in cities, and/or by increasing the number of alpacas, leading to increasing use of pastures. These individual practices are challenging collective land tenure regimes in which land access and labour provision are collectively regulated. These so-called 'free riders' are driving land tenure regimes towards more individualised models.

Second, by analysing changes in land tenure regimes it has been possible to identify some resilient types and observe that the changes are non-linear. In particular, the F/F and C/F types have persistently appeared in all periods covered by this study, despite changing external conditions. Even against the backdrop of the individualisation of land access triggered by market forces, the vast majority of herders in Caylloma produce under F/F and C/F types or Fn/Fn C/Fn sub-types. It appears that these regimes have been so resilient because they facilitate the sustainability of the extensive production system adopted by pastoralists in semi-arid mountain conditions. On the one hand, herders' activity depends on their access to natural forage (therefore, transhumance guided by pasture availability is an unavoidable activity) given their limited technological development. In the F/F and C/F tenure regimes land fragmentation is prevented. On the other hand, herders depend upon a certain amount of labour force to adequately manage their flocks. In the F/F and C/F regimes, labour needs are provided and regulated collectively by family or community members.

The maintenance of F/F and C/F regimes has depended on some enduring institutional arrangements that avoid common resource overuse by limiting the number of shareholders and maximising collective land access. On the one hand, intergenerational transfer of rights are still restricted by inheritance rules which prescribe that only some of the male children – and sometimes only one – can become official heirs to the set of shares in the different condominiums that the herder holds. On the other hand, these regimes fragment pasture time instead of pasture land. In Caylloma, herders prioritise maintaining the productive unity of the pastures, instead of increasing the number of shareholders, who gained their operational level rights through kinship relationships.

Despite this, both the F/F and C/F regimes are now in crisis due mainly to institutional changes. Ancient inheritance rules are being contested by the siblings who were previously excluded from this arrangement, thereby triggering a change in inheritance rules from patrilineal to bilateral, meaning that some of the other male and female siblings can now claim their rights as official heirs. By narrowing the degree of collective access from an extended to a nuclear family or individual basis land is becoming increasingly fragmented. This has led to the emergence of three new land tenure regimes: Fn/Fn, C/Fn and I/I. The first two are the most common and can be regarded as F/F and C/F sub-types where extended family collective land access rights are restricted to the nuclear family. The third sub-type, I/I, refers to a regime in which access to land is an individual right.

Third, the analysis shows that new land tenure regimes (Fn/Fn, C/Fn, and I/I) will be unable to sustain the pastoralist way of life over the long-term unless the state intervenes in some way. Most small estates under these regimes lack sufficient pastures to feed a herd big enough to sustain the reproduction of a pastoralist nuclear family or single household, meaning these systems generally suffer from resource overuse. In addition, under these regimes animal herds are mismanaged.

The herders who decide to stay have developed two strategies to deal with the current situation. Some have decided to re-establish inheritance restrictions thereby avoiding the potential division of land by the younger generation. The success of this initiative, however, will depend on the social acceptance of going back to the old rule and on the economic sustainability of collective users. Other herders have sought to increase their access to pastures through leasing and/or purchasing new land. The success of this strategy will

depend on the herder's financial capacity and the development of what is still a very small land market. In current conditions, this strategy has worked out only for a few nuclear families or individuals with enough economic and social capital to boost their links with the market system.

6 Policy recommendations

Government development initiatives for pastoralist areas in Peru have had two main foci: land policy and market-oriented policy. First, regarding land policy, attempts to establish communal land under the form of peasant communities or rural enterprises have evolved into initiatives to dismantle this system of commons and foster individual privatisation. Second, with regard to market-oriented policies, the state began by intervening in the wool market through the creation of state enterprises to buy and sell wool, and then made some weak attempts to promote the formation of herders' associations in order to improve their incomes from selling wool. Current state-led development strategies in pastoralist areas are more focused on protecting families in vulnerable situations, such as during severe droughts, than on promoting productivity.

Currently, various state programmes exist to improve alpaca genetics and alpaca fibre commercialisation. These programmes work mainly with large communities representing the majority of the herder population with access to abundant pastures. This study shows that there is a significant herder population which strives to maintain its livelihood activity in increasingly unsustainable conditions. It is therefore recommended that the state design specific public policies to support this vulnerable population.

Recent studies and reports have shown that pastoralist productive systems are one of the most sustainable productive systems on the planet (McGahey *et al.* 2014; Pearce 2016) and there are several interventions through which state policy could contribute to supporting pastoralist productive systems and improving the sustainability of vulnerable pastoralist families by promoting more sustainable land tenure systems. Based on the findings of the present study, the following suggestions can be made:

a. Public policy must take into account the variety and complexity of customary land tenure regimes that combine individual and collective rights in the *altiplano* in order to identify alternative forms for strengthening land tenure. Our study finds that customary land tenure regimes that combine individual and collective rights are more able to support the pastoralist mode of production. However, different customary land tenure regimes exist in the *altiplano* such as the Communal- and the Familial-based regimes. Thus land policies should be regionally adjusted.
b. State plans for supporting pastoralist groups should take into account that some pastoralist land tenure regimes are resilient and that most are sensitive to state intervention and market development. State intervention should be focused on the most vulnerable groups who are barely capable of reproducing their productive systems due to changes in land tenure regimes towards land access individualisation.
c. Stimulate the formation of small and medium herders' associations in order to increase their access to a greater quantity and variety of pastures. This would help to support more sustainable resource management.
d. Understand that the programmes for improving alpaca genetics will not function unless herders implement sustainable resource management practices. Genetic improvement needs adequate flock management that in turn requires access to large and diverse pasture land. Customary land tenure regimes facilitate this access while more individualised land tenure regimes may prevent it. Thus, programmes for alpaca genetic improvement should also take into account the capacity of beneficiary herders

to access enough land. As our study shows, some land tenure regimes allow greater access to pastures than others.

e. Invest in technological improvement in order to develop sustainable productive systems among pastoralists. In particular, water management technologies will be vital for improving pasture management. However, the introduction of such technology should be based on local customs, practices and knowledge. It should take into account local institutions for accessing land in order to prevent land access individualisation. In particular, technology for improving production such as water management systems or improved pastures should be implemented respecting communal and extended families' local institutional arrangements for accessing land.

f. Policy must be developed based on a clear understanding of how pastoralist activities impact on the environment and on how pastoralists, especially the poorest and most vulnerable, are being affected by climate change. As our study shows, different land tenure regimes sustain different natural resources management activities which in turn have different impacts on the environment in particular in the context of climate change.

It is expected that the policy recommendations summarised here could contribute to strengthening sustainable land management systems amongst Andean pastoralists by incentivising collective land tenure regimes.

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