

New Challenges to Food Security in Sub-Saharan Africa

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### **Abstract**

The countries of Sub-Saharan Africa remain among the globe's least developed and most food insecure nations. Policymakers argue that the answers to increased agricultural productivity and financial growth lie in the adoption of Western economic reforms and/or the Asian-style Green Revolution model. This thesis argues that in today's world of climate change and ever increasing food shortages, relying on traditional economic and agricultural development policies is insufficient. Rather, policymakers must more fully examine and understand the *scientific* and *economic* impacts of three increasingly important factors: land transfers, water shortages, and the adoption of GMO technology on the future of agricultural development in Sub-Saharan Africa. A secondary, but no less important argument is that the policies implemented by African governments must protect international human rights standards regarding the African people's rights to food, land, and water.

## Table of Contents

Introduction.....	3
Chapter 1: Sub-Saharan Africa’s Agriculture.....	14
Background.....	14
Parallels between Sub-Saharan Africa and East Asian Nations Economies in the 1960’s.....	17
Potential Policies for Boosting Food Security.....	21
The 2005-2009 Malawi’s Agricultural Input Subsidy Program (AISP).....	21
The Ethiopian Productive Net Safety Net Program (PNSNP).....	23
Chapter 2: Land Grabs.....	25
Traditional Land Rights and the First Theft of African Lands.....	25
African Traditional Land Tenure.....	26
Colonialism and Neocolonialism.....	31
Investors.....	33
Nexus between Land Grabs and Food Security.....	38
Land Grab Investments Could Help Sub-Saharan Nations Ensure Food Security.....	38
Land Grabs Threaten Food Security in Sub-Saharan Africa.....	40
Land Grabs in Ethiopia: The Gambela Case Study.....	41
Land Grabs in South Sudan: The Boma Case Study.....	43
Land Grabs Trample Sub-Saharan African People’s Human Rights.....	45
Conclusion.....	47
Chapter 3: Water Scarcity.....	50
Background.....	50
Reasons for Increasing Water Scarcity.....	54
Industrialization.....	55

Urban Areas .....	56
Population Increase and Changes in Diet .....	58
Land Grabs.....	59
Environmentally Friendly Requests and Blue Versus Green Water.....	61
Food Insecurity Increases in Sub-Saharan Countries Deeply Affected by The Ever-Looming Water Scarcity .....	63
Water Policies in Sub-Saharan Africa – Case Study of Tanzania .....	66
Conclusion .....	70
Chapter 4: GMOs.....	71
Overview.....	71
Pros and Cons of GMOs to Food Security.....	79
Advantages of GMOs to Food Security.....	79
Disadvantages of GMOs to Food Security .....	81
Adoption of GMOs in Sub-Saharan Africa .....	84
Use of GMOs in South Africa .....	84
Use of GMOs in Burkina Faso.....	85
Decision Making Process about the Use of GMOs .....	87
South Africa’s Model of GMOs Regulatory Framework .....	88
Conclusion .....	92
Bibliography .....	97
Appendix 1: List of Acronyms .....	105

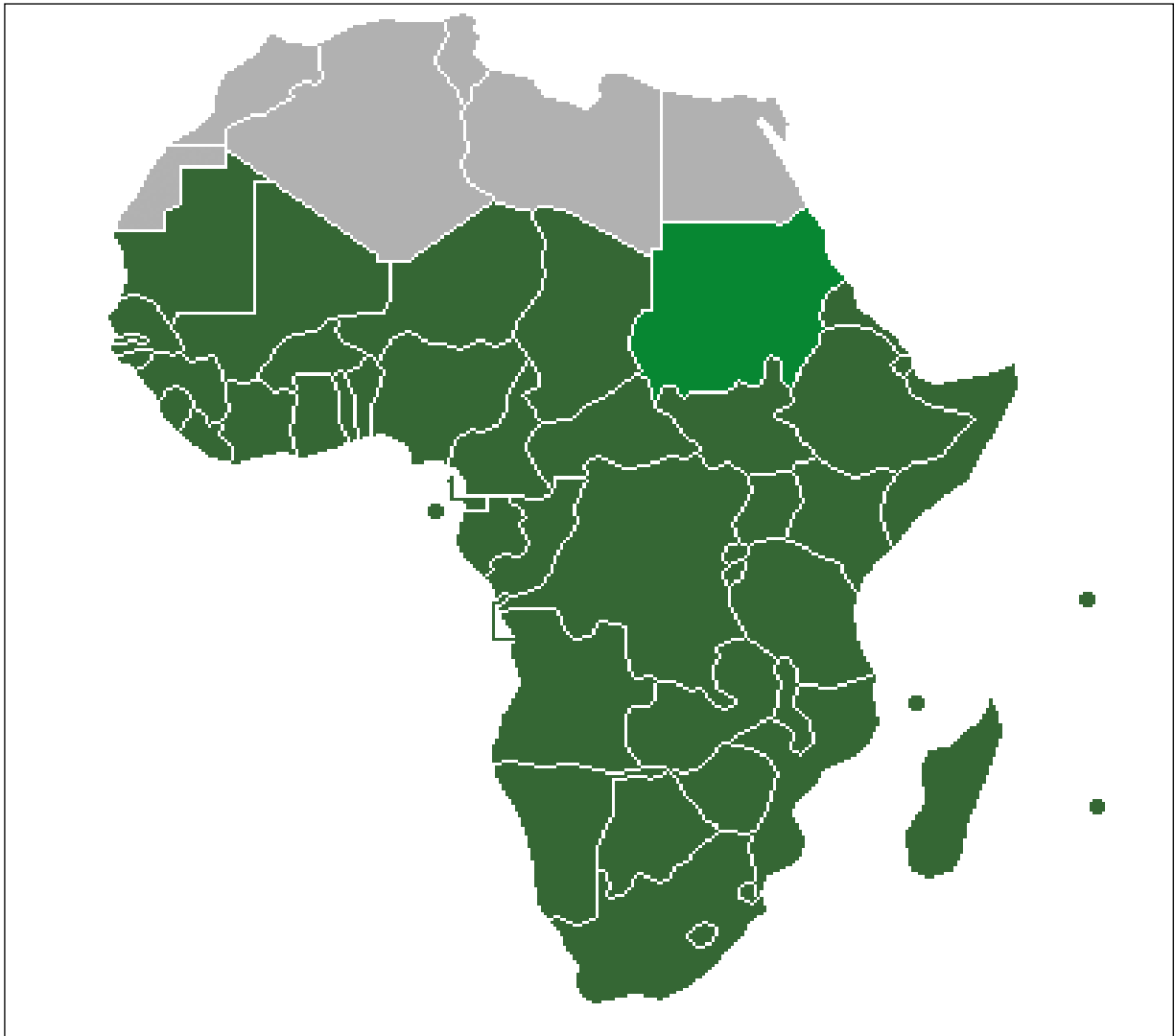
### **List of Maps**

Map 1: Map of Sub-Saharan Africa.....	1
Map 2: Global Physical and Economic Water Scarcity.....	55
Map 3: Distribution of Lower Income, Food Insecure Countries, 2012.....	76

### **List of Tables**

Table 1: Land Resources and Land Deals in Sub-Saharan Africa.....	33
Table 2: Purpose of Land Deals.....	34
Table 3: Global Water Use In The 20th Century (in cubic kilometers).....	52
Table 4: Three Models of Water Management.....	69
Table 5: Examples Of GMO Products Resulting From Agricultural Biotechnology.....	80

**Map 1: Map of Sub-Saharan Africa**



**Dark and lighter green:** Definition of "Sub-Saharan Africa" as used in the statistics of the UN institutions. (Note: the United Nations classifies Sudan as North Africa.)

Source: [http://en.wikipedia.org/wiki/Sub-Saharan\\_Africa](http://en.wikipedia.org/wiki/Sub-Saharan_Africa); accessed September 18, 2013.

*In 2011, I sat talking with my friend and roommate, Fiston Vuvu from the DRC. He told me about his uncle who was a 65-year old retired chemistry professor from the University of Kinshasa. He had suffered for several years from heart problems. In 2008, he went to his doctor for a check-up. As the doctor sat writing out a prescription, my friend's uncle told the doctor in a sermon-like voice, "Please prescribe me medicines that will cost no more than \$10." When the doctor inquired into the reasons for this request, his patient revealed that he only had \$20 to buy food for his family for the remaining two weeks of the month. As we sat talking about his uncle's plight, we realized how many of our family and friends had to choose between food and medicine, shelter, or education.*



## Introduction

Scholars have long pointed to agricultural development as the most important contribution toward national economic development. Great Britain, France, and the United States, according to most economists, have followed this trajectory to industrialization and economic expansion. By improving agricultural technology and national infrastructures, adopting land reform, and embracing free market economic policies these nations achieved the “golden” agricultural surplus. The sale of agricultural surplus provided the necessary profits for investing in industries and technology.

A study by Douglas Gollin et al. provides an empirical support for this claim. Building on the development and growth experience of Great Britain over the last 250 years and cross-sectional and panel data involving 62 countries over the 1960 to 1990 period, the study indicates that growth in agricultural productivity is quantitatively critical in explaining growth in Gross Domestic Product (GDP) per worker. Agricultural productivity contributes 54% of this GDP growth. Countries that are home to an increase in agricultural productivity supply labor from the agricultural to non-agricultural sectors, ultimately adding an additional 29% of GDP growth. Non-agricultural sectors contribute to the remaining 17% of GDP per worker.<sup>1</sup>

Not surprisingly, the World Bank and the International Monetary Fund (IMF) have all counseled the least developed nations of Sub-Saharan Africa (SSA) to follow the Western agricultural path to development. Sub-Saharan countries rank among the least developed and industrialized nations of the world. In 2003, the United Nations revised

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<sup>1</sup> Douglas Gollin, Stephen Parente, and Richard Rogerson, “The Role of Agriculture in Economy.” *Academic Room*, accessed September 1, 2013, <http://www.academicroom.com/article/role-agriculture-development>.

criteria to classify the Least Developed Countries (LDCs), based on the Gini index, a human resource weakness criterion including a composite Human Assets Index (HAI) of the following indicators: (a) nutrition; (b) health; and (c) education. The United Nations criteria also included an economic vulnerability criterion, which indicated that 32 out of 47 LDCs are located in sub-Saharan Africa.<sup>2</sup>

Despite having about 80% of the population depending on farming,<sup>3</sup> agricultural productivity remains low among many Sub-Saharan countries for a variety of reasons, including natural shocks such as environmental degradation and poor planning, as well as a lack of infrastructure. The lack of governmental supports and investments in agricultural is another critical factor, with many governments devoting on average less than 10% of their annual budgets to agricultural improvements.<sup>4</sup>

While the need for African economic development through agricultural surplus is great, the nations of Sub-Saharan Africa have an even greater need to develop their agriculture than simply as a tool for economic development – they need to feed their people and to improve their health. Of the roughly one billion people who lack access to food in

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<sup>2</sup> Amadou Boly, “Industrial Development in Least Developed Countries,” *United Nations Industrial Development Organizations*, accessed August 10, 2013, [http://www.unido.org/fileadmin/user\\_media/Publications/Research\\_and\\_statistics/Branch\\_publications/Research\\_and\\_Policy/Files/Working\\_Papers/2012/WP052012\\_Ebook.pdf](http://www.unido.org/fileadmin/user_media/Publications/Research_and_statistics/Branch_publications/Research_and_Policy/Files/Working_Papers/2012/WP052012_Ebook.pdf).

<sup>3</sup> Walter Odhiambo, “Financing African Agriculture: Issues and Challenges.” *Department of Agriculture and Agro-Industry, African Development Bank*, accessed August 15, 2013, [http://www.uneca.org/sites/default/files/page\\_attachments/walter\\_odhiambo-1\\_0.pdf](http://www.uneca.org/sites/default/files/page_attachments/walter_odhiambo-1_0.pdf).

<sup>4</sup> “An assessment of Strategic Opportunities for Sustainable Agricultural Intensification in Sub-Saharan Africa,” *Winrock International*, accessed August 7, 2013, [http://pdf.usaid.gov/pdf\\_docs/PNADW834.pdf](http://pdf.usaid.gov/pdf_docs/PNADW834.pdf).

the world, 240 million live in Africa<sup>5</sup>. More than one in four Africans—close to 218 million people—are malnourished.<sup>6</sup> The critical level occurs when malnourishment exceeds 10% of the total population.<sup>7</sup> This leads to frequent outbreaks of diseases and affects the capacity of human capital to work productively.

