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I. RE-THINKING BIODIVERSITY IN FOREST AND FIELD

Colonial Maize and Climate: Limits of Agricultural Development for Adaptation in Rift Valley, Kenya

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Introduction

Concerns about global climate change have brought heightened attention to the potentially dangerous impacts of climate variability on farming systems in Sub-Saharan Africa. Increased variability in rainfall, resulting in more drought and flood events, will have drastic impacts on agricultural production throughout Sub-Saharan Africa (Boko et al. 2007; Schlenker and Lobell 2010). In Kenya, the Ministry of Agriculture anticipates that increases in rainfall variability and temperature in the Rift Valley will negatively impact the production, availability, and accessibility of cereal crops nationwide (Waigwa 2009). The consequences of these predictions will be most acute in terms of famine and food shortages.

Climate variability and drought, however, have been reoccurring characteristics of Kenya’s climate for hundreds, if not thousands, of years. Famine and food shortages have been intimately woven into the lives of the Kenyan people. These events are not only linked to climatic activity; they are also deeply historical and political.

In this article, I examine the recent history of agricultural development in Kenya through a case study of Uasin Gishu District in Rift Valley Province. I discuss several historical adaptations to climate variability embedded within the broader political economy of Kenya. In doing so, I bring to question the orthodox views driving agricultural development in Kenya while exploring alternative avenues for future development and climate adaptation.

Local populations in the Rift Valley have adapted to variable climatic conditions over hundreds of years. A variety of indigenous farming techniques and cultural practices helped to manage risk in times of climatic uncertainty. Colonial expansion in Kenya replaced many of these historical coping mechanisms with much riskier monoculture maize and cash crop systems. Today, many smallholder farmers in Kenya are highly vulnerable to climatic shocks that disrupt maize cultivation. During these times, farmers turn their attention, and labor, to small gardens beside their homes. These homesteads resemble the indigenous systems that flourished before colonial encroachment, and they may provide an avenue to adapt to future changes in climate that has been largely overlooked by national policies and research objectives.

Study Site

Kenya has a total geographic area of approximately 580,000 sq km, containing a diversity of agro-ecological zones including humid and semi-humid plateaus, highland plateaus, semi-arid zones, and arid lands (Fig 1). Within each zone exists a similarly diverse suite of livelihood strategies that coincide with local cultures and environmental conditions, ranging from sedentary agriculture to nomadic pastoralism. Over 70% of the land in Kenya is considered arid or semi-arid, restricting crop agriculture to the coastal, central, and western regions of the country. Agriculture is the single-most important sector in the Kenyan economy, accounting for more than 50% of economic product and more than 80% of employment (Bates 2005). The major staple crop producing regions in the country are found mainly

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in the Western Province and the Rift Valley Province, the latter of which is the location of my field site.

Uasin Gishu is located in the Rift Valley, commonly known as the breadbasket of the country, and provides an exceptional laboratory to analyze agricultural development in Kenya. In the modern Kenyan economy, more than 70% of the staple cereal crops of maize, wheat, sorghum, and millet come from the region. The fertile Rift Valley contains a variety of agro-ecological zones, consisting mainly of an upper-highland wheat and barley zone and a lower-highland maize, pyrethrum, and sunflower zone. Uasin Gishu lies approximately 400 km northwest of Nairobi.

Interviews with small, medium, and large-scale farmers as well as political officials, environmental professionals, and government employees form the basis of the study. Interview data are contextualized with archival documents and missionary memoirs pertaining to agriculture and climate. In corresponding research, I employ agricultural and meteorological statistical analyses to elucidate broader historical trends of agricultural development in the Rift Valley.

### Agricultural Development in Uasin Gishu

#### Pre-colonial agrarian history

The diverse agro-ecological zones in the Rift Valley have provided fertile soils and favorable climatic conditions to farmers for thousands of years. The Nandi are believed to be one of the earliest dominant ethnic groups in the Rift Valley, at least since the mid-sixteenth century (Kipkorir 1978). Nandi were primarily agriculturalists that grew tremendous varieties of millets and tubers, a stark contrast to their famous nomadic contemporaries, the pastoral Maasai. Nandi farmers grew mainly eleusine, also known as finger millet, and raised small livestock such as goats and sheep (Kipkorir 1978).

While in-depth information concerning cultivation practices is sparse, it is clear that Nandi grew a variety of grains for food, beer, and trade (Kipkorir 1978). There is also evidence that trade in foodstuffs between different tribes in the Rift Valley was a common practice, especially during times of heightened climate variability. Along with traditional crops and agricultural techniques, trade and storage of grain were highly specialized forms of risk aversion during times of
environmental hazard or uncertainty for Nandi.

Colonial rule and New World crops

Western exploration and expansion in Africa had a profound influence on agricultural and economic development. Perhaps one of the longest-lasting relics of this encroachment was the establishment and proliferation of Western cereals and cash crops. Maize (Zea mays), a New World cereal crop, first appeared in East Africa following mercantilism and formal colonialism in the sixteenth century, when Portuguese settlers grew it along the Swahili coast (Fig 2) (McCann 2005). It slowly became a staple of the local diet, and by the mid-nineteenth century, maize was well-established as a principle crop in Swahili trade caravans and agricultural systems throughout the region (McCann 2005). Early maize agriculture in Kenya was characterized by highly localized variation in breeding and cultivation. Maize was originally incorporated into traditional mixed plots and swidden systems (Kipkorir 1978).

In the early part of the twentieth century, British settlers started growing maize in larger quantities, and colonial landowners used maize, a cheap food source, as the main form of sustenance for their African farm laborers. During the period from 1900-25, maize gradually became a staple food in the Kenyan diet, which was previously dominated by the millets, tubers, legumes, and kales commonly found in traditional farming systems (Republic of Kenya 1966). During this time, maize cultivation shifted to increased uniformity and standardization. Small farms with highly localized variability were replaced with large monoculture plantations. Maize and wheat became substitutes for the traditional varieties of sorghum and millet. This evolution from local variation to homogenization is a defining characteristic of both maize production and agricultural development in colonial Sub-Saharan Africa (McCann 2005).

Policies for monoculture cash crops

Droughts, and the resultant disputes over food policy, have played a fundamental role in contemporary Kenyan politics and agricultural development (Bates 2005). One of the earliest colonial agricultural policies influencing maize development occurred as a result of a severe drought and widespread food shortage in 1918-21. In 1921, the colonial government undertook measures to increase food supply, developing policies to stimulate agricultural production. The government “unhesitatingly recommended that farmers should

Figure 2. Desiccated maize field, Moiben Division, Rift Valley, Kenya. A field of maize intercropped with beans is withering due to insufficient rains. Photo by William Collier.
concentrate on the growing of maize” (Republic of Kenya 1966, 6). The area under maize production increased to a record high by 1928, and for the first time in the agrarian history of Kenya, a dominant system of maize production emerged (Fig 3) (Republic of Kenya 1966). Fifteen years later, maize development was, again, catalyzed as the result of a near-famine that occurred in 1943-44. This time, however, the colonial government questioned the policies created several years earlier. The Director of Agriculture stated “the correct policy would be to return at the earliest possible moment to a reduced production of cereals and an increase in leguminous and other crops” (Republic of Kenya 1966, 10). But due to the urgency of the situation and the resources available, the government concluded that there was “no alternative to giving all possible encouragement to the production of maize and other cereals” (Republic of Kenya 1966, 10). Thus, although the government recognized the limitations to mono-cropping cereal crops, and although it was suggested to develop other avenues of agricultural development, the colonial government concluded that the only practical option was to develop a system of increased dependency upon maize.

In 1966, just four years after independence in Kenya, a government commission was established to inquire into the status of maize in the country (Republic of Kenya 1966). The commission concerned with the future of agricultural production and development in independent Kenya, quickly criticized the previous colonial regime, stating, “The unwisdom of the policy of monoculture agriculture had not become apparent as of yet” (Republic of Kenya 1966, 12). The newly formed independent government recognized that the previous agricultural development path was unwise. But now, after more than four decades of independence, policies promoting monoculture cereals and cash crops still dominate agricultural development in the Rift Valley and throughout Kenya.

Future Climate Adaptation

Homegardens and climate variability

Farmers in the Rift Valley commonly keep several small gardens beside their homes. These gardens contain a variety of kales, legumes, and tubers, the crops that dominated Kenyan farming systems before establishment of cash crop agriculture. These vegetables are intercropped and grown in a variety of small plots around the homestead, increasing the nutritional base and diversifying the risk of crop failure across multiple plots and configurations. Beyond the

Figure 3. Agriculture-forest mosaic in Moiben Division, Rift Valley, Kenya. The agricultural landscape is dominated by large tracts of maize and wheat. A relic of a colonial plantation is located in the center of the valley. Photo by William Collier.
small, green mosaic of vegetables, these homegardens also provide a window into the broader history of agriculture in Kenya. Well-adapted to the climatic and environmental conditions, these crops exhibit a variety of characteristics advantageous for farmers. Above all, they are hearty, quick growing, and resistant to drought.

When weather conditions are unfavorable, farmers throughout the Rift Valley shift their daily labor schedules to spend significantly more time working in these small gardens, leaving the larger, less manageable fields of maize and wheat to wilt for fodder. These gardens not only represent the current success and survival, but also the indigenous environmental knowledge passed down from previous generations. These agricultural systems flourished for thousands of years in Kenya prior to colonial encroachment, and the knowledge, skills, and techniques developed to make them successful are a testament to their heritage.

Agroforestry techniques and systems, such as homegardens, can provide a wide range of nutritional and economic benefits to Kenyan farmers. Historically, home gardens have proven advantageous for spreading risk, diversifying the economic base, and providing increased sources of nutrition to Kenyan families (Fig 4). Similar to smallholder farmers in Indonesia, homegardens in Kenya provide an avenue for farmers to rely on and develop their own resources despite the transformations of the colonial experience (Dove 1990).

**Implications for adaptation**

As the impacts of climate change are anticipated to exacerbate food insecurity, there will be a need to balance short-term measures for hunger relief with long-term strategies for adaptation and resilience. It is important to recognize the complex economic, environmental, social, and political contexts of agricultural development and food security in Kenya. Understanding the historical roots of traditional agriculture and the contemporary consequences of a monoculture agricultural system may provide insights on how to adapt to future climate threats, while revolutionizing agriculture to increase food security in Kenya.

In the past two decades, agricultural scientists and policy planners have heralded the rapid advancement of maize as a major food crop in Africa. Agricultural economists have viewed the dominance of maize in East Africa as a miracle of the free market (McCann 2005). Even Nobel Laureate Norman Borlaug, father of Asia’s wheat-and-rice-
based agricultural Green Revolution of the 1970s, argues “the technologies and new crop varieties to launch Africa’s own Green Revolution, with maize adoption as its most visible expression, are already in existence” (McCann 2005, 11). But climate change adaptation initiatives that focus exclusively on new varieties of maize and increases in national crop productivity will not solve current and future food crises. They may very well continue to perpetuate a system that increases the vulnerability of poor smallholder farmers.

In Kenya, historically, concerns about food supplies have been manipulated to consolidate political power (Bates 2005). But over the last century, there have been voices warning of problems with colonial and contemporary agricultural policies, urging officials and policy-makers to move beyond unwise and vulnerable policies and investments. There have also been voices describing the daily struggles that emerge from a system of continued dependencies. Yet these are merely whispers from a far-off village, a message inaudible on the bustling paved streets of downtown Nairobi.

Current rainfall shortages in the Rift Valley have strained food supplies throughout the country, affecting more than 10 million people, one quarter of the total population. Food security is not expected to improve with the anticipated impacts of climate change. But the urgency of the situation and the need to act should not cloud our understanding of the historical, political, and economic circumstances in which 10 million people are hungry and 20 million people are trapped in a sea of maize.

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