Land Use Policy 62 (2017) 2–12

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Agricultural land use change in Karamoja Region, Uganda

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ARTICLE INFO

Article history:
Received 16 May 2016
Received in revised form
14 November 2016
Accepted 18 November 2016
Available online 22 December 2016

Keywords:
Agriculture
Land use policy
Remote sensing
Karamoja
Uganda

ABSTRACT

We examine dramatic cropland expansion in Karamoja, Uganda by investigating the links between biophysical and political historical events leading to the current state of agricultural land use. Our objective was to quantify agricultural expansion, uncover the dominant drivers leading to the current state of agricultural land use and its impacts on livelihoods. Region wide analysis of remotely sensed data, land use policy and history as well as farmer interviews were undertaken. We posit that government programs instituting sedentary agriculture are the most significant drivers of cropland expansion in Karamoja. We show a 299% increase in cropland area between 2000 and 2011 with most expansion occurring in Moroto District (from 706 ha to 23,328 ha). We found no evidence of an increase in overall crop production or food security and food aid continues to be essential due to recurrent crop failures. Due to lack of resources for inputs (e.g., seeds and labor) cultivated fields remain very small in size and over 55% of once cultivated land is left fallow. Our findings bring into question whether continued promotion of rain-fed agriculture in Karamoja serves the best interests of the people. Current cropland expansion is directly competing and compromising pasture areas critical for livestock-based livelihoods. Without strong agricultural extension programs and major investments in climate-smart options, cropland expansion will continue to have a net negative impact, especially in the context of current climate projections which indicate a future decrease in rainfall, increase in temperature and an increase in the frequency and magnitude of extreme events.

Introduction

Since the 1960s underlying forces (e.g., cropland expansion programs, controlled grazing) originating from land use policy and development programs, more than proximate causes (direct local level actions), have profoundly influenced land-cover and land-use change in Karamoja. Policies based on modernization theory developed during colonial and post-independence periods have greatly influenced what Karamoja is today. Modernization theory advocated for privatization and individualism in the region, which systematically discouraged the traditional customary[1] mutual right to grazing land, whilst promoting agricultural expansion and commercial mining (Mwebaza, 2015). Since the 1960s customary land was increasingly devoted to state use for mining, forestry, wildlife conservation and mineral exploration (Rugadya and Kamusiime, 2013). These policies contradicted and directly suppressed pastoralism, the traditional livelihood in the region.

Introduction of region borders in 1984 disorganized pastoralists by limiting their movement to formally communal land and access alternative grazing lands during drought years (Stites and Akabwai, 2009; Gelsdorf et al., 2012). This escalated cattle raids (Gray, 2000), land grabbing (Krätli, 2010) and overgrazing (Mamdani, 1982). Today the majority of the people of Karamoja have very little control over land ownership, its use and/or management augmented by government policy that limit communities' rights over the land (Rugadya and Kamusiime, 2013; Gelsdorf et al., 2012). Population, policy, biophysical and economic factors have and continue to impact land cover and land use in Karamoja with complex consequences on livelihoods and the environment. Examining this complexity requires a deeper look into what underpins land use and change.

Today, two ideologies about suitable livelihoods in Karamoja clash. While literature advocates for pastoral livestock-based livelihoods e.g., Levine (2010), Avery (2014), Sundal (2010), Matthysen and Finardi (2010), government programs are promoting sedentary crop-based livelihoods often leading to cropland expansion with the aim of increasing production in spite of the erratic climate and

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[1] Customary tenure recognizes both individual, family and communal ownership of land (Coldham, 2000).

http://dx.doi.org/10.1016/j.landusepol.2016.11.029
0264-8377/

continued crop failures. Levine (2010) indicates that the best livelihood strategy for most of Karamoja is livestock-based herding, yet a majority of government and development programs give more support to crop based livelihoods.

To examine factors leading to the current state of agricultural land use and expansion in Karamoja, we begin our analysis with a brief background of the region, demography and livelihoods. We then detail land use history and policy highlighting circumstances that underpin instituted agricultural development and the current state of agricultural land use in the region. We quantitatively assess agricultural/cropland expansion in the region using satellite data and present a new high-resolution croplands map for Karamoja for 2011/2012. Cropland-based agricultural land use is investigated specifically because there have been extensive programs aiming at increasing crop production primarily through area expansion but to our best knowledge no real quantifiable positive outcomes such as increased production or food security have been realized. Our analysis gives equivalent importance to the cultural, economic, political and biophysical aspects to enable a robust understanding of instituted policy impacts on agricultural land use and change in Karamoja.

Study area: the Karamoja Region of northeastern Uganda

Located in northeastern Uganda, Karamoja encompasses 28,000 km^2 between 1° and 4° North and 33°–35° East (Fig. 1) with the total population estimated at 1,017,900 million people[2]. 74.5% (about 700,000 people) live below the national absolute poverty line compared to only 19.7% for the rest of the country (UBOS, 2013)[3].

Karamoja is set on a large plateau at an average elevation of approximately 1000 m above sea level. The land plain rises to northeast toward the hilly terrain bordering the escarpment above the neighboring Turkana District in Kenya. The underlying basement complex rock mostly consists of undifferentiated acid and granitoid gneisses. Four preeminent mountains intersperse the plains, Mount Morungole in the north, Mount Kadam in the south, Mount Napak in the southwest and the largest, Mount Moroto, in the east. The Karamoja plains are dominated by sandy clay loams of low agricultural production and in parts degraded by soil erosion with low water holding capacity, while the base of Napak and Kadam Mountains is characterized by volcanic soils of medium productivity (Luzinda and Wilson, 1959; Kagan et al., 2009).

Rainfall in Karamoja is highly variable and sporadic in space and time ranging from 350 mm to 1500 mm per year (OPM, 2010). This broad range means both dry events (drought) and wet events (flooding) can occur in close proximity. This results in a characteristic heterogeneity of weather, vegetation and crop performance. The high environmental variability (vegetation, soils and terrain) across the region coupled with a dependence on rainfall significantly impacts crop yields in Karamoja. In general crop yields are highly variable in space and between years and are currently impossible to predict. Landscape location (riverbed vs. foothills), wealth status and farmer practices also impact crop yields. Our fieldwork revealed that within one village in the same season, yields of sorghum could range from zero (complete failure) to one ton per acre (exceptional).

The rainfall gradient determines major livelihood and land use characteristics. Defined by the dominant combination of land-uses, Karamoja is classified into three main livelihood zones excluding game reserves, Kidepo National Park and urban areas as shown in Fig. 1 along a gradient of decreasing rainfall from the west toward the drier and more agriculturally marginal northeast. As shown in Fig. 1 the livelihood zones are simply an indication of the most significant contributor toward livelihood sustenance and are not mutually exclusive. The agriculture livelihood zone (K02) is dominated by crop cultivation with minimal dependency on livestock for food and income. Field sizes are very small, estimated at 1.6 ha[4] and are often mixed cropped combinations of sorghum, maize, beans and/or millet. Sorghum and maize are by far the dominant crops and the most important for food security. The agro-pastoral zone (K03 and K04) is drier than the agricultural zone but receives enough rainfall to sustain crop cultivation complemented by livestock rearing. To manage uncertainty by ensuring access to water and pasture during the dry season, agro-pastoralists used to move between semi-permanent villages called “manyattas” and mobile cattle camps called “kraals” (Stites and Akabwai, 2009; Niamir-Fuller, 1999). The pastoral zone (K05) is the driest of the three zones and livestock and livestock products’ sales are the dominant sources of income.

To the naked eye, Karamoja looks virtually unchanged since the 1960s and the landscape remains sprinkled with grass-thatched manyattas (Fig. 2). However, at closer examination, population growth, and external forces including government programs, and demand for mineral resources have left significant impacts. Some of the changes including agricultural expansion, a decrease in woody vegetation, an increase in surface mining of gold and marble and greater clustering of manyattas are manifestations of the combined effects of development programs, insecurity, population pressure and culture. To-date, understanding of agricultural land use in Karamoja remains largely anecdotal and to our knowledge there have been no empirical studies of agricultural land use, its expansion and adoption by this formerly largely pastoral society. Understanding the characteristics of these changes, including when, and where, the shortcomings and the underlying motivations for current practices can provide insight into the trajectory of changes necessary for future planning for sustainable development within and beyond the agricultural sector in marginal Karamoja.

Land use history

According to Rugadya and Kamusiime (2013) Karamoja was home to large herds of wildlife including buffalos, elands, zebras, topis, hartebeests, giraffes and elephants that enabled hunting during the 1920s. By the 1950s, wildlife populations had declined tremendously, which compelled the government to gazette most of the land as protected areas. By 1962, 94.6% of land in Karamoja (mostly communal and pastoral land) had been allocated to wildlife conservation, forestry, and mineral exploration and prospecting (Rugadya and Kamusiime, 2013). Kidepo National Park and three controlled hunting areas in Napak, North Karamoja and South Karamoja were established in 1963 and in 1964 three additional game reserves in Matheniko, Bokora Corridor and Pian-Upe were designated (Rugadya and Kamusiime, 2013).

Earlier in 1894 when Uganda became a British Protectorate, the newly formed arbitrary administrative districts impacted pastoral communities (Sundal, 2010). For example according to (Sundal, 2010) 15% of Karamoja’s land was lost to the Protectorate of Kenya as a result. This disorganized pastoral communities through grazing zone and movement restrictions that limited cross-border grazing into neighboring Districts and into Kenya. In 1921 when Karamoja officially became a province with a civil administration, seasonal livestock migration was restricted to dry-season grazing lands

[2] UBOS, 2014 Census Provisional Results.

[3] The official absolute poverty line (which is equivalent to one US dollar per person per day in Purchasing Power Parity (PPP)) expressed in 2005/2006 prices.

[4] UBOS 2010. Uganda census of agriculture 2008/2009, Volume IV: Crop Area and Production Report.