Already home to 16 of the 17 countries where the prevalence of hunger exceeds 35% of the population, Africa became even more vulnerable following the 2008 decrease in the world stocks of grain and the spike in food prices. This situation has provided incentives for first-world governments to deliver food security through agricultural productivity at home and in regions such as Sub-Saharan Africa.

As mentioned above, the IMF, the World Bank, non-governmental organizations, and policymakers have produced a number of reports and policy papers extolling the need for Sub-Saharan African governments to pursue these policies. While many of these recommendations may well prove insightful and necessary, some may actually prove detrimental. International organizations, non-governmental organizations, and multinational corporations, for example, are increasingly pressuring African governments to accept land sales and the adoption of GMO crops. A critical premise for this paradigm is that these reforms will produce the “golden” agricultural surplus and serve as a bridge to economic development and prosperity. In the background of this situation lurks the

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<sup>5</sup> Jason Bremner, “Population and Food Security: Africa Challenge,” Population Reference Bureau, last modified February 2012, <http://www.prb.org/pdf12/population-food-security-africa.pdf>.

<sup>6</sup> Ibid.

<sup>7</sup> “Global: Food Crisis Could Worsen, Warns FAO,” *International Regional Information Networks (IRIN)*, last modified September 10, 2013, <http://www.irinnews.org/report/81892/global-food-crisis-could-worsen-warns-fao>.

suggestion that Sub-Saharan governments need to address core issues, such as the problems posed by the current lack of food security in taking bold and swift actions.

The purpose of this thesis is to examine three increasingly important, but overlooked, challenges to food security in many global nations, but especially those of Sub Saharan Africa. These include: 1) the escalating loss of African agricultural lands through sale and lease to other countries and multinationals, referred to as “land grabs”; 2) decreasing water for subsistence agriculture due to developmental pressures, land grabs, and climate change; 3) and the unknown impact of genetically modified crops on the future health and environment of the African continent.

The interplay of political and economic relationships involving Sub-Saharan countries and their foreign partners increasingly emerges as a structure of concentric circles, the centroid of which is land purchasing. These foreign partners include de jure governments, multinational corporations, and private investors. Multiple factors, including agricultural and biofuel production, and access to raw materials and water rights are driving large-scale foreign investments in Sub-Saharan lands. The decline in world grain stocks and a spike in food prices have created incentives for countries to ensure food security at home. At the same time, these incentives have increased international corporation and private investor interest in generating a commercial return from commodity production.<sup>8</sup>

In 2009, the Oakland Institute<sup>9</sup> initiated studies into land acquisition because of a change of the global food crisis. According to this organization, many governments quietly

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<sup>8</sup> Eric Holt-Gimenez, “Biofuels: Myths of the Agro-Fuels Transition,” *Food First*, last modified July 6, 2007, <http://www.foodfirst.org/fr/node/1712>.

<sup>9</sup> Oakland Institute, a California-based progressive think-tank founded by Anurhada Mittal in 2004.

handed over 20 million hectares of farmland that are worth some \$20-\$30 million to countries such as Saudi Arabia, Kuwait, China, and the United States. Most of this land is located in Africa. The Oakland Institute found that in Ethiopia, Tanzania, South Sudan, Sierra Leone, Mali and Mozambique, hedge funds and other speculators bought or leased roughly 60 million hectares of land, an area the size of France.<sup>10</sup> Anurhada Mittal, executive director of the Oakland Institute pointed out that in these countries, foreign investors could obtain land with such ease, as by offering a poor tribal chief a bottle of Johnnie Walker Whisky. There is a mounting concern that this type of practice in land purchasing is widespread in Sub-Saharan Africa and constitutes a potential threat to agricultural growth necessary for food security.

Land transactions undermine local people's livelihoods, violate indigenous and local people's rights to land, food, and water, and generate massive displacements of peoples. When engaging in land transactions, Sub-Saharan governments must determine whether these contracts meet the requirements contained in a variety of human rights documents, such as the African Charter of Human Rights, Indigenous Rights, and the two International Covenants to name a few, concerning land rights, access to food and water, and health. If not, governments must provide their citizens access to national and international courts for redress and compensation of their rights. To be effective, national and international courts must have at their disposal, legally binding national and international frameworks regulating land transactions. These land regulations must, in turn, be predicated on a comprehensive and balanced set of rights and duties of local and indigenous people that builds on traditional and modern land tenure laws, such as the 1976

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<sup>10</sup> Thalif Deen, "Development: Land Grabs for Production under Fire." *Global Issues*, last modified October 23, 2009, <http://www.globalissues.org/news/2009/10/23/3235>.

Aboriginal Land Rights (Northern Territory) Act.<sup>11</sup> This Act established the Aboriginal Northern Land Council and mandated the government to consult with and advise the traditional landowners on land management and economic development. The recognition and legal protection of indigenous African land rights through such legal instruments will secure land for small-scale agricultural production and ensure the sustainability of land, water, and other natural resources.

Inextricably tied with the threat of increasing food scarcity in Sub-Saharan Africa is the mounting threat of water scarcity. Water shortages in Sub-Saharan Africa are increasing due to a multitude of interrelated factors, including competing water demand, changes in hydrological regimes due in part to climate change, growing populations, rapid urbanization, and environmental degradation. Other factors that play a part in water shortages include expansion of infrastructure, land conversion and pollution that lead to changes in the fluxes, pathways, and stores of water.<sup>12</sup> Agriculture as currently practiced in Sub-Saharan Africa requires 65-75% of the region's freshwater for irrigation. As the total amount of water produced in the region declines and is subject to increasing demands, agriculture development and food security continuously becomes difficult to achieve. The situation in the Chagga farming system on the southern slopes of Mount Kilimanjaro, in Tanzania, provides a stark illustration of this problem.

Mount Kilimanjaro is the major water supply for the Chagga people of Tanzania and other parts of Eastern Africa. The snowcap of this mountain has already lost 82% of

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<sup>11</sup> "Aboriginal Land Rights (Northern Territory) Act 1976," *Australian Government Comlaw*, last modified March 3, 2010, <http://www.comlaw.gov.au/Details/C2010C00212>.

<sup>12</sup> "The Impact of Global Change on Water Resources: the Response of UNESCO's International Hydrological Program," *United Nations Educational, Scientific and Cultural Organization*, last modified 2011, <http://unesdoc.unesco.org/images/0019/001922/192216e.pdf>.

its volume due to global warming since 1912 and 33% of this loss in the past two decades.<sup>13</sup> This change has severely affected the amount of water runoff in rivers and irrigation channels available to agricultural farming on the slopes and valleys of Mount Kilimanjaro. Population pressures and urban demands have further limited the availability of water for agricultural production.<sup>14</sup>

This situation is being repeated throughout Sub-Saharan Africa, such as in the Niger Basin in Western Africa. To deal with water scarcity issues, Sub-Saharan governments need to create water management polices based on either the traditional (state management) approach or the market-based (neo-liberal) and the community-based (neo-populist) models. They also need to integrate some elements of the dual system of water rights prevalent in many Sub-Saharan countries in their water management agendas, and put in place institutions that run effective water policies in order to ensure the sustainability of water and food security.

While acknowledging the usefulness of creating policies that ensure water sustainability in order to boost food security, policymakers need also to initiate attitudinal surveys that take into account African countries' reluctance to adopt GMOs. In fact, according to corporations such as Monsanto and Du Pont, biotechnology in the form of GMOs, or genetically modified seeds, holds the answer to the world's ever-looming food insecurity. Biotech scientists argue that their ability to genetically modify seeds, to resist

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<sup>13</sup> Susan Schneegans, "A World of Science" *United National Educational Scientific and Cultural Organization*, accessed July 15, 2013, [http://www.unesco.org/science/world\\_sc\\_jan02.pdf](http://www.unesco.org/science/world_sc_jan02.pdf).

<sup>14</sup> Robert Thé, "Sociocultural Aspects of Water Usage amongst the Chagga People in North Eastern- Kilimanjaro, and Implications for Anti-Trachoma Programmes," *Academia.edu*, [www.academia.edu/491108/Sociocultural\\_Aspects\\_of\\_Water\\_Usage\\_amongst\\_the\\_Chagga\\_People\\_in\\_North\\_Eastern\\_Kilimanjaro\\_and\\_implications\\_for\\_anti-trachoma\\_programmes](http://www.academia.edu/491108/Sociocultural_Aspects_of_Water_Usage_amongst_the_Chagga_People_in_North_Eastern_Kilimanjaro_and_implications_for_anti-trachoma_programmes).

viruses and pests, to better utilize herbicides, to withstand extreme weather, to grow in poor soil conditions, and to increase targeted vitamins and proteins, can substantially increase agricultural production; thereby decreasing malnutrition and improving health.

There is little doubt that the need, at present, is great. For example, of the 140 million vitamin A-deficient children, living in 118 countries, a sizeable percentage lives in Africa.<sup>15</sup> Of this 140 million, between 250,000 and 500,000 A-deficient children become blind every year, and half of them pass away within 12 months of losing their sight. Similarly, in Asia and Africa, nearly 600,000 vitamin A-deficient women succumb to childbirth-related causes. To alleviate this vitamin A deficiency, German and Swiss researchers have developed a genetically engineered golden rice containing two genes from the daffodil, a bulbous plant from the lily family, and one gene from a bacterium that has increased the level of provitamin A in this crop – thereby proving, its developers argue, that GMO products can help eradicate malnutrition.<sup>16</sup>

Countering these claims are a number of scientists who argue that GMO crops have not effectively increased crop production, and in fact have led to adaptations in both weeds and pests, thereby requiring an increase in the use of herbicides, pesticides, and water.

Charles Benbrook, a research professor at the Center for Sustaining Agriculture and

Natural Resources at Washington State University, expresses the point:

Things are getting worse, fast. In order to deal with rapidly spreading resistant weeds, farmers are being forced to expand use of older, higher-risk herbicides. To stop corn and cotton insects from developing resistance To

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<sup>15</sup> Kaiser Jamil, “Biotechnology—A Solution to Hunger,” *United Nations Chronicle*, last modified 2010, <http://www.un.org/wcm/content/site/chronicle/home/archive/issues2009/toprotectssucceedinggenerations/pid/21567>.

<sup>16</sup> *Ibid.*



Bt, farmers planting Bt crops are being asked to spray the insecticides that Bt corn and cotton were designed to displace.<sup>17</sup>

A plethora of unanswered questions and issues emerge in scholars' discussions of the benefits and safety of GMOs. Whenever a statistic regarding the lack of safety of GMOs emerges, it is widely publicized<sup>18</sup> and viewed as further evidence that GMOs can cause detrimental effects on the environment and human health. With the goal of cautioning mainstream populations about the safety of GMO products, research conducted by many scientists starts at the micro-level of biotechnology and grows into a body of issues in the large literature of legal, economic, or political scholarship.

As this research demonstrates, scholars have devoted too little attention to how these three issues will ultimately affect the ability of Sub-Saharan African countries to feed their people. Will the transfer of African agricultural land into foreign hands bring increased productivity or simply the loss of desperately needed land for agriculture? Many nations and corporations are interested in gaining African lands because of the accompanying water rights. How will this and policies to divert water to industrialization affect the need for agricultural water? Are GMO crops the second coming of the Green Revolution, or a technology that will harm the health of African people and the environment, reduce genetic diversity, and ultimately cause an even greater need for agricultural expenditures on pesticides and water?

This thesis argues that policymakers must more fully examine and understand the *scientific* and *economic* impact of land transfers, water shortages, and the adoption of GMO

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<sup>17</sup> Theresa Phillips, "What are GMOs?" *About.com.Biotech/Biomedical*, accessed September 1, 2013, <http://biotech.about.com/od/faq/f/GMOs.htm>.

technology on the future of agricultural development in Sub-Saharan Africa. A secondary, but no less important argument is that the policies implemented by African governments must protect the international human rights standards regarding African people right to food, land, and water.

Upon conclusion, this thesis argues the following:

- In today's world of climate change and greater increase in food shortages, relying on traditional agricultural development policies related to the Asian-led Green Revolution or the Western agriculturally based path of development is insufficient. Policy makers must understand and consider the effects of land grabs, increasing water scarcity, and the unknown effects of genetically modified foods on the future of agricultural development and food.
- The failure to protect the land, water, and genetic resources of African farmers violates basic human rights provisions in a number of international legally binding documents, including, the United Nations Declaration of Human Rights, the International Covenants, the African Union Charter on Human Rights, and the Cartagena Convention to name a few.

This thesis is organized as follows. Chapter One discusses a background of agricultural development as a practiced and evidence-based discipline. It addresses the importance of agriculture in economic development by showing that agriculture help countries feed their populations. Chapter Two examines the increasing loss of African lands to foreign states and multinationals. The chapter opens with a discussion of traditional African land tenure systems and the impact of colonialism on this traditional land system. The chapter then examines the relationship between land grabs and food security and legal issues related to land grabs. Chapter Three examines the impact of water scarcity on agricultural development in Sub-Saharan Africa by addressing factors that cause water scarcity and its effects on agricultural growth. The chapter closes with a discussion of potential policies to alleviate the impact of water scarcity on agricultural growth through a case study of Tanzanian water management policies. Chapter Four

explores the relationship between GMOs and the advantages and disadvantages of adoption of biotechnology as a solution to feed populations in Sub-Saharan Africa. The thesis closes with policy recommendations that address new challenges to food security.

This research comes from my background as a citizen of one of the countries where more than one million people live on less than one US dollar a day, as well as the concern generated by the story of my friend Vuvu's uncle. Watching horrible images and reading reports of individuals suffering from hunger in countries, such as Ethiopia and Somalia, added to my concern about food security in Sub-Saharan Africa. I do not have an agricultural development background, but as a student in the Global and International Studies Master program, I want to be part of a global effort to fight hunger in Sub-Saharan Africa. It is hoped that this research will contribute to the important knowledge, information, and analysis that African policymakers need to understand the emergence of land grabs, water scarcity, and GMOs as potential challenges to food security. This thesis alerts Sub-Saharan countries to create legal and institutional policies that will adequately address food security concerns and lay the foundation for sustainable development that will help Sub-Saharan African nations win the title of "African Lions" in emulation of Asian Tigers.

## Chapter 1: Sub-Saharan Africa's Agriculture

This chapter opens with a historical perspective of agricultural development as a practice and evidence-based discipline. It continues by demonstrating the importance of agriculture in economic development through a discussion of agriculture as an engine of growth in non-agricultural sectors and an investigation of the platform that agriculture is a key factor feeding a country's population. Discussion of parallels between economies of Asian and Sub-Saharan countries in the 1960s gives some insight into this issue. Furthermore, an overview of some agricultural development policies in Malawi and Ethiopia substantiates the claim that agricultural development provides a broad basis for food security.

### Background

Agricultural growth has been critical in nations' economic development throughout history. Scholars, for example, have found a cornucopia of manuscripts from Ancient Rome, Greece, and Egypt on farm technology, best practices, and grain storage rules and techniques. In ancient Egypt for example, agriculture focused on the cultivation of cereal crops, such as emmer wheat (*Triticum dicoccum*)<sup>19</sup> and barley (*Hordeum vulgare*).<sup>20</sup> Both fertility of the land and general predictability of the time of harvest were key to high productivity from a single annual crop. The high payoff associated with this productivity was the storage of large surpluses against possible crop failures. Egyptian agricultural productivity also allowed the nation to emerge as the wealthiest state in the ancient Middle

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<sup>19</sup> John R. Baines, Alan K. Bowman, Peter F. Dorman, Alan Edouard Samuel, Edwards F. Wente, "Ancient Egypt" *Britannica*, accessed March 2013, <http://www.britannica.com/EBchecked/topic/180468/ancient-Egypt>.

<sup>20</sup> *Ibid.*

East until the creation of the large empires of the first millennium BC.<sup>21</sup> This historical model shows how agriculture was central to the development of pre-industrial societies and their economies.

Over the years, agricultural techniques have changed and improved. Meanwhile, economics has been an organizing framework for agricultural development as the field increased in status as an analytic topic. In Africa and Asia, agricultural development gained momentum as an evidence-based practice as their respective independence movements became prominent in the 1950s. In the 1960s, the rise of research in agricultural development established this field as a core area of study related to economics.<sup>22</sup> Although agricultural development has proceeded apace and emerged as a public good, government and private sectors' investments in the field waned around the 1980s and 1990s. Despite this situation, agricultural development regained momentum during the 2007-2008 global food price crisis when decision makers came to the understanding that many unanswered questions and dogmas needed to be addressed to unlock countries' agricultural development.<sup>23</sup> This global food price crisis created the need for self-sustaining agricultural development making it a prominent goal in all African nations, especially in the Sub-Saharan region.

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<sup>21</sup> Christoph B. Barrett, Michael R. Carter, and Peter C. Timmer, "A Century-Long Perspective on Agricultural Development," *Oxford University Press on behalf of the Agricultural and Applied Economics Association* (2010). Doi:10.1093/ajae/aaq005.

<sup>22</sup> Ibid.

<sup>23</sup> Christoph B. Barrett, "The Economics Of Agricultural Development: Overview," accessed March 7, 2013, [http://aem.cornell.edu/faculty\\_sites/cbb2/Books/Introduction%20Chapter%201%208June2011%20Revised%20Final%20Version.pdf](http://aem.cornell.edu/faculty_sites/cbb2/Books/Introduction%20Chapter%201%208June2011%20Revised%20Final%20Version.pdf).

Much has been written about how agricultural development is conducive to the development of non-agricultural sectors, such as industry, and how it provides food security. Economic historians suggest that agriculture has been a critical factor in the development of all the now-affluent countries in the world. In his 1954 essay, for example, Arthur Lewis, a Saint Lucian<sup>24</sup> economist known for his contributions in the field of economic development, suggests that, “industrial and agrarian revolutions often go together, [and] economies in which agriculture is stagnant do not show industrial development.”<sup>25</sup> The ability to import food requires the development of the manufacturing sector or other industrial exports.<sup>26</sup> Conversely, Lewis argues that countries, which fail to develop their agricultural sectors at a pace conducive to industrialization, are likely to import food. Classical economist Adam Smith and classical development theorists Lewis and Hirschman viewed economic development as a growth process requiring the reallocation of factors of production from a backward, low-productivity agricultural sector to a modern industrial sector with higher productivity and increasing returns.<sup>27</sup> Yet as a traditional sector, agriculture was credited with contributing passively to development by

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<sup>24</sup> Saint Lucia is a sovereign island country in the eastern Caribbean Sea on the boundary with the Atlantic Ocean.

<sup>25</sup> Ibid.

<sup>26</sup> Colin Kirkpatrick and Armando Barrientos, “The Lewis Model After Fifty years,” *Institute for Development Policy and Management*, last modified September 2004, <http://unpan1.un.org/intradoc/groups/public/documents/nispacee/unpan018979.pdf>.

<sup>27</sup> Irma Adelman, “Fallacies in Development Theory and their Implications for Policy,” *University of California Berkeley*, last modified May 1999, <http://rinoan.staff.uncs.ac.id/files/2009/12/fallacies-in-development-theory.pdf>.

providing labor and food to the industrialization process.<sup>28</sup> Dynamism of the green revolution in Asian countries in the 1960s and 1970s provides evidence of the need to reconsider the traditional view on agriculture.

Parallels between Sub-Saharan Africa and East Asian Nations Economies in the 1960's

Historically, the transition from colonialism to independence in the post-World War II period of many Asian, African, and Latin American countries led mainstream scholarship to consider studying the chasm between the countries which have achieved economic development status and those that have not. Based on analytical studies involving indicators, such as gross national product, level of political development, and technology and the modernization of society, this study proved that the world was home to both high income and low-income countries. Over the years, investigation of the differential performance among these countries led to a recategorization from First World (FW) to Third World (TW) into multiple different categories. Using GNP per capita as a basis to differentiate between countries, in 1993, the World Bank arrived at the following ranking: low-income countries (\$635 or less), lower middle income (\$2,555 or less), and high-income countries (over \$7,911).<sup>29</sup>

While some East Asian countries have emerged as high-income economies, many East Asian and South Asian countries are identified among middle-income and low-income

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<sup>28</sup> Xinshen Diao, Peter Hazel, Daniel Resnick, and James Thurlow, "The Role of Agriculture in Development: Implications for Sub-Saharan Africa," *International Food Policy Research Institute*, no. 153 (2007). DIO: 10.2499/97808962916114RR153.

<sup>29</sup> Scott Mainwaring, and Mathew S. Shugart, "Comparative Politics," *PhD Program of the Political Science of the City of New York University*, last modified July 2004, [http://scholar.harvard.edu/levitsky/files/mainwaring\\_shugart.pdf](http://scholar.harvard.edu/levitsky/files/mainwaring_shugart.pdf).

economies. However, a large number of South-Saharan Africa nations are listed as low-income countries. The transition of Eastern and Southern Asian countries' agriculture from a traditional pattern to a modern sector proved that agriculture could sustain momentum for broader economic development.<sup>30</sup> What is effective for one stage of the development process, however, may be ineffective or obsolete for the next stage. Policy recommendations for a country at a given time must be reconfigured in an understanding of its historical and socioeconomic context.

For example, initial conditions of the economies of both Sub-Saharan Africa and Eastern-Asian countries in the 1960s experienced minor differences.<sup>31</sup> At the demographic level of analysis, it is worth noting that over 80% of the population in Sub-Saharan Africa was concentrated in rural areas.<sup>32</sup> In addition, this proportion represented the labor force that worked in the agricultural industry. However, no significant difference existed between Sub-Saharan Africa's rural population percentage and the proportion of individuals who lived in rural Asia, which was approximately 87%.<sup>33</sup> Though Sub-Saharan countries seemed to be more dependent on agricultural exports than Asian countries, analysis of primary commodity export orientation indicates that there was no major difference between Sub-Saharan countries and their Asian counterparts on this issue.

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<sup>30</sup> Irma Adelman, "Fallacies in Development Theory and their Implications for Policy," *University of California Berkeley*, last modified May 1999, <http://rinoan.staff.uns.ac.id/files/2009/12/fallacies-in-development-theory.pdf>.

<sup>31</sup> Massoud Karshenas, "Agricultural and Economic Development in Sub-Saharan Africa and Asia," *University of London Russel Square*, last modified September 1999, <http://www.soas.ac.uk/economics/research/workingpapers/file28868.pdf>.

<sup>32</sup> Ibid.

<sup>33</sup> Ibid.



Though the economic fabrics of both Sub-Saharan African and Asian countries were subject to minor differences in the 1960s, post-independence governments of these nations broadly pursued a similar pattern of development based on the building of national economies and industrialization. However, data suggests that there was a higher employment rate in Asia than in Sub-Saharan Africa. In Asia, the huge supply of labor in agriculture fostered rates of industrial development at low and competitive wages. This supply of labor also favored the building of an appropriate infrastructure and paved the way for the integration of agriculture in national markets. At varying degrees of emphasis, agriculture made net financial contributions to non-agricultural sectors among different Asian countries. Unlike Asia, Sub-Saharan economies had a limited supply of labor and a relative abundance of cultivatable lands. Because of this limited supply of labor, the import substitution industries developed in Sub-Saharan countries could only be sustained through growing protection policies. In addition, the lack of basic infrastructures emerged as a significant barrier to the integration of the agrarian economy into the national, regional, or international market.<sup>34</sup> Discussion of these issues provides evidence that an agrarian economy can provide momentum for sustainable growth in non-agricultural sectors, such as industry.

Agricultural development has been critical in the economic improvement of Asian countries. Most of these countries had similar economic conditions with Sub-Saharan African countries in the 1960s. Sub-Saharan Africa has resources to develop its economy

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<sup>34</sup> Massoud Karshenas, "Agricultural and Economic Development in Sub-Saharan Africa and Asia," *University of London Russel Square*, last modified September 1999, <http://www.soas.ac.uk/economics/research/workingpapers/file28868.pdf>.

and mature into a powerful economic region. However, since the 1960s, Sub-Saharan Africa has been experiencing a steady economic downturn. Some alarming evidence to this situation is the prevalence of food scarcity in many of these countries. Investigation of this issue provides better understanding on how production surplus helps provide food security.

There is a general agreement that agricultural development provides long-term momentum for food security. It is critical to weave this discussion around Sub-Saharan Africa's food security concerns in order to gain some insight into the claim that agricultural growth contributes substantially to a country's food security. Based on data from the period of 1960-2007, the United Nations- Food and Agriculture Organization (FAO) indicated that Sub-Saharan countries had become net food importers. Statistically, these countries imported far less food per capita than other world countries (USD 17 per year),<sup>35</sup> but could not afford to cover their food import bills because their export revenues were limited. Among Sub-Saharan countries, the share of food spending in a household has generally been high. This situation implies that the share of food imports over GDP is not considerable, which indicates that domestic production has substantially contributed to feed Sub-Saharan Africa's population.

However, domestic food production has been low and has increased annually by only 2.7 percent.<sup>36</sup> Mirroring the law of cause and effect, any increase in per capita consumption must cause a rise in imports. There exists a broad spectrum of evidence to

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<sup>35</sup> Francis Ng and M Atamay Aksoy, "Who are the Net Food Importing Countries?" *The World Bank Development Group Research Group*, last modified January, 2008, <http://elibrary.worldbank.org/docserver/download/4457.pdf?expires=1378866684&id=id&accname=guest&checksum=CD3E99DFED5B6C4F67F036EF6BD8BC1E>.

<sup>36</sup> Manitra A Rakotoarisoa, Masimo Lafrate, Mariana Paschali, "Why Has Africa Become a Net Food Importer," *Food Agriculture Organization*, last modified 2012, <http://www.fao.org/docrep/015/i2497e/i2497e00.pdf>.

support that there is weak growth in food production across Sub-Saharan Africa. The underperformance in agricultural production is largely due to technical, infrastructural, and institutional factors.<sup>37</sup> However, other factors contribute to the stunted agricultural growth, including distortions associated with both domestic and international agricultural policies, such as protectionist policies and subsidies from high-income countries and taxation on food productivity. Despite these factors, Sub-Saharan Africa could increase its agricultural production, and an examination of some programs to address food insecurity shows how the creation of effective agricultural policies can boost agricultural production.

#### Potential Policies for Boosting Food Security

##### *The 2005-2009 Malawi's Agricultural Input Subsidy Program (AISP)*

The Malawian government has created the Agricultural Input Subsidy Program (AISP) to help Malawi address low corn production and household food insecurity. According to Andrew Dorward et al, people's livelihoods and food insecurity in Malawi have occurred as a result of low yields emerging from the perpetual cultivation of corn on the same land without adding organic or inorganic fertilizers, which is further complicated by Malawi's poor infrastructure. Also, difficulties in accessing both domestic and international markets due to lack of public and private investments in transport and infrastructures and seasonal scarcities led to a regime of price variations that depressed market development. High corn prices created incentives for poor consumers to avoid purchasing corn and grow as much of their own staple foods as possible. Low agricultural productivity and lack of foreign or domestic investments have increased poverty within Malawian rural communities.

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<sup>37</sup> For further discussion on technical and institutional factors associated with low agricultural production refer to Lewis' Africa eEcon

The Agricultural Input Subsidy Program has helped Malawi address these issues and has increased productivity by relieving both profitability and affordability constraints associated with the use of inputs needed to increase staple productivity.<sup>38</sup> AISP has also led to an increase in income among local farmers and a reduction of food prices. Similar policies have allowed some Sub-Saharan countries, such as Ethiopia, to build a basis for food security after experiencing a series of food crises.

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<sup>38</sup> Andrew Dorward, Ephraim, Chirwa, T.S. Jayne, “The Malawi Inputs Agricultural Subsidy Program,” *World Bank*, accessed April 9, 2013, [http://siteresources.worldbank.org/AFRICAEXT/Resources/258643-1271798012256/MAIP\\_may\\_2010.pdf](http://siteresources.worldbank.org/AFRICAEXT/Resources/258643-1271798012256/MAIP_may_2010.pdf).

## The Ethiopian *Productive Net Safety Net Program (PNSNP)*

Studies indicate that Ethiopia has been effectively food deficient due to lack of agricultural infrastructure since the 1980s.<sup>39</sup> In this country, the food gap rose from 0.75 million tons in 1979/80 to 5 million tons in 1993/94, decreasing to 2.6 million tons in 1995/96. Between 1998 and 2012, Ethiopia was home to major food crises that left large groups of people in need of food assistance. In 2012, 4.5 million people were in need of emergency food assistance in Ethiopia. This country also ranked 157 out of 169 in the 2010 UNDP Human Development Index with the main engine of its economy lying in agriculture, which employed about 80% of the country's 82 million people.<sup>40</sup>

In the postwar period, President Meles renewed the country's political focus by emphasizing the need to make Ethiopia a self-sufficient country. The path to self-sufficiency appeared to be long and winding, but the Productive Net Safety Net Program (PNSNP), designed to address food insecurity across Ethiopia led to modest improvements in food security.<sup>41</sup> Access to the PNSNP and other programs, such as the Household Asset Building Program (HABP) also led to considerable improvements in the use of fertilizers

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<sup>39</sup> Sereena Singh, "Famine in Ethiopia," *World Information Transfer*, last modified January 28, 2012.

<sup>39</sup> Ibid.

<sup>40</sup> Ibid.

<sup>41</sup> "The Impact of Ethiopia's Net Productive Safety Net Program on Agricultural Productivity," *Journal of African Economies*, <http://jae.oxfordjournals.org/content/early/2012/09/26/jae.ejs023.full>.

and enhanced investments in agriculture, thus improving agricultural productivity among households.<sup>42</sup>

The ever-looming food insecurity in Sub-Saharan Africa is the result of many factors including environmental, historical, and structural issues. Many countries or regions, such as Southeast Asia, that were riding the same wave of economic stagnation as Sub-Saharan Africa have become prosperous nations. Many might refer to multiple reasons, such as religion (Confucianism) to explain the South-Eastern Asian economic success. But, at some point, perspectives from diverse horizons will converge about the thesis that good policies have played a key role in the economic development of these countries. What is then demanded from Sub-Saharan countries is to create effective policies that will address major concerns, such as a lack of infrastructure, as well as new challenges to food security in these countries.

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<sup>42</sup> “The Impact of Ethiopia’s Net Productive Safety Net Program on Agricultural Productivity,” *Journal of African Economies*, <http://jae.oxfordjournals.org/content/early/2012/09/26/jae.ejs023.full>.

## Chapter 2: Land Grabs

The present chapter discusses the background of land practices, the traditional African land tenure, and how new colonialism created incentives for land grabs. It addresses the extent, reasons, and processes behind the African land grabs and discusses the impact of land grabs on food security in Sub-Saharan Africa.

### Traditional Land Rights and the First Theft of African Lands

In recent decades, a new global land rush has been extensively acquiring large expanses of arable land in Sub-Saharan Africa and the developing world. Despite their ageless traditions, villagers or individuals living in rural agrarian communities are discovering that African governments own their land and have been leasing it, often at bargain prices, to private investors or foreign governments.<sup>43</sup> Media, NGOs, and mainstream scholarship have described these land acquisition practices as “land grabs,” meaning that foreign investors are forcibly taking or stealing lands from local or indigenous people.<sup>44</sup> Mama Keita, a 73-year old village head of Soumani in Mali expresses the point: “They told us this would be the last rainy season for us to cultivate our fields, after that, they will level all the houses and take the land. We were told that Gaddafi owns this land.”<sup>45</sup> In many Sub-Saharan countries, indigenous and local people are increasingly thrown out of their agrarian communities because of land deals made between their

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<sup>43</sup> Neil MacFarquahar, “African Land Grab,” *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

<sup>44</sup> Cecilie Friis and Anette Reenberg, “Land Grab in Africa: Emerging Land Systems Drivers in a Teleconnected World,” *The Global Land Project International Project Office*, last modified 2010, [http://www.globallandproject.org/arquivos/GLP\\_report\\_01.pdf](http://www.globallandproject.org/arquivos/GLP_report_01.pdf).

<sup>45</sup> Neil MacFarquahar, “African Land Grab,” *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

governments and foreign investors. Other than the forced migration of villagers from rural agrarian communities, these land deals have multiple detrimental effects on local communities, including violations of basic human rights and food insecurity. The practice of land grabs by foreign investors in Sub-Saharan Africa is not a new phenomenon. In the colonial period, European settlers overtook various parts of Africa and introduced new land right systems that overlapped with the African traditional land tenure systems and forced these traditional systems into obsolescence.

### *African Traditional Land Tenure*

Building on White's 1959 classification of different patterns of land tenure, Gear M. Kajoba discusses four land tenure categories in Sub-Saharan Africa. One land tenure system Kajoba identified involves societies where individuals acquire community land rights by residence, without allocation. This tenure system prevailed in pre-colonial Africa, where countries, such as Zambia, had vast lands where populations were sparse. In this country, family members could occupy community land by clearing unoccupied space or by claiming this land through inheritance. Individuals could also qualify for access to land in villages where they were politically accepted in the community. Often times, the head of the village granted individuals who were politically considered *persona grata*<sup>46</sup> the community permission to have land after a consultation in which some hierarchical members of the community were involved. For individuals who acquired land, the community protected their right to use land as long as they put it in use. Failure to use the land resulted in its return to community control. Both individuals who acquired land and the head of the village had no personal ownership of land. Although the head of the village

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<sup>46</sup> *Persona grata, somebody who is acceptable to other people.*



could receive gifts, such as food or wine from community members during special occasions like the celebration of the new harvest, he was responsible for holding and protecting the community land without extracting benefits, such as land taxes. Both the village head and the whole community worked to produce their own food for subsistence. This indicates that the African traditional society was egalitarian under the system of subsistence production and communal tenure.<sup>47</sup>

Another land tenure system prevalent in Africa is land holding under the control of lineages. In this system, only members who traced their heritage from a common ancestry had access to agricultural land. For example, among the Luvale of Western Zambia, land ownership was synonymous with the matrilineage system. Transfer of land rights among the Luvale people occurred between matrilineal relatives or friends. Matrilineal relatives were also entitled to take over the land rights of deceased persons.

In contrast, in pre-colonial Shona and Ndebele societies located in present-day Zimbabwe, no community member owned land.<sup>48</sup> The male chief of the patrilineage, who descended from the original owner of the land, distributed land to the village headmen. In turn, these headmen held all village lands in the family name and allocated them to male members of the family lineage, and sometimes with the consent of the male chief of the patrilineage, to male non-lineage members. Often times, chiefs and headmen claimed the best lands for themselves. In Shona and Ndebele societies, the role of women in land

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<sup>47</sup> Gear M. Kajoba, "Land Use and Land Tenure in Africa: Toward An Evolutionary Conceptual Framework," *the University of Zambia*, accessed March 15, <http://www.codesria.org/IMG/pdf/Kajoba.pdf>.

<sup>48</sup> Dorcas Shumba, "Women and Land: A Study on Zimbabwe," *Journal of Sustainable Development in Africa*, accessed June 15, 2013, <http://www.jsda-africa.com/Jsda/Vol13No7-Winter2011A/PDF/Women%20and%20Land%20-%20A%20Study%20on%20Zimbabwe.Dorcus%20Shumba.pdf>.

distribution and political authority was limited. Polygamous men often were allocated huge amounts of land to support their wives and families.<sup>49</sup>

Change in land tenure had begun to emerge under the lineage-based land tenure system when practices, such as long cultivation of cassava gardens gave considerable momentum to the legitimacy of individuals that have ownership of land. For example, as land shortage increased in the Chavuma area of northern Rhodesia (Zambia), this area became home to a commercialization of land as a saleable commodity. Individuals outside a matrilineage could acquire land through cash transactions. Surplus gardens having crops and surplus resting land were sold and their prices increased. The rights of individuals to sell land gained momentum over time and many of them had the liberty to sell the land over which they had ownership in these pre-colonial societies, and did not need the Chief of the matrilineage to consent to the sale.

Kajoba also discusses the land tenure system that involves societies where chiefs exercised direct control over allocation of land with a descending hierarchy of estates. He points out that this system gained momentum with the emergence of centralized states or kingdoms in Africa. The pre-colonial semi-feudal agrarian-social Mosi Empire in Burkina Faso was an example of this system, with the King and chiefly classes controlling the land and giving land rights to their subjects including serfs, slaves, and eunuchs.<sup>50</sup>

The semi-feudal land tenure system was also prevalent in Sub-Saharan countries such as Zambia. Among the Lozi people, an ethnic group in western Zambia, law stipulated

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<sup>49</sup> Ibid.

<sup>50</sup> Gear M. Kajoba, "Land Use and Land Tenure in Africa: Toward An Evolutionary Conceptual Framework, *the University of Zambia*, accessed March 15, <http://www.codesria.org/IMG/pdf/Kajoba.pdf>.

that land belonged to the king who had control over the termite and man-made mounds on the Zambezi flood plain, where land was scarce. The richest fishing areas, reed beds, reserves, grazing areas, and turtle lakes were reserved for the King. Councilors or indunas, princes and princesses, care takers of the royal graves and guardians of the king's castle helped the king in the task of controlling mounds. The village or homestead heads were also entitled to allocate lands. Many serfs obtained lands through their homestead heads. Over time, a landlord group with political titles emerged in the Lozi Kingdom and had privileged access to arable land and other resources. This group excluded ordinary people from access to arable land and other natural resources and tended to make sure that family members in their male matrilineage inherited these resources.<sup>51</sup> Feudal land systems were also prevalent in various parts of Sub-Saharan Africa. This system, for example, emerged in the late 19<sup>th</sup> century in southern and western parts of Ethiopia. In these areas, the Emperor granted lands to the military establishment, aristocracy, nobility, and church that could lease, mortgage, or sell these lands. These groups also collected various taxes from tenants including land tax, education tax, cattle tax, and agricultural income tax. Tenants paid rent in kind or by providing 50% of their harvests to the landlord who could evict from the land any tenant that defaulted in his obligations to pay rent.<sup>52</sup>

Lastly, White discussed how the imposition of colonial rule in Sub-Saharan Africa led to land alienation and the settlement of European commercial farmers in countries including Kenya, Malawi, Zimbabwe, and Zambia. Prior to the 1878 Berlin Conference, colonizers acquired land in an insensitive manner in Africa. This practice of acquiring land

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<sup>51</sup> Ibid.

<sup>52</sup> Ibid.

forcibly ran counter to general guidelines of customary laws in various parts of Africa, whereas these lyrics of Ziggy Marley's *Africa Land* show: "Leave Eritrea to Angola, Ethiopia to South Africa, this is the land of my forefathers . . . This is the birth of our ancestors."<sup>53</sup> In African traditional societies, land is a gift from ancestors, a birthright to every community member and public good, the rights to which run throughout traditional songs, legends, and proverbs. By coercively establishing their domains in Africa, European settlers violated African culture, traditions, and especially Africans' rights to their ancestral lands.

The 1878 Berlin Conference decisions that laid the blueprint for the current African political-geographical map worsened this situation by making obsolete the validity of African traditional borders. Africa was divided into many countries and colonizers put forward new land policies that were detrimental to African indigenous and customary laws. For example, in various tribal areas, the British introduced their ideas of formal property rights and an indirect rule system. The indirect system imposed the British administrative and legal systems on the local people. The British, however, limited the application of the indirect system to a few wealthy territories. Because of their huge economic potential, many large farms, plantations, and specifically Kenyan Highlands and parts of Rhodesia, were exempted from the indirect system and remained under the British control. On the other hand, in their Sub-Saharan colonies, the French established their legal land tenure

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<sup>53</sup> Ziggy Marley, "Africa Land" *Youtube*, accessed April 7, 2013, <http://www.youtube.com/watch?v=dyCHy3zq9o4>.

system. They asserted a right to assimilate Africans into the Western culture and granted many of them full citizenship.

As colonizers withdrew from Africa during independence movements in the 1960s, they left African countries in shambles without laying the foundation for modern economic development and democratic processes. Worse still, colonizers did not consider the alternative of reestablishing the pre-colonial customary law system in African countries that were on their pathway to independence. This situation has led to the prevalence of a dual system of land rights including the long established customary land law and English land law in various parts of Sub-Saharan Africa.

### *Colonialism and Neocolonialism*

As decolonization rolled around, a subtle and indirect colonialism featuring developed countries exploiting Sub-Saharan nations continued in the form of neocolonialism. This new form of partnership has led many developed countries to make unscrupulous deals with Sub-Saharan governments to acquire resources such as ivory or minerals, or to grow food for export back to high-income countries. Today developed nations are investing in Sub-Saharan lands to grow foods for international markets to further increase their bottom lines. For example, recently, Madagascar was poised to sign a 99-year deal to rent 1.3 million hectares, or half of the country's current arable land, to South Korea's Daewoo logistics corporation to grow corn and plant palm oil for export. The government has put this project on hold after the Malagasy people protested out of concern that the Daewoo deal could make them a colony of South Korea. Local protests eventually forced the Malagasy President, Marc Ravalomanana to step down and hand power over to the army in 2009. Expressing concern about the hold on the Daewoo project,

Shin Dong-Hyun, general manager at Daewoo Logistics Corporation claims that media reports have made Madagascan people very angry because the Daewoo project makes them ashamed of being a part of what they refer to as a neocolonialism system.<sup>54</sup>

Neocolonialism, the collision of widespread effects of impeding water scarcity, and the 2007-2008 decline in world stocks of grain, and spike in food prices have created incentives for a renewed interest in land in Sub-Saharan Africa.<sup>55</sup> Foreign investors including *de jure* governments, multinational corporations, and private investors are increasingly buying land in Sub-Saharan Africa. This region has huge amounts of uncultivated, fertile, and cheap land. As such, it represents a huge opportunity for foreign investors, such as governments, to grow food and cultivate biofuels to feed both global population and nationals of their own countries and ensure energy security at home. A World Bank study involving farmland deals that cover at least 110 million acres--the size of California and West Virginia combined--indicates that in 2009, Africa was home to more than 70% of land deals in the world. Among nations that transfer millions of acres to foreign investors are Mozambique, Ethiopia, and Sudan.<sup>56</sup> The following table offers a better view of land resources and land deals in Sub-Saharan Africa.

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<sup>54</sup> Julian Ryall and Mike Pflanz, "Land Rental Deals Collapses after Backlash against Colonialism," *The Telegraph*, last modified January 14, 2009, <http://www.telegraph.co.uk/news/worldnews/africaandindianocean/madagascar/4240955/Land-rental-deal-collapses-after-backlash-against-colonialism.html>.

<sup>55</sup> "Land, Energy, and Water," *Share the World's Resources (STWR)*, accessed September 1, 2013, <http://www.stwr.org/land-energy-water/food-crisis-causes-surge-in-land-grabbing.html>.

<sup>56</sup> Neil MacFarquahar, "African Land Grab," *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

**Table 1: Land Resources and Land Deals in Sub-Saharan Africa**

FAO land resource data (1,000)				Land deals as percentage of:		
Recipient country	Land area	Agricultural area	Forest	Land area	Agricultural area	Agriculture + forest
Ethiopia	100.000	35.077	12.718	2.9	8.2	6.1
Madagascar	58.154	40.843	12.764	4.7	6.7	5.1
Sudan	237.600	136.773	66.368	1.3	2.3	1.6
Tanzania	88.580	34.200	34.433	1.9	5.0	2.5
Mali	122.019	39.609	12.372	2.0	6.1	4.6
Mozambique	78.638	48.800	19.162	13.1	21.1	15.2
Uganda	19.710	12.812	3.454	9.5	14.6	11.5
DR Congo	226.705	22.650	132.971	4.9	48.8	7.1
Nigeria	91.077	78.500	10.270	0.9	1.0	0.9
Zambia	74.339	25.589	41.562	3.0	8.8	3.3
Ghana	22.754	14.850	5.286	0.4	0.6	0.4
Malawi	9.408	4.970	3.336	3.3	6.2	3.7
Senegal	19.253	8.637	8.583	2.6	5.9	3.0
The magnitude of land deals as a percentage of the total land area, the agricultural area and the agricultural area plus the forest covered area in each of the 13 main recipient countries. Areas as of 2007.						
Source: Friis, Cecilie and Reenberg, Anette, <i>Land grab in Africa: Emerging land system drivers in a teleconnected world</i> . GLP Report No. 1. GLP-IPO, Copenhagen, 2010, page 11.						

*Investors*

Tests and parameters for weighing the status of high profile investors of transnational land acquisition operations in Sub-Saharan Africa indicate a variety of entities profiled as land purchase investors. These investors fall in three categories: countries, multinational corporations, and private investors. Countries where governments or private sectors have already made land deals or expressed interest are China, South Africa, Libya, and Saudi Arabia. While China and South Africa have engaged in land deals to grow sugar cane, Libya and Saudi Arabia have showed interest in cultivating rice. Other countries

involved in land acquisition practices include Canada, Belgium, France, South Korea, India, the Netherlands, and the United States.<sup>57</sup> Most countries with growing populations and economies including China and India often engage in land deals to feed their populations and become energy-independent at home by growing biofuels such as sugar cane. According to De Seto et al., “A 100% conversion to bioethanol on a global scale will require a 20-fold increase in the production of biofuels, and a doubling of the total cultivated land worldwide.”<sup>58</sup> Greater production of biofuels translates into an increase in amounts of land to cultivate biofuel crops. The following table provides an idea of the area of investment of some land deals.

**Table 2: Purpose of Land Deals**

		<b>Food production</b>	<b>Biofuels</b>	<b>Industrial production</b>
Ethiopia	26	8	15	1
Madagascar	24	3	16	3
Sudan	20	11	2	

Source: Friis, Cecilie and Reenberg, Anette, *Land grab in Africa: Emerging land system drivers in a teleconnected world*. GLP Report No. 1. GLP-IPO, Copenhagen, 2010, page 13.

Changes in consumption patterns in the West and in countries like China and India also factor in land grabs. In fact, an increase in demand for animal-based food production (meat and poultry), which demands more land than plant-based foods (natural food), is

<sup>57</sup> Neil MacFarquahar, “African Land Grab,” *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

<sup>58</sup> “Land Grab in Africa: Emerging Land Drive Systems in a Teleconnected World,” *The Global Land Project International Project Office*, last modified 2010, [http://www.globallandproject.org/arquivos/GLP\\_report\\_01.pdf](http://www.globallandproject.org/arquivos/GLP_report_01.pdf).



associated with significant environmental concerns. A 2006 report by the United Nations Food and Agriculture Organization (FAO) points out human diets, especially the meat in these diets, cause more greenhouse gases, carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, and the like to spew into the atmosphere than either transportation or industry. The study found that current production levels of meat contribute between 14% and 22% of the 36 billion tons of “CO<sub>2</sub>-equivalent” greenhouse gases produced worldwide. For example, the production of half a pound of hamburger for someone’s lunch, a patty of meat the size of two decks of cards, releases as much greenhouse gas into the atmosphere as driving a 3,000-pound car for a distance of 10 miles.<sup>59</sup> Human consumption of meats contribute to global warming and land degradation, which creates incentives for foreign countries to tap into new lands in Sub-Saharan Africa to grow crops and biofuels.

A number of Gulf States including Saudi Arabia and Kuwait have engaged in land purchasing in Sub-Saharan Africa because they have their own environmental concerns, such as land degradation, and because these countries have available capital to purchase new lands. In the last two decades, Egypt and Libya have emerged on the list of countries embracing land-purchasing practices to feed their populations and increase their portfolios.

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Increase in the value of land and water and the rise of farmland as a global asset have created incentives for many international corporations to engage in land purchasing.

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<sup>59</sup> Nathan Fiala, “How Meat Contributes to Global Warming,” *Scientific American*, last modified February 4, 2009, <http://www.scientificamerican.com/article.cfm?id=the-greenhouse-hamburger>.

<sup>60</sup> “Land Grab in Africa: Emerging Land System Drivers in a Teleconnected World,” *The Global Land Project International Project Office*, last modified 2010, [http://www.globallandproject.org/arquivos/GLP\\_report\\_01.pdf](http://www.globallandproject.org/arquivos/GLP_report_01.pdf).

Examples of corporations purchasing Sub-Saharan African land include American companies such as New York-based Jarch Capital; this firm acquired a territory that is the size of Dubai from a war lord in South Sudan in 2011. In 2003, Dominion Farms Limited purchased a swampland in Kenya and turned it into a rice plantation - purportedly flooding local farms to force the displacement of local farmers from their land.<sup>61</sup> In the last two decades, eleven British companies have leased an estimated 1.6 million acres.<sup>62</sup> Similarly, corporations such as Goldman Sachs, Deutch, and BlackRock of New York City are buying land in Sub-Saharan Africa where land is cheap and sales are expected to increase on the horizon. The international Agro-fuel production industry's drive to buy up cheap land in Sub-Saharan Africa has paved the way for private investors to engage in land investment deals.

Private investors purchase cheap land in Sub-Saharan Africa to develop large-scale crop cultivation, beef and poultry production, and biofuel production. Examples of private investors that acquire land in Sub-Saharan Africa include Bruce Rastetter, chief executive officer (CEO) of Pharos Ag, co-founder of Agrisol Energy, CEO of Summit Farms and a donor to Iowa State University. Rastetter and his companies have purchased three abandoned Tanzanian refugee camps including Lugufu in Kigoma province (25,000 ha), and both Katumba (80,307 ha) and Mishamo (219, 800 ha) in Rukua province. Jean Claude Gandur, chairman of Addax Bioenergy has also acquired 20,000 acres of sugar cane

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<sup>61</sup> "Alec at 40: Turning Back The Clock on Prosperity and Progress," *Dominions Farms Limited*, accessed August 31, 2013, [http://www.sourcewatch.org/index.php/Dominion\\_Farms\\_Limited](http://www.sourcewatch.org/index.php/Dominion_Farms_Limited).

<sup>62</sup> Ibid.

plantations in Sierra Leone to produce ethanol for export to Europe.<sup>63</sup> As all these land investors flock to Africa, land and water resources become scarce. As noted earlier, this rush for cheap land in Sub-Saharan Africa has threatened populations' livelihoods and emerged as a significant environmental stressor in various parts of Africa including Ethiopia and South Sudan.

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<sup>63</sup> Courtney Comstock, "Meet the Millionaires and Billionaires Suddenly Buying Tons of Land in Africa," *Oakland Institute*, last modified June 30, 2011, <http://www.oaklandinstitute.org/meet-millionaires-and-billionaires-suddenly-buying-tons-land-africa-0>.

## Nexus between Land Grabs and Food Security

### *Land Grab Investments Could Help Sub-Saharan Nations Ensure Food Security*

There appears to be a growing consensus that land grabs can help Sub-Saharan Africa ensure food security. In fact, advocates of this claim argue that international land deals can end decades of low investments in developing countries' farming industries. Supporting this contention, Abou Sow, executive director of Office du Niger, a semi-autonomous government agency in Mali, points out "Even if you gave the population [in rural communities] the land, they do not have the [resources] to develop it, nor does the state."<sup>64</sup> According to those who share Sow's opinion, transnational land investments will deliver multiple opportunities including improving environmental problems, creating jobs, bringing new technologies, and developing infrastructure in many low-income countries. These opportunities will lay the foundation for sustainable development. For example, new technologies and infrastructure building will help African small-scale farmers boost their agricultural production and supply regional and international markets. Land investment opportunities will also help these farmers to shift gradually from subsistence agriculture to new farming systems that will put Sub-Saharan countries on the path to food security.

International organizations, such as the United Nations, the World Bank, the International Institute for Economic Development, the Food and Agriculture Organization, and the International Fund for Agricultural Development, support the claim that agricultural growth through land deals provides low-income countries with increased opportunities. These opportunities include providing income to farmers, building

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<sup>64</sup> Neil MacFarquahar, "African Land Grab," *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

infrastructure, and increasing food security.<sup>65</sup> On a similar note, an article from the *New York Times* emphasizes that, if done equitably, land acquisition practices can feed the growing global population by introducing large-scale commercial farming systems in regions home to low agricultural productivity.<sup>66</sup> Robert Engelman, Executive Director of WorldWatch, adds, “If all governments [involved in land grabs] capably represented the interests of their citizens, cash-for-crop land deals might improve prosperity and food security for both sides.”<sup>67</sup> There is potential that land grabs can lead to food security in regions, such as Sub-Saharan Africa. Most advocates of this claim appear to lay out their case for the centrality of land grabs in helping low-income nations to ensure food security by calling for parties involved in land deals to act responsibly. However, even when international firms start using lands they just acquired, these companies often fail to meet corporate social responsibility<sup>68</sup> and export crops cultivated on the African soil to international markets, which worsens food security concerns among local populations. Whether an effective link can be established between land grabs and food insecurity at a national scale remains unclear and logically unproven. In fact land grabs often result in

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<sup>65</sup> “Land Grabs in Agriculture: Fairer Deals Needed to Ensure Opportunity for Locals,” *Nourishing the Planet*, last modified July 26, 2011, <http://blogs.worldwatch.org/nourishingtheplanet/%E2%80%9Cland-grabs%E2%80%9D-in-agriculture-fairer-deals-needed-to-ensure-opportunity-for-locals/>.

<sup>66</sup> Neil MacFarquahar, “African Land Grab,” *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

<sup>67</sup> “Land Grabs in Agriculture: Fairer Deals Needed to Ensure Opportunity for Locals,” *Nourishing the Planet*, last modified July 26, 2011, <http://blogs.worldwatch.org/nourishingtheplanet/%E2%80%9Cland-grabs%E2%80%9D-in-agriculture-fairer-deals-needed-to-ensure-opportunity-for-locals/>.

<sup>68</sup> Corporate social responsibility (CSR) refers to corporate initiative to assess and take responsibility for the company’s effects on the environment and impact on social welfare.

local populations being displaced from their ancestral lands leading thus to a rising tide of detrimental effects, such as food insecurity.

### *Land Grabs Threaten Food Security in Sub-Saharan Africa*

While there is some consensus that land grabs could deliver opportunities for development in Sub-Saharan Africa, indigenous and local populations, non-governmental organizations, and activists in the political and environmental realm increasingly question the benefits associated with land grabs. They condemn land grabs as neocolonial land acquisition that destroy villages, uproot tens of thousands of farmers, create a volatile mass of landless poor, and threaten local and indigenous people's livelihoods.<sup>69</sup> Worse still, these NGOs and activists support the idea that much of the food produced by foreign investors on the Sub-Saharan countries' soil is bound for wealthier nations. On that score, Kofi Annan, former United Nations secretary general, notes:

The food security of the country concerned must be first and foremost in everybody's mind. Otherwise it is straightforward exploitation and it won't work. We have seen a scramble for Africa before. I don't think we want to see a second scramble of that kind.<sup>70</sup>

Food security is a national security concern and governments that fail to feed their populations open doors to a dependence on foreign capital in the form of exploitation.

Concerned with this situation, Sub-Saharan countries need to take necessary steps to ensure

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<sup>69</sup> Neil MacFarquahar, "African Land Grab," *New York Times*, Last modified December 22, 2010, <http://12degreesoffreedom.blogspot.com/2010/12/african-land-grab.html>.

<sup>70</sup> William Davidson, "Ethiopia to Lease 42% of Gambella, the Size of Netherlands," *ECADF Ethiopian News and Opinions*, last modified June 5, 2013, <http://ecadforum.com/2013/06/05/ethiopia-to-lease-42-percent-of-gambella/>.

food security and avoid what Annan has described as the first scramble since the time when Western settlers came to Africa and colonized the land. As mentioned earlier, colonizers deprived Africans of parts of their rich land in countries such as Kenya and Zimbabwe (Rhodesia) and established their land rights systems to the detriment of existing African traditional land tenure systems. There is little empirical evidence to prove that colonizers' dispossessing Africans of their ancestral land led to major food insecurity concerns. Merci Andrews recalls that land offers the basis for all human life. It feeds men, women, boys, and girls, and humans are intimately bound to land.<sup>71</sup> This translates into the idea that forced transfer of land from African tribes to colonizers led to an increase in food insecurity. Assuredly, populations concerned with these land transfers were restricted from accessing some fishing sites or using parts of their rich lands to grow crops, which could lead some tribal groups to migrate to new areas or stage war against colonizers. As noted earlier, the colonial-forced land acquisition practices have matured into new patterns in the post-independent period in Sub-Saharan Africa and are now occurring in the form of land grabs. If colonial land practice acquisition led to food insecurity in areas home to forced land transfers, then there is potential that current land grabs could affect local populations' food security. An exploration of the practice of land deals in Ethiopia and South Sudan could reveal evidence that land grabs cause food insecurity.

*Land Grabs in Ethiopia: The Gambela Case Study*

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<sup>71</sup> Lungisile Ntsebeza and Ruth Hall, *The Land Question In South Africa: The Challenge of Transformation and Redistribution*, (Cape Town: HRPS Press, 2007), <http://books.google.com/books?id=of3KVb-mjclC&pg=PA202&lpg=PA202&dq=land+provides+is+life+in+africa&source=bl&ots=IPkHetLC7E&sig=JrYZ3wlhQSHgmrnBY5zBzgL2GSI&hl=en&sa=X&ei=x15M>.

In the last decade, Ethiopia has been leasing 42% of Gambela, a territory the size of the Netherlands, to farming investors including India's Karutui Global Limited and Saudi Star, a company owned by Ethiopian-born Saudi Sheikh Mohammed Hussein Ali Al Almoudi.<sup>72</sup> These multinational corporations have started huge farms to export rice and other crops.

To ensure the investments of Saudi Star, Karutui Global Ltd, and other multinational corporations, the Ethiopian government created Villagization, a project designed to resettle about 45,000 households from Gambela into new or enlarged villages closer to roads and services. Human Watch Rights (HWR) and local people criticized this program and claimed that the government has used Stalin-style collectivization carried out through beatings or killings to clear land for foreign investors. Denying these accusations, the government made the case that the Villagization project has led to a successful relocation of roughly 35,000 families into 100 new villages.<sup>73</sup>

In 2009, in other parts of Gambela where Saudi Star acquired 25,000 acres of land to grow rice, Sheikh Mohammed Hussein Ali Al Almoudi claimed that he would bring a revolution in food production and improve the social conditions of the local people. Al Almoudi's promises not only proved untrue, but the Saudi Star project caused a massive displacement of the Anuak people, an ethnic group that lives in different parts of Eastern Africa. Hostile to the Saudi Star project, members of the Anuak tribe contended that this project did not deliver opportunities and create jobs in their communities. Rather the Saudi

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<sup>72</sup> Ibid.

<sup>73</sup> Ibid.



Star project has caused environmental problems including water stress that affects fishing sites and farming activities and threatened the Anuak people's livelihood.<sup>74</sup>

If there is such a likelihood that land grabs cause food insecurity and affect local communities' livelihoods in one Sub-saharan country, such as Ethiopia, then an exploration of the practice of land acquisition in another Sub-Saharan country, such as South Sudan, is key to determining whether land grabs affect food security at a national level.

*Land Grabs in South Sudan: The Boma Case Study*

In 2008, Al Ain National Wildlife, an Emirati corporation, signed a 30-year deal with the government of South Sudan to develop and manage a 1.68 million hectare tourism project on a government-owned national park in Boma, Jonglei state. Boma is home to an ethnically diverse group of people including the Murle, Jie, Kachipo, and Ayuak. The South Sudan government neither included nor consulted these communities in the land negotiation with Al Ain National Wildlife, which was brokered at the highest level of government.

With the South Sudanese government's support, Al Ain National Wildlife began relocating in 2009 roughly 15,000 local residents to a new location, four hours away by car.<sup>75</sup> From the beginning, local communities expressed concerns about the move. A central reason for their concern is the possibility of conflicts between the Marua, pastoral communities from the Murle ethnic group, and other agricultural communities including the Jie and the Murle when these communities are forced to resettle in the same area. Al

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<sup>74</sup> Ibid.

<sup>75</sup> Anurhada Mittal and Frederic Mousseau, "Understanding land Investment Deals in Africa," *The Oakland Institute*, last modified 2010, [http://www.oaklandinstitute.org/sites/oaklandinstitute.org/files/OI\\_country\\_report\\_south\\_sudan\\_1.pdf](http://www.oaklandinstitute.org/sites/oaklandinstitute.org/files/OI_country_report_south_sudan_1.pdf).

Ain National Wildlife pledged to provide educational and health services and build infrastructure for concerned communities. The company also promised to create jobs and build villages in areas outside of the park to encourage local people to resettle there. Unfortunately, Al Ain National Wildlife has not delivered the benefits it pledged to the local community as of yet.<sup>76</sup>

In Ethiopia, land deals have led to several environmental issues including land degradation, deforestation, and water stress. These environmental concerns have caused small-scale food insecurity problems in Gambela (Ethiopia) due to their negative impact on local people's livelihoods. Similarly, in Boma (South Sudan) Al Ain National Wildlife's resettling of rural communities into new areas will cause risks of conflict between these communities and reduce to a minimum their access to food.

Whether there is a nexus between land grabs and food security at a national scale remains therefore unproven. Gregory Myers, chief of the USAID's land tenure and property rights Division, points out that "More investments will be needed to ensure that all people achieve food security."<sup>77</sup> Certainly both public and private investments must be part of the solution. To date, there is no evidence that large-scale land investments, even done responsibly, can benefit small farmers and food security.<sup>78</sup>

The practice of land deals in Ethiopia and South Sudan indicates that environmental issues and forced migration of rural communities deeply affect these communities' livelihoods. As this threatening of local people's livelihoods often occurs in small-scale

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<sup>76</sup> Ibid.

<sup>77</sup> "Do Land Grabs Promote Food Security?" *Oxfam* last modified September 4, 2013, <http://politicsofpoverty.oxfamamerica.org/2013/09/04/do-land-grabs-promote-food-security/>.

<sup>78</sup> Ibid.

areas, by way of inductive logic, it can be argued that land grabs cause sectorial food insecurity. If land grabs cause food insecurity in small-scale areas, then the paradigm that land grabs cause food insecurity at a national level could prove true if large-scale land grabs gain momentum over time. This assumption is logically meaningful if socioeconomic and environmental benefits delivered by land deal investments are held constant at their minimal levels.

#### Land Grabs Trample Sub-Saharan African People's Human Rights

In Sub-Saharan Africa, many individuals occupy large areas of land without having a formal title that gives them legal ownership of these areas. Yet, customary land rights do not make individuals immune to possible dispossession of their land by foreign investors. One of the corollaries to this situation is that the land rights belonging to women, social groups relying on grazing, woodlands or wetlands, and ethnic minorities, as well as indigenous people are subject to constant violations.<sup>79</sup>

A number of Sub-Saharan jurisdictions have proven effective in redressing violations of indigenous people's rights to land. A prime example of this claim is the decision by the African Commission on Human and People's Rights ruling in favor of the Endorois, a traditional community of approximately 60,000 nomadic pastoralists in Kenya. In the 1970s, the Kenyan government decided to create a national reserve and tourist facility around Lake Bogoria in the Rift Valley and the Mochongoi forest on the Laikipia

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<sup>79</sup> "Land Tenure and International Investments in Agriculture," *The High Level Panel of Experts on Food Security*, last modified July 2011, [http://www.fao.org/fileadmin/user\\_upload/hlpe/hlpe\\_documents/HLPE-Land-tenure-and-international-investments-in-agriculture-2011.pdf](http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE-Land-tenure-and-international-investments-in-agriculture-2011.pdf).

Plains (Central Kenya).<sup>80</sup> To achieve this goal, the government evicted the Endorois from their land and forced them to move to semi-arid land, where they lost most of their cattle.

According to the Endorois, land is the center of their religion, culture and traditional practices. The Endorois first brought the case of their forced displacement from their ancestral lands to Kenyan courts, but were denied a hearing. In 2003, the Endorois brought the case before the African Commission on Human and People's Rights.<sup>81</sup> In its reasoning, the African Commission emphasized that the Endorois have a clear historic attachment to their ancestral land and are a distinctive indigenous people, a term contested by many African governments who contend that all Africans are indigenous.<sup>82</sup>

The Commission also found multiple violations of the African Charter on Human and People's Rights, a document ratified by Kenya in 1992. These include: article 8 (the forced eviction of the Endorois from their ancestral lands interfered with their right to religious freedom), and article 14 (the property of the Endorois people has been severely encroached upon since their expulsion, and as such, their right to property has been breached). The Commission noted a violation of article 17, sections 2 and 3 (the forced settlement of the Endorois to semi-arid land has led to a major threat to their pastoralist way of life and therefore to a denial of the essence of their right to culture). Similarly, there was also an infringement of article 21. According to this article, "The Kenyan government

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<sup>80</sup> Michel Morel, Landmark Decision on the Eviction of Indigenous People in Kenya, "International Law Observer," last modified April 19, 2010, <http://www.internationallawobserver.eu/2010/04/19/landmark-decision-on-the-eviction-of-indigenous-people-in-kenya/>.

<sup>81</sup> "Kenya: Landmark Ruling on Indigenous Land Rights," *Human Rights Watch*, last modified February 4, 2010, <http://www.hrw.org/news/2010/02/04/kenya-landmark-ruling-indigenous-land-rights>.

<sup>82</sup> Ibid.

has not breached only the Endorois' rights to freely dispose of their wealth and natural resources, but also its obligation to provide restitution and compensation in cases of spoliation." Lastly, the Commission put forward article 22 against the Kenyan government. By not providing adequately for the Endorois in the development process, the Kenyan government has infringed upon this people's right to development.<sup>83</sup> The Commission ruled that the Kenyan government needs to recognize rights of ownership of land to the Endorois. The government also needs to approve the rehabilitation of the Endorois ownership of land and pay them proper compensation for the losses suffered.<sup>84</sup>

In various parts of Sub-Saharan Africa, indigenous and local people have suffered violations of their basic human rights, including being killed and losing their ancestral lands due to land grab activities. Often times these people have been denied redress for these violations because of a lack of appropriate regulatory frameworks. Yet the following international instruments could be used by their signatory parties to develop legal reasoning in regard to contemporary legal land deal cases: the African Charter of Nations, the United Nations Land Grab Guidelines, and the Universal Declaration of Human Rights (UNDH). Similarly, the United Nations Declaration on the Rights of Indigenous Peoples and the International Labor Organization Indigenous and Tribal Peoples Convention 1989 (C169) could also be critical in courts providing redress for violations of individuals' rights to land.

## Conclusion

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<sup>83</sup> Michel Morel, Landmark Decision on the Eviction of Indigenous People in Kenya, "*International Law Observer*," last modified April 19, 2010, <http://www.internationallawobserver.eu/2010/04/19/landmark-decision-on-the-eviction-of-indigenous-people-in-kenya/>.

<sup>84</sup> Ibid.

Two insights stand out from the examination of land grabs. Transnational corporations have pledged to deliver opportunities, such as food security for local and indigenous people, but their promises have not been upheld. Land acquired by transnational land investors has gone out of production for these people. It is by now well established that land grabs contribute to food insecurity in areas concerned with land purchasing. These practices threaten rural communities' livelihoods.

Though there is considerable interest in drawing parallels between this issue and the suggestion that land grabs also affect food security at a national level, there appears to be little to suggest in this regard. To understand whether land grabs cause food insecurity at a national level is to consider a country as a human body. In fact, when some human organs are affected by any given pathology, a lack of an appropriate treatment might knock the whole body out of homeostasis. This could lead to a total shutting down of the body over time. Similarly, an increase in large-scale land acquisition could cause food insecurity at a national level. Negative trends that lead to this critical level, however, are reversed by opportunities delivered by foreign investors as local and indigenous people might have access to local markets where they buy food produced by foreign investors on their ancestral lands.

Ultimately, the chapter has offered insight into the suggestion that land grabs cause environmental problems, such as land degradation, that result in violations of basic human rights, including the right to food and water. The chapter has also noted that Sub-Saharan countries lack effective regulatory frameworks that prevent and provide legal redress for violations of local and indigenous people's basic human rights. If Sub-Saharan governments could create these regulatory frameworks, they would effectively protect their

populations' rights to land, food, and water. The next chapter examines the relationship between the issue of water shortages and food security in Sub-Saharan Africa.

### Chapter 3: Water Scarcity

This chapter first reviews the primary reasons for current and increasing global water scarcity, including such issues as the use of water in agriculture, growing populations, and environmental concerns. It examines the relationship between water scarcity and food security in Sub-Saharan African nations. Ultimately the chapter explores Tanzania's successful program to alleviate water scarcity.

#### Background

Peak oil has made headlines in recent years; however, the specter of peak water will loom over global populations in the future<sup>85</sup>. The Bateke people, a large ethnic group in the Republic of Congo, have a proverb that says, "Palm wine on its own cannot quench someone's thirst." There are alternatives for oil, such as biofuels, wind power, and solar energy, but no substitute for water exists. Without water, there will be no food. With the threat of an imminent lack of water on earth, media headlines will refer to massive migrations to Mars or other planets that potentially have water as a possible option to feed the world's populations.

A human drinks on average 4 liters of water a day,<sup>86</sup> but it takes 2000 to 5000 liters of water to produce one person's daily food.<sup>87</sup> Today, irrigated lands throughout the world produce about 40% of the global grain harvest and irrigation expansion has played a part in

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<sup>85</sup> Lester R. Brown, "Peak Water: What Happens When the Wells Go Dry?" *Earth Policy Institute* last modified September 12, 2013, <http://www.renewableenergyworld.com/rea/blog/post/2013/07/plan-b-pdates-peak-water-what-happens-when-the-wells-go-dry>.

<sup>86</sup> Ibid.

<sup>87</sup> "Water Agriculture and Food Security," *United Nations Water*, accessed September 2, 2013, [http://www.unwater.org/statistics\\_sec.html](http://www.unwater.org/statistics_sec.html).



increasing this harvest by a factor of three during the last six decades.<sup>88</sup> In recent decades, irrigation expansion has come to a standstill and there was just 10% growth in irrigation between 2000 and 2010.<sup>89</sup>

Historically, water use in the farming industry came from rivers or underground aquifers. Six thousand years ago, the Sumerians developed irrigation systems by building dams across rivers and constructing reservoirs to divert water onto the land through a network of gravity-fed canals. These techniques of irrigation prevailed until the second half of the twentieth century, when the amount of sites to build dams came to a minimum, which led to a decrease in the prospect for expanding irrigation. As a result, farmers turned to drilling wells as an adequate alternative in order to tap underground water resources.

Globally, two-thirds of all human withdrawals of water (about 2600km<sup>3</sup>) are used each year to irrigate crops.<sup>90</sup> Agricultural production accounts for 85% of global water consumption, and this percentage is expected to increase by a factor of two by 2050.<sup>91</sup> Generally, it takes roughly 1500 liters of water to produce one kilogram of wheat while 1

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<sup>88</sup> Lester R. Brown, *Peak Water: What Happens When the Wells Go Dry?* *Earth Policy Institute*, last modified September 12, 2013, <http://www.renewableenergyworld.com/rea/blog/post/2013/07/plan-b-updates-peak-water-what-happens-when-the-wells-go-dry>.

<sup>89</sup> *Ibid.*

<sup>90</sup> Kenneth Strzepek and Brent Boehlert, "Competition for Water for the Food System," *Philosophical Transactions of the Royal Society*, B 2010 365, doi:10.1098/rstb.2010.0152.

<sup>91</sup> *Ibid.*

kg of beef takes 15,000 liters of water.<sup>92</sup> The table below demonstrates the increasingly large amounts of water necessary for various water needs, including agriculture.<sup>93</sup>

**Table 3: Global Water Use In The 20th Century (in cubic kilometers)**

Use	1900 (Year)	1950 (Year)	1995 (Year)
<b>Agriculture</b>			
Withdrawal	500	1100	2500
Consumption	300	700	1700
<b>Industry</b>			
Withdrawal	40	200	750
Consumption	5	20	80
<b>Municipalities</b>			
Withdrawal	20	90	350
Consumption	5	15	50
Reservoir evaporation	0	10	200
<b>Totals</b>			
Withdrawal	600	1400	3800
Consumption	300	750	2100
Source: <i>World Water Council 2000</i> p 2., data here refer to use of blue water.			

This table indirectly shows that as global population increases, pressure on water increases to meet the demands of other key issues, such as growing urban populations or energy production.<sup>94</sup> Vorosmarty et al, point out that an increase in world population will sustain the intensity of the pressure that current population levels have on water resources.<sup>95</sup> More alarming is the domino effect of the rise in income that causes diets to shift toward more water-intensive agriculture and increased levels of water service such as

<sup>92</sup> “Water Agriculture and Food Security,” *United Nations Water*, accessed September 2, 2013, [http://www.unwater.org/statistics\\_sec.html](http://www.unwater.org/statistics_sec.html).

<sup>93</sup> John Gowing, “Food Security for Sub-Saharan Africa: Does Water Scarcity Limit the Options?” *University of New Castle Upon Tyne*, accessed July 5, 2013, <http://www.luwrr.com/uploads/paper03-02.pdf>.

<sup>94</sup> Kenneth Strzepek and Brent Boehlert, “Competition for Water for the Food System,” *Human Transactions of the Royal Society*, B 2010 365, Doi: 10. 1098/rstb.2010.0152.

<sup>95</sup> Ibid.

community standpipes and plumbing systems. As a result, there is an exponential increase in per capita water demand in low-income countries. In a broader sense, all of these issues have led to severe water scarcities in various regions of the world, including Sub-Saharan Africa.

Hydrologists use the Falkenmark Index, a population-water equation, to assess water scarcity. According to this calculus, an area experiences water stress when its annual water supplies decrease below 1,700 m<sup>3</sup> per capita.<sup>96</sup> Water scarcity occurs when annual water supplies drop below 1,000 m<sup>3</sup> per capita.<sup>97</sup> A population faces absolute water scarcity when annual water supplies decrease below 500 m<sup>3</sup> per capita.<sup>98</sup> Water scarcity therefore refers to a point at which the aggregate impact of all users hinders the supply or quality of water to such a degree that all sectors in need of water are not fully satisfied.<sup>99</sup> Water scarcity does not occur at every level of supply and demand. Very often, scarcity might occur because of social constructs such as a product of affluence, expectations, customary behavior, and conflicting laws (land rights systems). In some other instances, scarcity might be a direct consequence of altered supply patterns resulting from climate change.<sup>100</sup>

Among symptoms of water scarcity are severe environmental degradation factors, including river desiccation and pollution, decrease in groundwater levels, and growing

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<sup>96</sup> “International Decade for Action ‘Water For Life,’” *United Nations Department of Economic and Social Affairs (UNDESA)*, accessed August 5, 2013, <http://www.un.org/waterforlifedecade/scarcity.shtml>.

<sup>97</sup> Ibid.

<sup>98</sup> Ibid.

<sup>99</sup> Ibid.

<sup>100</sup> Ibid.

problems of water allocation in regions where some groups compete with others. Today, the world is home to roughly 700 million people in 43 countries that suffer from water scarcity. It is expected that by 2025, there will be 1.8 billion people living in absolute water scarcity conditions.<sup>101</sup> At the same time, half of the global population could be experiencing water stress. Due to existing climate change there is a probability of more than 50% that this half of this population will live in areas of severe water stress by 2030, including between 75 million and 250 million in the Sub-Saharan region and the rest of Africa by 2030.<sup>102</sup>

#### Reasons for Increasing Water Scarcity

Water scarcity is both a natural and man-made phenomenon.<sup>103</sup> As the following map<sup>104</sup> shows, there is sufficient freshwater on earth for the global population, but it is distributed unevenly and large volumes of water are wasted, polluted, and unsustainably managed.<sup>105</sup>

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<sup>101</sup> Ibid.

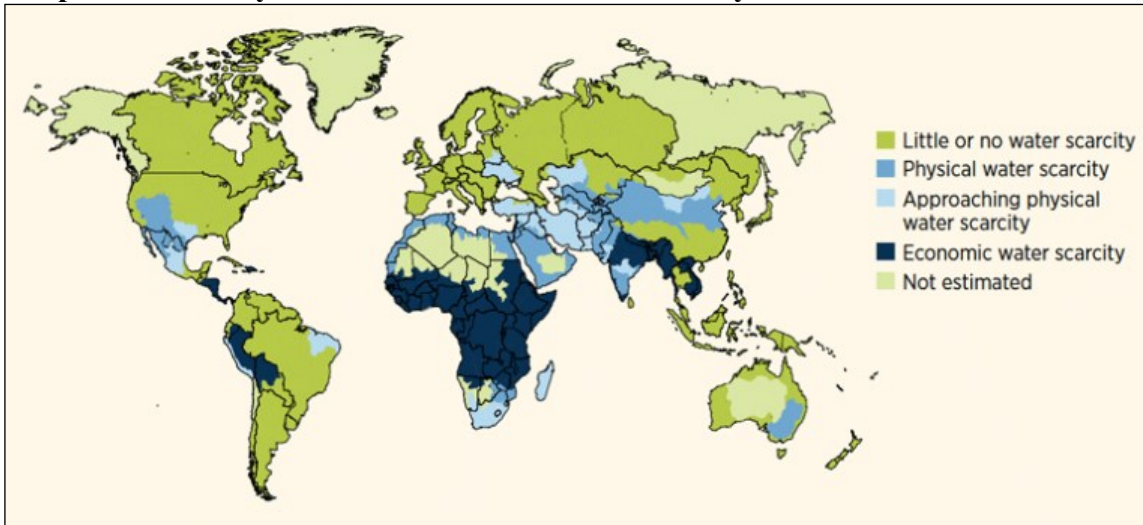
<sup>102</sup> Ibid.

<sup>103</sup> “International Decade for Action ‘Water For Life,’” *United Nations Department of Economic and Social Affairs (UNDESA)*, accessed August 5, 2013, <http://www.un.org/waterforlifedecade/scarcity.shtml>.

<sup>104</sup> Ibid.

<sup>105</sup> Ibid.

**Map 2: Global Physical and Economic Water Scarcity**



*Source:* World Water Development Report 4. *World Water Assessment Programme (WWAP)*, March 2012.

Understanding water scarcity is complicated by several factors. Among these factors are industrialization, expanding urban areas, increase in populations, changes in diets, land grabs, and environmental requirements. Water availability may be improved in one geographical area by decreasing it in another. Scarcity does not occur at every level of supply and demand. For example, the use of water in industrialization may improve by decreasing its use in farming.

### *Industrialization*

As a country industrializes it tends to have an increasing industrial manufacturing water use that decreases when a country develops more service-based industries such as food services.<sup>106</sup> When industrial manufacturing water consumption becomes costly, an implementation of water-conserving technologies and a regulation of water prices can lead

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<sup>106</sup> Kenneth Strzepek and Brent Boehlert, “Competition for Water for the Food System,” *Human Transactions of the Royal Society*, B 2010 365, Doi: 10. 1098/rstb.2010.0152.

to a decrease in water use.<sup>107</sup> For example, in developing countries new power plants that use water for thermoelectric cooling are being built to avoid an excessive water use. Similarly, new facilities in developed nations tend to use air-cooling condensers to reduce water consumption.<sup>108</sup>

Developed countries' transfer of water-use technologies to developing countries also allows the latter's to avoid experiencing the effects of a stage of economic development where their per capita industrial water use is very high. Most Sub-Saharan countries have not experienced water-related effects of a stage of development where their per capita industrial water use is at maximum yet. If Sub-Saharan governments could consider this situation when drafting their agendas to address water scarcity, then they would be well equipped to handle detrimental effects of industrial manufacturing water use when transitioning to their stage of developed nations.

### *Urban Areas*

Policy makers agree that municipal water demand is a major driver of water scarcity. From a microeconomic standpoint, concerns like rising population and per capita income contribute to the shift of the municipal water demand curve to the right, or increase in water demand.<sup>109</sup> Cole points out that a nation's per capita GDP is a key determinant of its corresponding per capita municipal water use. Because of a rise in per capita income among low-income countries, standards of water services are transitioning from rainwater

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<sup>107</sup> Ibid.

<sup>108</sup> Ibid.

<sup>109</sup> Ibid.

catchment and spring water systems, truck supplied water, or public standpipes to plumbing systems that supply water directly to customers' houses.<sup>110</sup>

The range of water consumption in urban areas varies between 10 and 400 liters, with individuals at the grass root level of services consuming 10 liters a day and those at high levels using between 150 and 400 liters of water.<sup>111</sup> Often times, the relationship between per capita water use and per capita GDP is a function of the development path of countries. Developed countries that have a more equalized distribution of resources (Gini coefficients close to a minimum zero) tend to have better standards of water services than low-income countries that have poor resource distribution (Gini coefficients close to a maximum one hundred).

It is worth noting that in developed countries where a sizable percentage of populations have access to water, both household and commercial water consumption increases with respect to incomes. Further increases in income often result in a decrease of household and commercial consumption of water in that countries implement water-efficiency measures such as water-saving showerheads and toilets. Examples of countries that have implemented water-efficient measures include the United States, where per capita municipal water use has decreased as per capita GDPs have increased.<sup>112</sup>

Conversely, developing countries such as Sub-Saharan countries that are home to a rise in incomes are likely to experience increase in per capital municipal water use as water service's capacity expands. Similar effects occur among countries that experience a

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<sup>110</sup> Ibid.

<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

considerable increase in population size.<sup>113</sup> Therefore, among Sub-Saharan countries many individuals remain vulnerable to water scarcity in that increase in municipal per capita water leads to an expansion of withdrawals of huge amounts of water to supply urban areas. Simultaneously, rising municipal per capita water limit access increases the number of people suffering from water scarcity because affording water companies' bills becomes challenging for them.

#### *Population Increase and Changes in Diet*

As the global population increases and more low-income countries from the periphery to the center as middle-income countries, there is progressively a greater increase for food.<sup>114</sup> How governments will address this issue remains unclear, but to be sure, in order to feed over than 9 billion by 2050, with current changing diets, there will be a need to double cropland areas.<sup>115</sup> In fact, in 1961, the average availability of daily food calories per capita was 2,250 kilocalories and this number decreased over time and became 1961 in 2007.<sup>116</sup>

Currently, the Chinese middle class is larger than the population of country, such as the United States. In Africa, 350 million individuals have joined the middle class. Greater social mobility increasingly involves greater demand for water, though these are good news, the question now is whether these middle classes would be able to buy, drive,

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<sup>113</sup> Ibid.

<sup>114</sup> "Global Changes in Diets and the Consequences for Land Requirements for Food" *Journalist's Resource*, accessed August 27, 20113, <http://journalistsresource.org/studies/environment/sustainability/global-changes-in-diets-and-the-consequences-for-land-requirements-for-food>.

<sup>115</sup> Ibid.

<sup>116</sup> Ibid.



and eat in this planet, which is increasingly home to scarcity of natural resources, such as water.<sup>117</sup>

Growing quantities of food needed to feed the world's growing population, and provide this population a good quality of life, requires the use of large quantities of water. Currently, over 70% of fresh water withdrawals go to food production. With an increase in global population and change in lifestyles, the farming industry needs to increase agricultural productivity by roughly 70% by 2050.<sup>118</sup> Along with these issues, rise in incomes and crop prices creates incentives for farmers to seek higher production that leads to an installation of sprinkler and irrigation systems that increase crop water use. These agricultural practices are major contributors of severe water scarcity problems in various parts of the world, such as Sub-Saharan Africa.

### *Land Grabs*

It is a well-known fact that climate change contributes largely to water scarcity in Sub-Saharan Africa, but evidence suggests that among other drivers of water scarcity in this region is the increase in land grabs. Anuradha Mittal expresses this point:

The land grabs phenomenon is being done in the name of modernizing agriculture and expanding African economies, but it cuts out the core natural resources that support African livelihoods for the majority—land and water. This huge transfer of natural wealth to outside investors is eroding food security, water security, and cultural integrity for local people.<sup>119</sup>

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<sup>117</sup> “Why Water Scarcity Means Food Scarcity,” *Triple Pundit: People Planet Profit*, last modified August 30, 2012, <http://www.triplepundit.com/2012/08/water-scarcity-means-food-scarcity/>.

<sup>118</sup> Ibid.

<sup>119</sup> Paul B. Farrell, “Hot Global Real Estate: 416 Land-Grab Deals,” *Oakland Institute*, last modified March 6, 2012, <http://www.oaklandinstitute.org/hot-global-real-estate-416-land-grab-deals>.

Boosting agriculture and developing African economies are two ideas that foreign investors use to promote land purchase activities in regions such as Sub-Saharan Africa. These land deals involve the transfer of the rights to natural resources, such as inland waters from the lessor to the lessee, which threatens local people's livelihoods and undermines water security.

As foreign investors use leased lands for extensive, water-demanding farming activities, which involves large activities of deforestation, they contribute to accelerating desertification, causing drought, and especially damaging existing water supplies. For example, in the region of Segou, in Mali, the Libyan-backed Malibya Development Company built an irrigation canal that runs through villages to reach 100,000 hectares of land leased to this subsidiary company of Muammar Gadhafi by the Malian government.<sup>120</sup> Researcher Devlin Kuyek, who works for the European group Grain, explains that when building this canal that provides some industrial-scale agribusinesses water, Malibya desecrated graves and bulldozed houses to clear way for this canal that is 200 meters wide at some places and is almost a river. Land grabs are associated with an increase in the building of irrigation systems and large dams. There is a growing concern that clearing a way for the canal, which causes diversion of water from major rivers, will negatively affect local communities, downstream populations, and the environment by causing or increasing concerns, such as water scarcity.<sup>121</sup>

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<sup>120</sup> Steve Fisher, "Africa for Sale," *International Rivers (People Water Life)*, last modified September 1, 2011, <http://www.internationalrivers.org/resources/africa-for-sale-1657>.

<sup>121</sup> Ibid.

### *Environmentally Friendly Requests and Blue Versus Green Water*

Many Sub-Saharan rivers and lakes have been altered due to increases in frequency of floods, severity of droughts, increase in urban water use and hydropower systems without returning water to rivers and lakes through drainage or groundwater systems.<sup>122</sup> These changes have required not only a shift in how the earth's finite water supply is used, but in how different types of water are used. To maintain adequate levels of water, countries must ensure that water taken from rivers, lakes, and refillable underground aquifers are adequately replenished. One international instrument that regulates this issue is Environmentally Flow Requirement (EFR).

EFR refer to the quality, quantity, and timing of water flows required to maintain the components, functions, processes, and resilience of aquatic ecosystems that give goods and services to people.<sup>123</sup> Discussing EFR, