



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



**THE GEOGRAPHY OF CUSTOMARY LAND IN
ZAMBIA: IS DEVELOPMENT STRATEGY ENGAGING
WITH THE FACTS?**

by

Nicholas J. Sitko, Jordan Chamberlin, and Munguzwe Hichaambwa

Working Paper 98

September 2015

Indaba Agricultural Policy Research Institute (IAPRI)

Lusaka, Zambia

Downloadable at: <http://www.iapri.org.zm>

and <http://www.aec.msu.edu/agecon/fs2/zambia/index.htm>

**THE GEOGRAPHY OF CUSTOMARY LAND IN ZAMBIA:
IS DEVELOPMENT STRATEGY ENGAGING WITH THE FACTS?**

by

Nicholas J. Sitko, Jordan Chamberlin, and Munguzwe Hichaambwa

Working Paper No. 98

September 2015

**Indaba Agricultural Policy Research Institute (IAPRI)
26a Middleway, Kabulonga,
Lusaka, Zambia**

Sitko is assistant professor International Development Michigan State University (MSU), and currently on long-term assignment with the Indaba Agricultural Policy Research Institute (IAPRI) in Lusaka, Zambia. Chamberlin is senior scientist at International Maize and Wheat Improvement Center (CIMMYT). Hichaambwa is senior research associate and business development manager, IAPRI.

ACKNOWLEDGMENTS

The Indaba Agricultural Policy Research Institute is a non-profit company limited by guarantee and collaboratively works with public and private stakeholders. IAPRI exists to carry out agricultural policy research and outreach, serving the agricultural sector in Zambia so as to contribute to sustainable pro-poor agricultural development.

We wish to acknowledge the financial and substantive support of the Swedish International Development Agency and the United States Agency for International Development (USAID) in Lusaka. We further would like to acknowledge the technical and capacity building support from Michigan State University and its Researchers and Patricia Johannes for her editing and formatting assistance.

Any views expressed or remaining errors are solely the responsibility of the authors.

Comments and questions should be directed to the

Indaba Agricultural Policy Research Institute
Executive Director
26A Middleway
Kabulonga, Lusaka
tel +260 211 261194; fax +260 211 261199
email: kabaghec@iconnect.zm

**INDABA AGRICULTURAL POLICY RESEARCH INSTITUTE
TEAM MEMBERS**

The Zambia-based Indaba Agricultural Policy Research Institute research team is comprised of Antony Chapoto, Brian Chisanga, Munguzwe Hichaambwa, Chance Kabaghe, Stephen Kabwe, Auckland Kuteya, Olipa Zulu, Thelma Namonje-Kapembwa, Rhoda Mofya-Mukuka, Brian Mulenga, Nicholas Sitko, and Solomon Tembo. Michigan State University-based researchers associated with IAPRI are Margaret Beaver, Eric Crawford, Steven Haggblade, T.S. Jayne, Nicole Mason, Chewe Nkonde, Melinda Smale, and David Tschirley.

EXECUTIVE SUMMARY

Customary land is the foundation of smallholder agriculture in Zambia. In recent decades much of this land has undergone significant change as the result of population pressures, land alienation, infrastructure investments, and climate change. Despite these changes, knowledge about both the quantity of customary land and the quality of this land for agricultural commercialization purposes is scant. Using available spatial data on Zambian land, coupled with geographically explicit rural household survey data, this paper seeks to fill the persistent knowledge gaps around Zambia's customary land resources. More specifically, the paper has three primary objectives:

- 1) To update the facts on the magnitude and location of land under customary tenure in Zambia;
- 2) To identify and describe factors which may constrain smallholder access and/or utilization of land resources within remaining customary areas;
- 3) To document recent evidence for institutional dynamism within customary areas, particularly incipient patterns of land commodification and associated institutional changes.

Data and Methods

The paper utilizes a combination of nationally representative rural household survey data and available geo-spatial data sources.

Key Findings

- 1) The amount of customary land available for smallholder utilization is far less than the figure of 94% that is frequently utilized in land policy documents. Using available spatial data we estimate that a more realistic figure is 54%, or approximately 40 million hectares.
- 2) Populations within customary land areas are highly clustered. While only 8% of Zambia's customary land has population densities exceeding 20 people per km², roughly 30% of the population in customary areas reside in these more densely populated regions.
- 3) Much of the spatial clustering of rural populations follows infrastructural investments. Only 5% of Zambia's customary land is within 2 hours to an urban center of 20,000 people or more. Yet, this 5% of land is home to approximately 12% of the customary land population.
- 4) The majority of Zambia's customary land is extremely remote from urban areas. We estimate that 69% of the remaining customary land is 8 hours or more from an urban center of 20,000 people or more.
- 5) Average aggregate rainfall in most of Zambia is adequate for cereal crop production. However, many parts of the country experience high levels of inter and intra-seasonal rainfall variability. This is particularly the case in the southern, eastern, and western parts of the country. Yet due to historical investments in infrastructure these are also the same regions where large shares of the rural population live. We estimate that 55% of the rural population lives in areas with higher intra-seasonal rainfall variation than the national median.
- 6) In higher density and more market accessible regions of rural Zambia, institutions for allocating land are changing rapidly. Traditional mechanisms for allocating land are breaking down and are being replaced by market systems, such as land rental. Similarly, land

alienation is occurring most rapidly in these more accessible areas. Finally, fallow rates show a marked decline in these more accessible regions.

Discussion and Conclusion

Our findings suggest that there is far less customary land available for smallholder utilization than is often assumed in policy-making circles. Moreover, of the remaining customary land, little has the sorts of market access and climatic conditions to easily enable agricultural commercialization. Indeed, remaining customary areas where the conventional components of a smallholder-led development strategy are most viable are also the places where processes of land commodification and alienation are most prevalent. In the regulatory vacuum that characterizes Zambian land policy, these institutional dynamics must be interpreted with some apprehension.

Without policies that protect customary rights of holders from land appropriation, and enable local residents to alienate land and to participate on equal footing in land markets, on-going processes of land commodification and alienation are unlikely to achieve the sorts of outcomes necessary for a pro-poor agricultural growth strategy to take hold. Indeed, these processes are likely to hasten already severe land inequality conditions, and will serve to enclose viable agricultural areas from smallholder use.

Recommendations:

In lights of these concerns and the evidence presented, there is urgent need to prioritize the enactment of a land policy in Zambia. This policy must:

- 1) Provide standardized procedures for alienating land in customary areas, with clear steps to support titling acquisition by local residents.
- 2) Be attentive to on-going institutional changes in land allocation systems in customary areas by providing legal recognition and security to market transactions in customary areas.
- 3) Be complimented with investments in infrastructure and services to improve market access conditions and climate change adaption capacity in Zambia's remaining customary land. These investments should be particularly attentive to prevailing rainfall conditions and projected changes. This suggests a dual strategy of infrastructural investments in more stable agro-ecological zones, coupled with climate change mitigation investments, such as dam construction, in drier more unstable regions.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	iii
INDABA AGRICULTURAL POLICY RESEARCH INSTITUTE TEAM MEMBERS	iv
EXECUTIVE SUMMARY	v
LIST OF TABLES	viii
LIST OF FIGURES	viii
ACRONYMS AND ABBREVIATIONS	ix
1. INTRODUCTION	1
2. LAND POLICIES AND LANDSCAPE TRANSFORMATIONS	3
3. DATA AND METHODS	4
4. REVISING THE 94%: HOW MUCH CUSTOMARY LAND DOES ZAMBIA REALLY HAVE?	5
5. NOT ALL LAND IS CREATED EQUAL: ENDOWMENT HETEROGENEITY WITHIN CUSTOMARY AREAS	8
5.1. Population Densities, Population Distributions, and Land Gini Coefficients	8
5.2. Market Access Conditions	11
5.3. Climatic Conditions	12
6. INSTITUTIONAL DYNAMISM WITHIN CUSTOMARY AREAS: SPATIAL PATTERNS IN THE COMMODIFICATION OF TRADITIONAL LAND	16
7. DISCUSSION AND CONCLUSIONS	19
REFERENCES	21

LIST OF TABLES

TABLE	PAGE
1. Land Area under Alternative Management Claims (Km ² and %)	6
2. Share of Available Customary Land by Population Density	8
3. Share of Available Customary Land by Travel Time to Urban Center of 20,000 People or More	11
4. Share of Available Customary Land and Percent of Population by Annual Rainfall Average Quartiles 1993-2013, Zambia	13
5. Inter-seasonal Coefficients of Variation in Annual Rainfall in Available Customary Land Areas of Zambia, 1993-2013	14
6. Share of Customary Land by Quartiles of Coefficient of Variation in Intra-seasonal Pentadal Rainfall, 1993-2013	15
7. Rental Market Participation Rates	16
8. Title Conversion Rates	17
9. Reductions in Fallowing, as Share of Farm Area	17

LIST OF FIGURES

FIGURE	PAGE
1. Accounting for Land That Is Unavailable to Smallholder Cultivation in Zambia	5
2. Population Densities in Available Customary Land Areas, Zambia	9
3. Percent of Smallholders Reporting that Local Customary Authorities Do not Have Land to Allocate by District, Zambia	9
4. Gini Coefficient of Smallholder Land Holdings by District	10
5. Travel Time to Urban Center of 20,000 or Greater for Available Customary Land, Zambia	12
6. Annual Average Rainfall (mm) in Available Customary Land Areas, 1993-2013	13
7. Inter-seasonal Coefficients of Variation in Annual Rainfall in Available Customary Land Areas of Zambia, 1993-2013	14
8. Quartiles of Intra-seasonal Coefficient of Variation for Pentadal Rainfall in Available Customary Land, 1993-2013	15

ACRONYMS AND ABBREVIATIONS

CHIRPS	Climate Hazards Group InfraRed Precipitation with Stations
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo - International Maize and Wheat Improvement Center; Mexico)
CSO	Zambia's Central Statistical Office
GLWD	Global Lakes and Wetlands Database
GMAs	Game Management Areas
GRUMP	Global Rural-Urban Mapping Project
ha	hectares
IAPRI	Indaba Agricultural Policy Research Institute
IUCN	International Union for Conservation of Nature
km	kilometers
MAL	Ministry of Agriculture and Livestock
mm	millimeters
RALS	Rural Agricultural Livelihoods Survey
SRTM	Shuttle Radar Topography Mission
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre

1. INTRODUCTION

To feed its burgeoning urban and rural populations over the next several decades, African agriculture will require large and sustained growth in production. While some of this growth will certainly need to come from yield improvements, there is every reason to believe that growth of the magnitude required will depend in large part upon area expansion (Evenson and Gollin 2003). Yet despite the region's nominal land abundance, the scope for such growth is increasingly seen as fraught with challenges related in part to constrained access to arable land resources by smallholder populations (Jayne, Chamberlin, and Headey 2014). In order to be viable, smallholder-led development strategies will have to contend with realistic assessments of the distribution of land resources and the institutions that govern access to these resources (Jayne et al. 2014; Jayne, Chamberlin, and Headey 2014). While this is unambiguously true in very densely populated places like Rwanda and Malawi, it may well also be the case in the region's ostensibly low-density countries (Chamberlin, Jayne, and Headey 2014). In this paper, we assert that Zambia is one such case, although it is not often recognized as such because of an inadequate and outdated knowledge base on the availability of arable land for smallholder production and associated land governance institutions.

With a total surface area of 751,610 km² and a population of 14.6 million people, the population density in Zambia is among the lowest in Sub-Saharan Africa, representing one of the most land abundant countries in the region. Of Zambia's total land area, it is frequently asserted that 94% falls under customary systems of land administration (Government of Zambia 2002; Zambian Development Agency 2014; Zambian House of Chiefs 2009). By implication, this land is available for cultivation by smallholder farmers. Policy makers and development practitioners, therefore, rarely consider land access to be a constraint to smallholder production. Perhaps as a result of this pervasive belief, the enactment of a comprehensive land policy has stagnated for decades (Nolte 2014). Instead of tackling thorny issues related to smallholder land access, Zambian policy-makers have opted to pass procedural laws, such as the 1995 Land Act, which provides guidelines for the transfer of customary land to leasehold tenure, but does not seek to regulate land allocations or administrative systems (Sitko, Chamberlin, and Hichaambwa 2014).

The narrative of land abundance, and the land policy inertia it engenders, serves important political and economic purposes. On the one hand, it is often mobilized in development strategy documents and policies, particularly those aimed at attracting foreign investment to Zambia's agricultural and mining sectors (e.g., Zambia Development Agency 2015). On the other hand, recent evidence shows that local elites are increasingly utilizing Zambia's opaque land administration system to alienate large tracts of customary land for speculative purposes (Sitko and Jayne 2014a; Jayne et al. 2014).

Yet household survey data from rural Zambia increasingly contradicts the dominant narrative that Zambia has an abundance of freely utilizable arable land in customary areas. According to nationally representative household survey data for 2012, 54% of smallholders in Zambia indicated that traditional authorities, the administrators of Zambia's customary land, no longer have land available to allocate to local households.¹ Some of this may have to do with the high levels of spatial clustering in rural population distributions. Jayne, Chamberlin, and Headey (2014) report that just under half of Zambia's rural population resides in just 20% of the rural land area, and nearly a third of the rural population are concentrated in just 10% of the land

¹ These data come from the Rural Agricultural Livelihoods Survey, further described in section II.

area. Such clustering begs the question: if so much land is available and households report localized access constraints, what is preventing them from tapping into the remaining surplus?

We assert that the stylized portrayal of Zambia as a country in which the vast majority of land is under customary tenure and is freely available for cultivation by the smallholder majority is fundamentally disconnected from reality. The oft-quoted 94% (of land area under customary tenure) is not grounded in empirical evidence and is increasingly subject to criticism (Kalinda et al. 2008; Honig and Mulenga 2015). The continued dominance of this land abundant narrative means that land and agricultural policies and investments are detached from the land access constraints experienced by most smallholder farmers. There is, therefore, urgent need to update our knowledge on both the quantity of available customary land and its potential for smallholder cultivation and commercialization. Furthermore, we suggest that competition for land resources are engendering important institutional changes within areas which are nominally under traditional tenure. Such changes appear to be under-recognized by current land policy discussions, which tend to emphasize the predominance of informality and non-market allocation mechanisms (House of Chiefs 2009). A continuation of policies based on an empirically naïve narrative of land abundance runs the risk of worsening smallholder land access conditions and foreclosing future opportunities for future generation of smallholder farmers.

Using available spatial data on Zambian land, coupled with geographically explicit rural household survey data, this paper seeks fill the persistent knowledge gaps around Zambia's customary land resources. More specifically, we have three primary objectives:

- 1) To update the facts on the magnitude and location of land under customary tenure in Zambia;
- 2) To identify and describe factors which may constrain smallholder access and/or utilization of land resources within remaining customary areas; and
- 3) To document recent evidence for institutional dynamism within customary areas, particularly incipient patterns of land commodification and associated institutional changes.

The paper is organized as follows. Section 2 describes the historical institutional and legal contexts of Zambian land administration, along with a review of how land resources are characterized in policy documents. Section 3 describes the data and methods that we use to provide and updated characterization. Sections 4, 5 and 6 provide findings related to our three objectives. Section 7 concludes with policy implications of these findings, with particular attention to how a more empirically grounded understanding of customary land resources and institutional realities may affect smallholder-led development strategies.

2. LAND POLICIES AND LANDSCAPE TRANSFORMATIONS

We begin by situating our analysis within the context of the country's land policy environment. Like many countries in Sub-Saharan Africa, land in Zambia is administered through what Mamdani (1996) referred to as a *bifurcated* system rooted in the historical legacy of indirect rule (Colson 1971). To facilitate the colonization of Zambia (then Northern Rhodesia), colonial officials created two systems of governance with distinct geographies. So-called *crown land* was demarcated along major infrastructure corridors and nascent urban centers. These areas were designed to attract a European settler population, and were administered under British common law principles (Berry 1993; Sitko, Chamberlin, and Hichaambwa 2014). Estimates from the time state that crown land comprised 6% of the total land area of the colony, but it is unclear how this figure was derived (Orders in Council 1928). The remaining 94% of land was designated as native reserves and native trust land, administered through a system of chiefs and headmen. These *traditional authorities* were tasked with collecting hut taxes on behalf of the colonial government, and in return were provided considerable discretion over the administration of land in their designated areas (Berry 1993; Colson 1971). While land allocation practices vary across traditional authority systems, the common principle of granting usufruct rights to local residents and prohibiting individual alienation are shared by all traditional systems.

Following independence in 1964 the bifurcated system of land administration was continued, with crown land simply renamed *state land*. In 1975 the Government of Zambia, as part of its transition to a single party rule and under the guise of its humanist state ideology, stripped all land of its value, vested it in the president, and converted all freehold titles on state land to leaseholds (Roth, Khan, and Zulu 1995). This was followed in 1995 with a new Land Act, which fused native reserves and trusts into *customary land*, and created procedures for individuals and companies to transfer customary land to leasehold title (Sitko, Chamberlin, and Hichaambwa 2014; Brown 2005).

The 1995 Land Act was part of a broader transition to a more liberalized economic policy regime. Since its promulgation, Zambia has undergone a host of transformations, which have likely radically transformed the geography of customary land in the country. Over the last decade Zambia has had gross domestic product growth rates of over 6%, making it one of the fastest growing economies in the world. This has contributed to the rise of a Zambian urban middle class, yet has failed to improve incomes for the majority of the population, particularly those in rural areas. Recent analyses suggest that many of these urban wage earners are investing in the acquisition of land in customary areas and are converting it to titles as prescribed by the 1995 Land Act (Sitko and Jayne 2014a). Zambia is also in the midst of a population boom driven by population growth rates of nearly 3%, and rapid urban expansion, with urbanization rates of 4.15% (Central Statistical Office 2010). To accommodate this rapidly growing urban population, the central and local governments have acquired significant tracks of customary land and converted it into leaseholds for urban residents. The central government has also utilized the 1995 Land Act to alienate land for commercial farming blocks and agricultural settlement areas (Chenoweth, Knowles, and Ngenda 1995; Sitko, Chamberlin, and Hichaambwa 2014).

The combination of permissive land policies, demographic changes, and rising urban incomes are likely altering the conditions for customary land access in important ways. In the following section, we explore how these changes intersect with previous administrative designations, such as National Parks and Game Management Areas, to shape the paradoxical landscape of land constraints for the rural poor amidst a seeming abundance of land.

3. DATA AND METHODS

Indicators of household land use, participation in land tenure and market institutions, and perceptions about land availability come from the 2012 RALS, a nationally representative household survey conducted by the Indaba Agricultural Policy Research Institute in collaboration with Zambia's Central Statistical Office (CSO) and Ministry of Agriculture and Livestock (CSO/MAL/IAPRI 2012). A total of 8,839 households were surveyed in 442 Standard Enumeration Areas in all districts of the country. The sample was designed to be representative of the rural farm households cultivating less than 20 hectares (ha) of land for farming and/or livestock production. The reference period for the survey was May 2011 to April 2012, corresponding to the 2011/2012 production and marketing season.

To track changes in market participation and title acquisition, we compare RALS data with information from the 2001 and 2008 waves of the *Zambian Supplemental Survey*, carried out by CSO in association with the then-Ministry of Agriculture and Cooperatives and MSU. The survey the sampling frame included 70 of Zambia's 72 Districts and, like the RALS, is nationally representative.

Boundaries of land claims are from a variety of sources. Data on the boundaries of National Parks, Game Management Areas (GMAs), and designated Forest Reserves are from the World Database on Protected Areas (IUCN and UNEP-WCMC 2013). Data on state lands (which include farm blocks) are from a spatial boundary dataset in wide circulation within the Ministries of Agriculture, Finance, Planning, and other governmental and non-governmental entities, although the provenance of this dataset cannot be determined with certainty. To evaluate the validity of these datasets, we confirmed that mapped boundaries conformed to knowledge held by managerial and operational personnel within the relevant ministries.

Other geospatial data come from a variety of sources. Rural population densities are from the GRUMP project (Balk and Yetman 2004). Data on rainfall come from the Climate Hazards Group InfraRed Precipitation with Stations (CHIRPS) data, a 0.05° resolution, gridded precipitation time series dataset (Funk et al. 2014). Market access is calculated on the basis of a travel time model which uses data on roads, elevation, and land cover. Roads data were adapted from topographic map data by staff at the United Nations' World Food Programme's Vulnerability and Mapping unit for Zambia (Mulando personal communication). Elevation data are from NASA's SRTM dataset. Land cover data are from GlobCover for 2009 (Bontemps et al. 2011). Water body boundaries come from the Global Lakes and Wetlands Database.

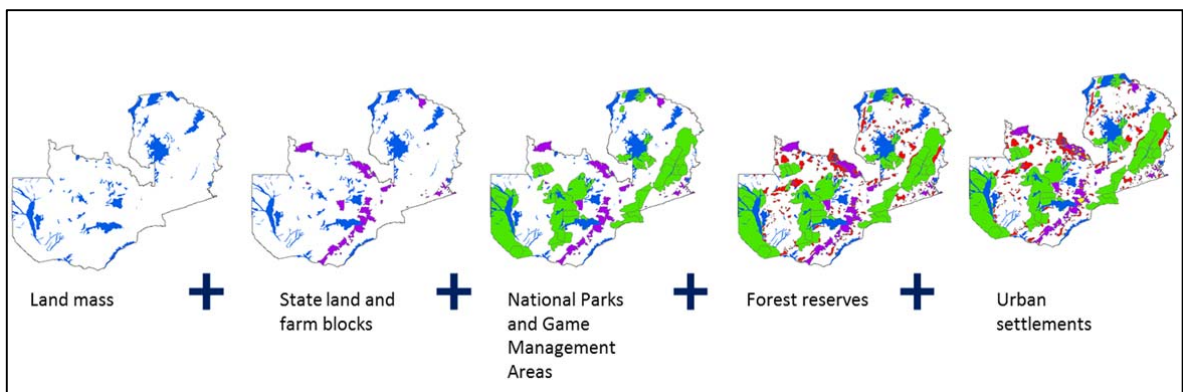
4. REVISING THE 94%: HOW MUCH CUSTOMARY LAND DOES ZAMBIA REALLY HAVE?

While often informally acknowledged as being out of date, the figure of 94% of Zambia’s land area being under traditional authority continues to play a central role in how policy makers and state agencies conceptualize land access and administrative conditions in the country. For example, the *Zambian Development Agency’s* pamphlet to attract investment in *Zambian agriculture* highlights the 94% figure and the fact that this land can be converted to leasehold title as an important selling point to potential investors (*Zambian Development Agency 2014*). However, given the recent economic and demographic dynamics affecting land acquisitions by the state and individuals, combined with historical land designations such as Forest Reserves and National Parks, which are officially designated as customary areas but are not available to smallholder cultivation, the figure of 94% begs revision.

To estimate the amount of customary land available for smallholder production requires accounting for not only land that is administered as state land, including farm blocks and urban settlements, but also land use categories ostensibly under customary control but where smallholder cultivation is either prohibited, such as national parks, or subject to ambiguous or competing regulatory frameworks, such as in forest reserves and game management areas. Figure 1 provides a visual representation of what the map of Zambia looks like as these areas are progressively removed from customary control.

Accounting for these various land designations significantly alters the amount of land that is under customary rule and available for smallholder cultivation. Table 1 summarizes the amount of land available under customary control by province and at a national level. Based on these calculations we estimate that only 54% of Zambia’s land, or approximately 40 million hectares, remains under customary control and potentially available to smallholder cultivation; far less than the 94% used in most discussions about customary land.

Figure 1. Accounting for Land That Is Unavailable to Smallholder Cultivation in Zambia



Source: Authors.

Table 1. Land Area under Alternative Management Claims (Km² and %)

	Total	Wetlands	Urban Settlements	National Parks and GMAs	Forest Reserves	State Lands	Remaining Customary Land
Central	94,811 (12.6%)	7,595 (8.0%)	250 (0.3%)	26,540 (28.0%)	5,842 (6.2%)	7,595 (8.0%)	50,577 (53%)
Copperbelt	30,760 (4.1%)	1,829 (5.9%)	1,746 (5.7%)	4,157 (13.5%)	5,736 (18.6%)	5,570 (18.1%)	15,130 (49%)
Eastern	50,989 (6.8%)	1,405 (2.8%)	165 (0.3%)	16,280 (31.9%)	4,545 (8.9%)	2,975 (5.8%)	26,776 (53%)
Luapula	49,779 (6.6%)	1,3438 (27.0%)	169 (0.3%)	6,169 (12.4%)	4,310 (8.7%)	0 (0%)	27,044 (54%)
Lusaka	22,003 (2.9%)	325 (1.5%)	974 (4.4%)	12,016 (54.6%)	487 (2.2%)	3,897 (17.7%)	5,765 (26%)
Muchinga	86,831 (11.6%)	5,778 (6.7%)	167 (0.2%)	34,916 (40.2%)	8,959 (10.3%)	84 (0.1%)	42,369 (49%)
North Western	125,524 (16.7%)	6,084 (4.8%)	500 (0.4%)	22,671 (18.1%)	4,834 (3.9%)	4,918 (3.9%)	100,436 (80%)
Northern	77,628 (10.3%)	12,629 (16.3%)	337 (0.4%)	10,356 (13.3%)	24,248 (31.2%)	1,936 (2.5%)	25,511 (33%)
Southern	85,471 (11.4%)	10,276 (12.0%)	734 (0.9%)	23,570 (27.6%)	7,095 (8.3%)	9,297 (10.9%)	40,370 (47%)
Western	127,623 (17.0%)	13,797 (10.8%)	164 (0.1%)	39,584 (31.0%)	8,130 (6.4%)	0 (0%)	71,613 (56%)
National	751,417 (100%)	72,983 (9.7%)	5,231 (0.7%)	196,697 (26.2%)	73,896 (9.8%)	36,450 (4.9%)	405,516 (54%)

Source: Authors' calculations.

While we acknowledge that smallholder settlement does occur in some GMAs and forest reserves, we believe that this calculation significantly under represents available customary land, because we are unable to adequately account for land that has been converted by individuals from customary to leasehold land. Data on land conversions tracked by the Ministry of Lands are woefully out of date and lack spatial coordinates. Despite these facts, over 280,000 ha of land have been recorded as being converted from customary to leasehold title for agricultural purposes alone (Sitko and Jayne 2014a). Once other land uses, such as mining, are accounted for, we would expect this number to rise substantially.

Despite the limitations of the available data, this simple exercise goes some way toward clarifying the actual customary land availability situation in Zambia. In aggregate, 40 million ha of land would seem to be more than sufficient to accommodate Zambia's current smallholder population and future generations to come. Why then do so many Zambian smallholders claim that customary authorities in their areas do not have additional land to allocate to local residents? Perhaps the question is not how much customary land is available, but rather what is the potential of the existing land to provide reasonable opportunities for the smallholder farming sector? In the following section we explore in more detail the prevailing conditions for smallholder agriculture in Zambia's remaining customary land.

5. NOT ALL LAND IS CREATED EQUAL: ENDOWMENT HETEROGENEITY WITHIN CUSTOMARY AREAS

The capacity of smallholders to utilize agriculture as a means to a more prosperous livelihood requires, among other things: 1) Reasonably low population densities and land ownership inequality to allow future generations to access land without significant fragmentation of existing farms; 2) Reasonable access to input and output markets and basic services; and 3) Rainfall conditions that are adequate for rain-fed production systems and stable enough to limit the risk of routine weather induced crop failure. Important policy questions, therefore, revolve around the geographic distribution of smallholder population in Zambia's remaining customary land and the conditions under which these populations live. In this section we utilize these three geographic dimensions of smallholder livelihoods (population and land distribution, market access, and rainfall conditions) to disaggregate Zambia's remaining customary land. In particular, we quantify both the share of the customary land and the share of the customary land population living under these various geographic conditions.

5.1. Population Densities, Population Distributions, and Land Gini Coefficients

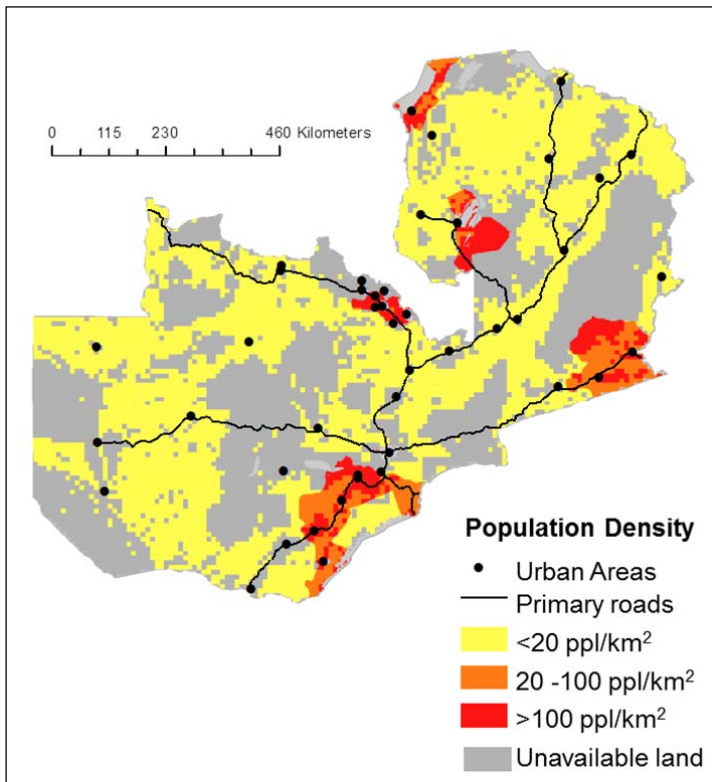
Of the estimated 40 million ha of customary land that are likely available for smallholder access, population densities remain quite low. As shown in Table 2, 92% of this available land has population densities of less than 20 people/km². Thus, it appears on aggregate that population densities are not a major constraint to smallholder's capacity to expand land holdings or acquire land for future generations. However, as shown in Table 2, 30% of the population residing in customary areas of Zambia lives in regions where population densities exceed 20 people/km². These higher density regions are concentrated in the eastern and southern parts of the country, with smaller high density pockets in the northern parts of the country (Figure 2). As shown in Figure 3, these pockets of high density customary areas coincide quite closely with districts where smallholder farmers report the highest incidence of land constraints.

Table 2. Share of Available Customary Land by Population Density

Population Sensity (People/km ²)	Share of Available Customary Land by Population Density	Share of Customary Land Population
<20	92%	70%
20-100	7%	23%
>100	1%	7%

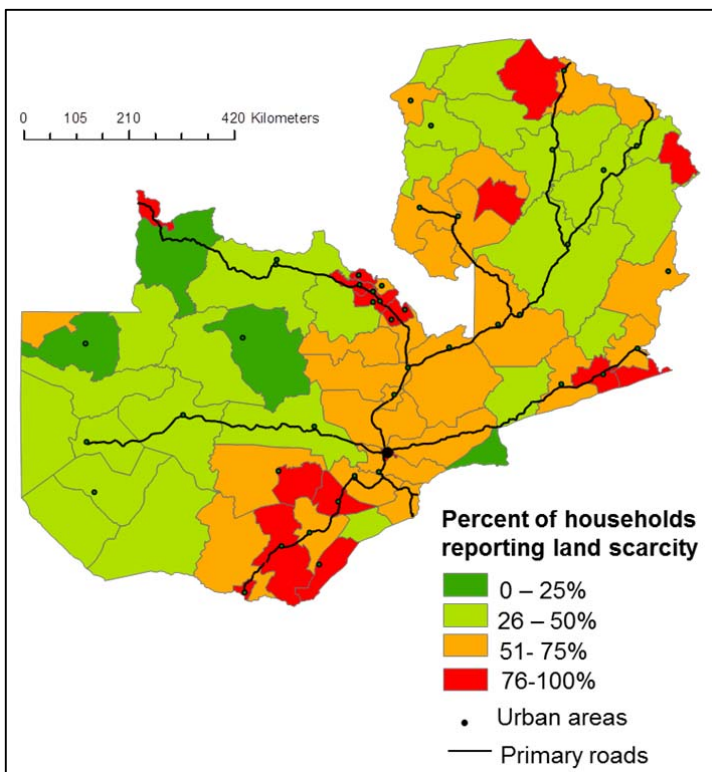
Source: Authors.

Figure 2. Population Densities in Available Customary Land Areas, Zambia



Source: Authors.

Figure 3. Percent of Smallholders Reporting that Local Customary Authorities Do not Have Land to Allocate by District, Zambia



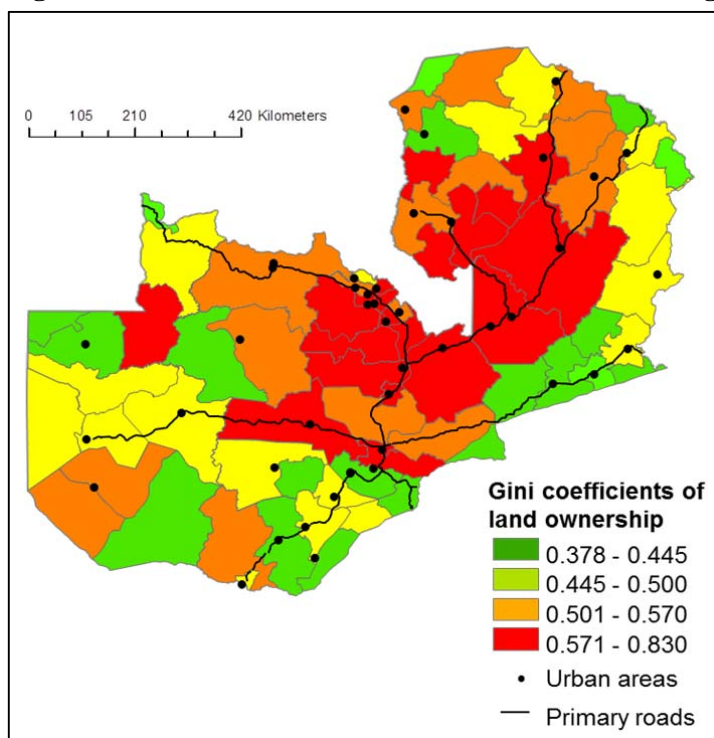
Source: CSO/MAL/IAPRI RALS Survey 2012.

However, reported land scarcities are not just a matter of population densities. In some parts of the country, land scarcities also have a geographic relationship with inequality in land ownership. As shown in Figure 4, the districts that follow the major road infrastructure north from the capital Lusaka, including the Copperbelt region, have very high levels of inequality in land holding size among smallholders² as measured by district level Gini coefficients. Indeed, in these districts, Gini coefficient for land ownership exceed 0.57, which is considerably higher than the 0.50 estimates from Latin America where land inequality is considered a major constraint to agricultural-led poverty reduction (Deininger and Squire 1998). High land Gini coefficients in areas in close proximity to urban centers are being driven, in large part, by the acquisition of customary land by urban elites (Sitko and Jayne 2014a). Much of this land is being acquired for speculative purposes and is being converted to leasehold tenure, thus removing it from future smallholder use (ibid).

Interestingly, in many of the higher density regions in the southern and eastern parts of the country, Gini coefficients in land size are lower. We posit that this is the result of several decades of land fragmentation due to high population densities and limited land availability, leading to some equilibration of land size ownership.

Thus, while population densities throughout Zambia’s remaining customary land are quite low on average, large segments of the rural populations are clustering in pockets where land access conditions are considerably more constrained.

Figure 4. Gini Coefficient of Smallholder Land Holdings by District



Source: CFS 2010.

² Note that the data used to calculate Gini coefficient do not include farms greater than 20 ha in size. If these farm were included Gini coefficients would likely be much higher.

Table 3. Share of Available Customary Land by Travel Time to Urban Center of 20,000 People or More

Travel Time	Share of Available Customary Land	Share of Customary Land Population
Greater than 6 hours	69%	58%
2 to 6 hours	26%	30%
Less than 2 hours	5%	12%

Source: Authors.

The skewed distribution of land ownership in many parts of the country and high people to land ratios in others combine to substantially limit the poverty reduction potential of agricultural growth (Johnston and Mellor 1961; Johnston and Kilby 1975; Deininger and Squire 1998; Quan and Koo 1985) and the future viability of smallholder agriculture (Jayne et al. 2003; Jayne, Chamberlin, and Headey 2014).

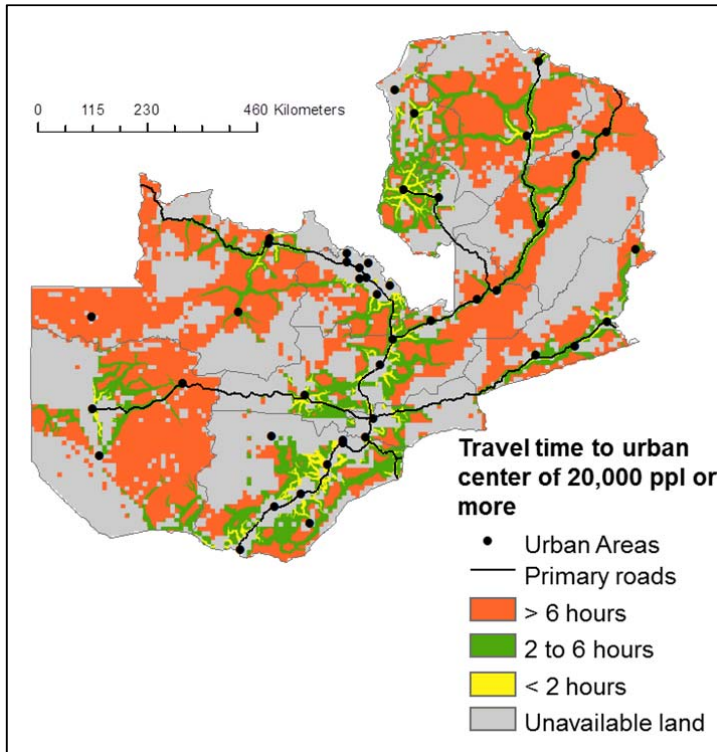
5.2. Market Access Conditions

Why do rural populations cluster in these areas, despite mounting land pressures? Much of the population distribution in Zambia's remaining customary land appears to be a function of infrastructural investments and resultant effects on market access conditions. As shown in Table 3, the vast majority of the remaining customary land is located in areas with fairly severe market access conditions. We estimate that of the available customary land in Zambia, 69% of it is located more than six hours from an urban center with a population of more than 20,000 people. Of the remaining 31% of the customary land only 5% of it is within two hours of an urban market area. However, it is within these relatively more accessible regions that many rural dwellers live. We estimate that roughly 12% of the population residing in customary land areas lives in the 5% of land that is within 2 hours of an urban market.

As shown in Figure 5, most of the market accessible customary land areas are located in the southern, eastern, and northern parts of the country where population densities and land size Gini coefficients are highest, and land constraints are becoming most acute. Thus, the distribution of urban centers and associated infrastructure linking these centers to rural hinterlands plays an important role in explaining the paradox of mounting land constraints in a low population density country.

While market intermediation services for agricultural products are reasonably competitive in Zambia, and elsewhere in Sub-Saharan Africa, physical remoteness still acts as an obstacle to improving smallholders' livelihoods (Sitko and Jayne 2014b; Chamberlin and Jayne 2013). Elevated transactions costs and limited access to important social services, such as health care and education, severely constrain the capacity of smallholders to earn a viable income and to provide opportunities for their children. Without significant investment to improve the infrastructure conditions in Zambia's remaining customary land, smallholders will continue to cluster in higher density, less remote areas. This, in turn, will drive up population densities and further limit the agricultural viability of these regions.

Figure 5. Travel Time to Urban Center of 20,000 or Greater for Available Customary Land, Zambia



Source: Authors

5.3. Climatic Conditions

During Zambia’s colonial period, European settlement expanded from the south of the country to the mining regions of the Copperbelt, with pockets of settlement in the northern and eastern parts of the country. This settlement pattern laid the foundation for the current distribution of urban centers and infrastructure in Zambia, as well as the location of customary land for smallholder agriculture. We posit that this historical legacy created a path dependency in the distribution of rural populations, which may not be consistent with where agro-ecological conditions are most favorable for the rain-fed production systems that predominant in rural Zambia.

Over the period 1993 to 2013, median annual rainfall in Zambia was 936 mm. As shown in Table 4, an estimated 44% of the remaining customary land in Zambia experiences average rainfall below the national median, yet these same areas are home to 52% of total population living in customary areas. As shown in Figure 6, these drier regions are clustered in the southern half of the country, where most of the original European settler agriculture took place in Zambia.

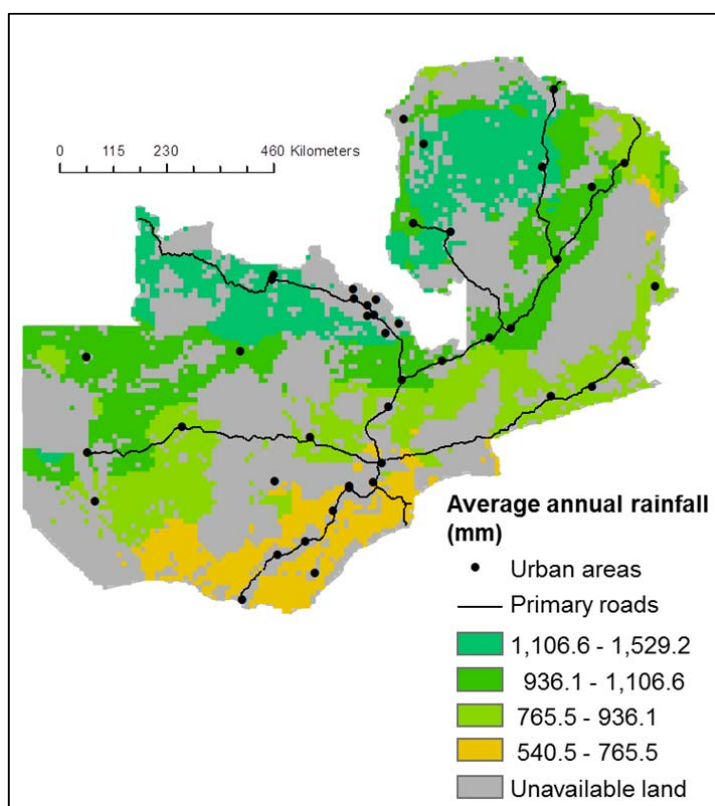
While aggregate rainfall conditions for most of Zambia are within acceptable ranges for the cultivation of staple grains, such as maize, there are serious concerns with inter and intra-seasonal rainfall variability in many parts of the country (Sys et al. 1993). Crop production simulator models suggest that rainfall variability, both between and within seasons, can have major effects on crop productivity in southern and eastern Africa (Cooper et al. 2008).

Table 4. Share of Available Customary Land and Percent of Population by Annual Rainfall Average Quartiles 1993-2013, Zambia

Rainfall Quartile	Average Rainfall Range (mm)	Share of Customary Land	Share of Customary Land Population
Lowest	540.5 - 765.5	14%	16%
2 nd	765.5 - 936.1	30%	36%
3 rd	936.1 - 1,106.6	32%	25%
Highest	1,106.6 - 1,529.2	24%	23%

Source: Authors.

Figure 6. Annual Average Rainfall (mm) in Available Customary Land Areas, 1993-2013

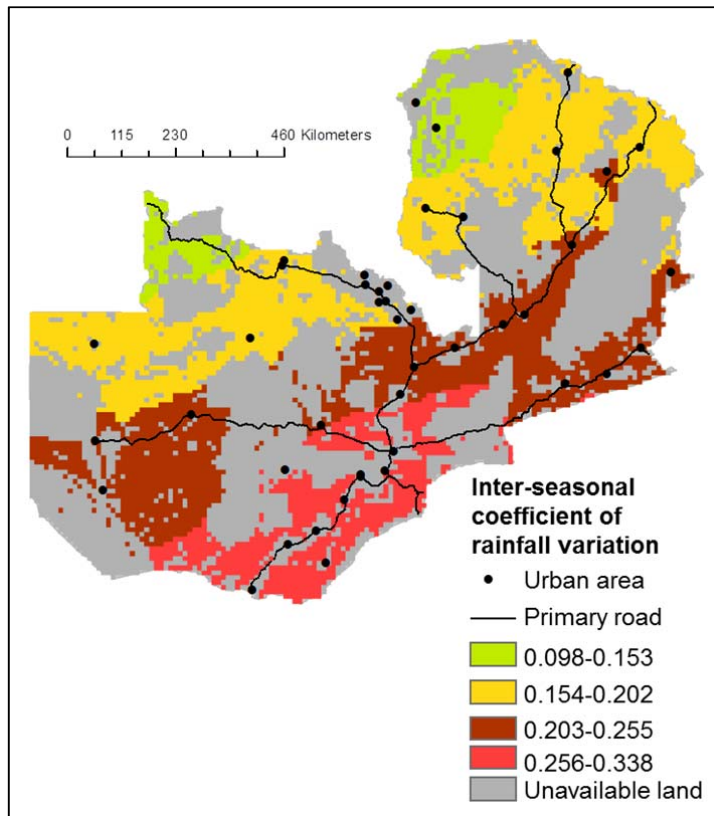


Source: Authors.

As shown in the tables and maps below, the southern half of the country experiences the greatest level of inter and intra seasonal variation in rainfall. As shown in Figure 7, most of the southern part of Zambia has witnessed inter-seasonal coefficients of variations in rainfall of 0.256 to 0.338 between 1993 and 2013. Moreover, approximately 26% of the customary land population lives within these highly variable rainfall regions (Table 5), where crop failure due to drought are common and rural livelihood security is tenuous (Cliggett 2005; Sitko 2008).

Intra-seasonal rainfall variations are equally important, as short droughts or heavy rains within a cropping season can dramatically alter yields (Cooper et al. 2008). The median coefficient of intra-seasonal rainfall variability in Zambia over the 20 year period 1993 to 2013 is approximately 0.85.

Figure 7. Inter-seasonal Coefficients of Variation in Annual Rainfall in Available Customary Land Areas of Zambia, 1993-2013



Source: Authors.

Table 5. Inter-seasonal Coefficients of Variation in Annual Rainfall in Available Customary Land Areas of Zambia, 1993-2013

Inter-seasonal Coefficient of Variability Quartile	Range	Share of Available Customary Land	Share of Customary Land Population
Highest	0.098-0.153	23%	25%
2 nd	0.154-0.202	24%	23%
3 rd	0.203-0.255	25%	26%
Lowest	0.256-0.338	27%	26%

Source: Authors.

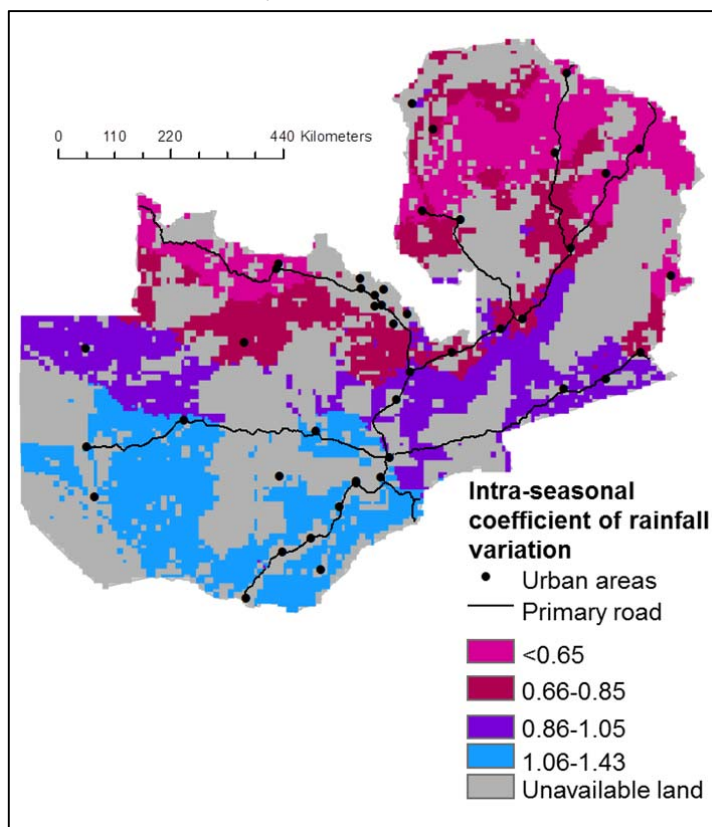
As shown in Table 6, approximately 50% of Zambia's remaining customary land areas intra-seasonal rainfall variability that is greater than the national median, but is home to 55% of the customary land population. As shown in figure 8, most of these risky cropping regions are spread across high density portions of the southern part of the country.

Table 6. Share of Customary Land by Quartiles of Coefficient of Variation in Intra-seasonal Pentadal Rainfall, 1993-2013

Rainfall CV Quartile	Range	Percent of Available Customary Land	Share of Customary Land Population
Lowest	<0.65	9%	10%
2 nd	0.66-0.85	41%	35%
3 rd	0.86-1.05	34%	36%
Highest	1.06-1.43	17%	19%

Source: Authors.

Figure 8. Quartiles of Intra-seasonal Coefficient of Variation for Pentadal Rainfall in Available Customary Land, 1993-2013



Source: Authors.

Unfortunately, most climate models suggest that regardless of changes in greenhouse gas emissions, we are now “locked into global warming and inevitable changes to climatic patterns which are likely to exacerbate existing rainfall variability in SSA and further increase the frequency of climatic extremes” (Copper et al. 2008; IPCC 2007). What this means is that in the more climatically volatile regions of southern Zambia, the coming decades will likely see an increase in the unpredictability of rainfall patterns from one year to the next, and an increase in the frequency of intra-seasonal droughts. Thus, in large segments of Zambia’s remaining customary land, we are likely to see increased livelihoods uncertainty and decreased viability of rain-fed crop production.

6. INSTITUTIONAL DYNAMISM WITHIN CUSTOMARY AREAS: SPATIAL PATTERNS IN THE COMMODIFICATION OF TRADITIONAL LAND

The preceding discussion suggests that of the remaining customary land in Zambia, only a fraction is located in areas with reasonably good market access conditions and fairly stable weather patterns. In the context of high levels of variability in the agricultural potential of Zambia’s remaining customary land, we anticipate significant demand pressure and institutional adaptations in these more viable areas, where the relative profitability of agricultural production is higher. In particular, we would expect to see the growth in the incidence of land markets and land titling in the customary land areas with the best endowments of geographical capital (proximity to markets and production potential).

Allocation mechanisms for customary land are commonly perceived to occur primarily, if not exclusively, through non-market systems such as inheritance and usufruct allocations from traditional authorities. Yet as competition for scarce land resources increases, these non-market systems often break-down, giving way to more market-oriented systems of land allocation (Berry 1993; Sitko 2010). Incipient land markets tend to evolve in ways that tend to reflect localized power differentials, because customary land administration systems do not explicitly permit market-based land transactions, thus pushing these markets through clandestine channels (Sitko 2010). Despite the ambiguity associated with whether or not renting is allowed by customary authorities, rural household survey evidence indicates that land markets are developing rapidly, especially in areas of higher rural population densities and market access (Table 7).

A large and growing literature indicates that the development of rental markets within smallholder farming environments may have a beneficial impacts on allocative efficiency (e.g., net transfers of land to the most productive farmers) as well as on equity and welfare outcomes (Holden et al. 2009). Nonetheless, empirical evidence for these impacts in Africa remains somewhat mixed (ibid). In the case of Zambia, there are some important areas of concern *a priori*. In particular, because emerging markets for customary land lack formal institutional support, participation may not be solely a function of an ability to pay. As Sitko (2010) has shown, participation in quasi-legal rental markets requires significant social capital in order to protect the transaction from punitive measure from traditional authorities and from appropriation by the other party to the transaction. In this context, rental markets may disproportionately favor local elites, excluding more marginalized households, and undermine some of the efficiency and welfare benefits that may otherwise accrue to land market development.

Table 7. Rental Market Participation Rates

Hours from city [‡]	2001	2008	2012
0-2	3.4%	3.4%	4.0%
2-4	1.7%	1.6%	3.3%
4-8	0.9%	1.1%	3.0%
>8	0.4%	0.6%	2.8%
Total	1.0%	1.2%	3.0%

Source: The 2001 and 2008 data are from the CSO/MAL/FSRP Supplemental Surveys; 2012 data are from the CSO/MAL/IAPRI Rural Agricultural Livelihoods Survey.

Notes: [‡] city = settlement of $\geq 100,000$ inhabitants in 2000.

Table 8. Title Conversion Rates

Hours from city*	2001	2008	2012
	Titled Land	Titled Land	Titled Land
0-2	6.0%	11.1%	27.7%
2-4	4.2%	5.4%	14.8%
4-8	2.9%	1.8%	5.6%
>8	2.7%	1.5%	4.1%
Total	3.2%	3.1%	8.6%

Source: The 2001 and 2008 data are from the (CSO/MAL/FSRP) Supplemental Surveys; 2012 data are from the CSO/MAL/IAPRI Rural Agricultural Livelihoods Survey.

Notes: † city = settlement of $\geq 100,000$ inhabitants in 2000.

The 1995 Land Act provides the legal support to convert customary usufruct rights to leasehold title. Competition for land in more accessible regions raises the value of that land and increases incentives to transfer it to leasehold title. As shown in Table 8, over the period 2001 to 2012, we see an aggregate increase in land titling, with the pace of conversions particularly high in areas of relatively favorable access to markets.

Like the emergence of land rental markets, the rapid pace of land alienation in market accessible regions is not simply an organic process of institutional adaptations to land pressures. The 1995 Land Act places the power to convert customary land to leasehold title in the hands of the local traditional authority. It does not provide guidance or mechanisms to protect usufruct rights holders from having their land appropriated or to allow local residents to convert their land to leasehold title (Sitko, Chamberlin, and Hichaambwa 2014; Nolte 2014). As a result, conversion process trends to favor non-local individuals with access to wage income, often from public sector employment (ibid). There are two reasons for this: first, these individuals have the economic wherewithal and social capital needed to negotiate terms with the local traditional authorities, and; second, they are more aware of the processes and procedures for converting land and are more capable of negotiating bureaucratic complexities than local small-scale farmers. Thus, rather than reflecting a process of land alienation by local farmers seeking to secure their land rights under conditions of mounting scarcity, the growth in land titling in more market accessible regions is being driven in large part by non-local urban wage earners (Sitko, Chamberlin, and Hichaambwa 2014 show evidence for this in Zambia).

Table 9. Reductions in Fallowing, as Share of Farm Area

Hours from city [†]	2001	2008	2012	Reduction between 2001 and 2012
0-2	15.8%	9.8%	7.9%	-8.0%
2-4	14.8%	11.2%	11.0%	-3.8%
4-8	16.3%	10.8%	12.5%	-3.8%
>8	16.7%	10.9%	14.2%	-2.5%
Total	16.3%	10.8%	12.6%	-3.7%

Source: The 2001 and 2008 data are from the CSO/MAL/FSRP Supplemental Surveys; 2012 data are from the CSO/MAL/IAPRI Rural Agricultural Livelihoods Survey. Notes: † city = settlement of $\geq 100,000$ inhabitants in 2000.

Finally, indirect evidence of increasing scarcity is shown by trends in fallow rates among smallholder farmers (Table 9). Mirroring the spatial and temporal trends in the commodification of customary land shown above, fallow rates are lowest in the most accessible (but densely populated) parts of the country and they are declining the most quickly. While overall fallowing rates declined by 3.7% between 2001 and 2012, they declined by 8.0% in the most accessible areas over the same period.

All of the spatio-temporal trends presented above are consistent with competitive pressures inducing changes in land institutions and management practices in customary areas with reasonably good access to markets. These are precisely the areas where the majority of the country's rural population resides. These are also the areas where conventional smallholder-led development strategies may have the most traction: technology adoption faces the lowest costs, market-oriented production strategies are most viable, access to extension and other services is least constrained, etc. While the institutional landscape in these high potential regions is changing rapidly, this change is occurring in absence of a regulatory framework that is cognizant of the current and future needs of the smallholder farming community.

7. DISCUSSION AND CONCLUSIONS

While Zambia's customary land resources are very large in magnitude, they are a great deal less than the 94% of the country's land area. We have shown that a simple spatial accounting exercise, based on best available evidence, indicates that about half of the rural land resources may be nominally ascribed as part of the customary tenure system. We have also shown that such an exercise probably severely underestimates the land which is truly available to smallholder producers: there are significant constraints to smallholder land expansion – poor market access and risky agro-climatic production endowments, in particular. Furthermore, household survey evidence suggests that there may be substantial prior claims on what otherwise appears to be idle land. Taken together, this suggests that not only is customary land scarcer than often assumed, more importantly the amount of customary land with requisite market access and rainfall conditions to enable a process of smallholder commercialization is extremely constrained.

We have shown that populations are clustering in the regions with the greatest potential for a market-led smallholder growth process to take hold. At the same time, there are indications of non-traditional land institutional developments within these more accessible customary regions. Do such changes imply indigenous responses to increasing competition for scarce resources? Or do they indicate incipient processes of alienation of customary land by urban elites or others? It is probably too early to say with certainty, although the implications of the answer are significant. What is clear is that the places where the conventional components of a smallholder-led development strategy are most viable are also the places where processes of land commodification and alienation are most prevalent. In the regulatory vacuum that characterizes Zambian land policy, these institutional dynamics must be interpreted with some apprehension.

Without policies that protect customary rights holders from land appropriation, and enable local residents to alienate land and to participate on equal footing in land markets, on-going processes of land commodification and alienation are unlikely to achieve the sorts of outcomes necessary for a pro-poor agricultural growth strategy to take hold. Indeed, these processes are likely to hasten already severe land inequality conditions, and will serve to enclose viable agricultural areas from smallholder use.

In lights of these concerns and the evidence presented, there is urgent need to prioritize the enactment of a land policy in Zambia. This policy must provide standardized procedures for alienating land in customary areas, with clear steps to support land title acquisition by local residents. Moreover, this policy must be attentive to on-going institutional changes in land allocation systems in customary areas by providing legal recognition and security to market transactions in customary areas.

Yet these policy changes alone are not sufficient to cope with the mounting land constraints experienced by the majority of rural people in Zambia. They must be complimented with investments in infrastructure and services to improve market access conditions and climate change adaption capacity in Zambia's remaining customary land. These investments should be particularly attentive to prevailing rainfall conditions and projected changes. This suggests a dual strategy of infrastructural investments in more stable agro-ecological zones, coupled with climate change mitigation investments, such as dam construction and irrigation investment, in drier, more climatically unstable regions.

More broadly, our analysis suggests that the dominant narrative of land abundant Africa must be viewed with considerable trepidation. Even in one of the lowest density countries in Sub-Saharan Africa, the viability of a smallholder-led development strategy is increasingly circumscribed by land constraints. As such, even in apparently land abundant countries, policies and investment strategies must be attentive to the ways in which land constraints shape the current and future prospects for smallholder agriculture. As African populations and economies grow, the need for an explicit integration of land policies with broader development objectives is increasingly critical.

REFERENCES

- Balk, Deborah and Gregory Yetman. 2004. *The Global Distribution of Population: Evaluating the Gains in Resolution Refinement*. New York, NY: Columbia University, Center for International Earth Science Information Network.
- Berry, S. 1993. *No Condition Is Permanent: The Social Dynamics of Agrarian Change in Sub-Saharan Africa*. Madison, WI: University of Wisconsin Press.
- Bontemps, Sophie, Pierre Defourny, Eric Van Bogaert, Olivier Arino, Vasileios Kalogirou, and José Ramos Pérez. 2011. *GlobCover 2009, Product Description and Validation Report*. Leuven, Belgium and Paris: Université Catholique de Louvain and European Space Agency.
- Brown, T. 2005. Contestation, Confusion, and Corruption: Market-based Land Reform in Zambia. In *Competing Jurisdictions: Settling Land Claims in Africa*, ed. Sandra Evers, Marja Spierenburg, and Harry Wels. Boston: Brill Leiden.
- Central Statistical Office, Ministry of Agriculture and Cooperatives and Food Security Research Project (CSO/MAL/FSRP). 2001. *First Supplemental Survey to the 1999/2000 Post-Harvest Survey Data*. Lusaka, Zambia: FSRP.
- Central Statistical Office, Ministry of Agriculture and Cooperatives and Food Security Research Project (CSO/MAL/FSRP). 2008. *Third Supplemental Survey to the 1999/2000 Post-Harvest Survey Data*. Lusaka, Zambia: FSRP.
- Central Statistical Office, Ministry of Agriculture and Livestock and Indaba Agricultural Policy Research Institute (CSO/MAL/IAPRI). 2012. *Rural Agricultural Livelihoods Survey (RALS) Data*. Lusaka, Zambia: IAPRI.
- Central Statistical Office. 2010. *Zambian Census, 2010*. Accessed 15 July 2015 at: http://unstats.un.org/unsd/demographic/sources/census/2010_phc/Zambia/PreliminaryReport.pdf.
- Chamberlin, J. and T.S. Jayne. 2013. Unpacking the Meaning of 'Market Access': Evidence from Rural Kenya. *World Development* 41: 245-264.
- Chamberlin, Jordan, T.S. Jayne, and D. Headey. 2014. Scarcity Amidst Abundance? Reassessing the Potential for Cropland Expansion in Africa. *Food Policy* 48: 51-65.
- Chenoweth, F., J. Knowles, and G. Ngenda. 1995. Settlement Programs. Land Tenure, Land Markets, and Institutional Transformation in Zambia. In *Land Tenure, Land Markets, and Institutional Transformation in Zambia*, ed. M. Roth and S.G. Smith. Madison, WI: Land Tenure Center, University of Wisconsin Madison.
- Cliggett, L. 2005. *Grains from Grass: Aging, Gender, and Famine in Rural Africa*. Ithaca, NY: Cornell University Press.
- Colson, E. 1971. *The Social Consequences of Resettlement: The Impact of the Kariba Resettlement upon the Gwembe Tonga* (Vol. 4). Manchester, England: Published on

behalf of the Institute for African Studies, University of Zambia by Manchester University Press.

- Cooper, P.J.M., J. Dimes, K.P.C. Rao, B. Shapiro, B. Shiferaw, and S. Twomlow. 2008. Coping Better with Current Climatic Variability in the Rain-fed Farming Systems of Sub-Saharan Africa: An Essential First Step in Adapting to Future Climate Change? *Agriculture, Ecosystems, & Environment* 126.1: 24-35.
- Deininger, K. and L. Squire. 1998. New Ways of Looking at Old Issues: Inequality and Growth. *Journal of Development Economics* 57.2: 259-287.
- Evenson, R.E. and D. Gollin. 2003. Assessing the Impact of the Green Revolution, 1960 to 2000. *Science* 300.5620: 758-762.
- Funk, C.C., P.J. Peterson, M.F. Landsfeld, D.H. Pedreros, J.P. Verdin, J.D. Rowland, B.E. Romero, G.J. Husak, J.C. Michaelsen, and A.P. Verdin. 2014. A Quasi-global Precipitation Time Series for Drought Monitoring. *U.S. Geological Survey Data Series Number 832*: 4 <http://dx.doi.org/10.3133/ds832>.
- Government of Zambia. 2002. Draft Land Policy. Accessed online 16 March 2015 at: http://www.mokoro.co.uk/files/13/file/lria/zambia_draft_land_policy_nov_2002.pdf
- Honig, L. and B. Mulenga. 2015. The Status of Customary Land and the Future of Smallholder Farmers under the Current Land Administration System in Zambia. IAPRI Working Paper No. 101. Lusaka, Zambia: IAPRI.
- IPCC. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. In *Regional Climate Projections*, ed. S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller. Cambridge, UK: Cambridge University Press,
- IUCN and UNEP-WCMC. 2013. The World Database on Protected Areas. Cambridge, UK: UNEP-WCMC. Accessed 15 February 2015. Available at: www.protectedplanet.net.
- Jayne, T.S., J. Chamberlin, and D. Headey. 2014. Land Pressures, the Evolution of Farming Systems, and Development Strategies in Africa: A Synthesis. *Food Policy* 48: 1-17.
- Jayne, T.S., A. Chapoto, N. Sitko, C. Nkonde, M. Muyanga, and J. Chamberlin. 2014. Is the Scramble for Land in Africa Foreclosing a Smallholder Agricultural Expansion Strategy? *Journal of International Affairs* 67.2: 35.
- Jayne, T.S., T. Yamano, M.T. Weber, C. Tschirley, R. Benfica, A. Chapoto, and B. Zulu. 2003. Smallholder Income and Land Distribution in Africa: Implications for Poverty Reduction Strategies. *Food Policy* 28.3: 253-275.
- Johnston, B.F. and J. Mellor. 1961. The role of Agriculture in Economic Development. *American Economic Review* 51.4: 566-593.
- Johnston, B.F. and P. Kilby. 1975. Agriculture and Structural Transformation: Economic Strategies in Late Developing Countries. New York: Oxford University Press.

- Kalinda, T., S. Bwalya, A. Mulolwa, and H. Haantuba. 2008. Use of Integrated Land Use Assessment (ILUA) Data for Forestry and Agricultural Policy Review and Analysis in Zambia. Lusaka, Zambia: Report prepared for the Forestry Management and Planning Unit of the Department of Forestry, FAO, the Zambian Forestry Department, and Ministry of Tourism, Environment, and Natural Resource Management.
- Mamdani, M. 1996. *Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism*. Princeton, NJ: Princeton University Press.
- Nolte, K. 2014. Large-scale Agricultural Investments under Poor Land Governance in Zambia. *Land Use Policy* 38: 698-706.
- Orders in Council (Crown Land and Native Reserves). 1928. Livingstone, Northern Rhodesia: Colonial Office.
- Quan, N. T. and A.Y. Koo. 1985. Concentration of Land Holdings: An Empirical Exploration of Kuznets' Conjecture. *Journal of Development Economics* 18.1: 101-117.
- Roth, M., A.M. Khan, and M.C. Zulu. 1995. Legal Framework and Administration of Land Policy in Zambia. In *Land Tenure, Land Markets, and Institutional Transformation in Zambia*, ed. M. Roth and S.G. Smith. Madison: Land Tenure Center, University of Wisconsin Madison.
- Sitko, N.J. 2010. Fractured Governance and Local Frictions: The Exclusionary Nature of a Clandestine Land Market in Southern Zambia. *Africa* 80.01: 36-55.
- Sitko, N.J. and T.S. Jayne. 2014a. Structural Transformation or Elite Land Capture? The Growth of "Emergent" Farmers in Zambia. *Food Policy* 48: 194-202.
- Sitko, N.J. and T.S. Jayne. 2014b. Exploitative Briefcase Businessmen, Parasites, and Other Myths and Legends: Assembly Traders and the Performance of Maize Markets in Eastern and Southern Africa. *World Development* 54: 56-67.
- Sitko, N.J., J. Chamberlin, and M. Hichaambwa. 2014. Does Smallholder Land Titling Facilitate Agricultural Growth? An Analysis of the Determinants and Effects of Smallholder Land Titling in Zambia. *World Development* 64: 791-802.
- Sitko, N. 2008. Maize, Food Insecurity, and the Field of Performance in Southern Zambia. *Agriculture and Human Values* 25.1: 3-11.
- Sys, C., E. Van Ranst, J. Debaveye, and F. Beernaert. 1993. Land Evaluation Part III, Crop Requirements. Agricultural Publications No. 7. Brussels, Belgium: Ghent University International Training Center.
- Zambian Development Agency. 2014. Lusaka: Zambian Development Agency. Accessed online 15 March 2015 at:
http://www.zda.org.zm/sites/default/files/Agriculture%20Sector%20Leaflet%20-%202014_0.pdf

Zambian House of Chiefs. 2009. Chiefs and the Law in Independent Zambia. Accessed online at: <http://www.houseofchiefs.com/2009/01/chiefs-and-law-in-independent-zambia.html> .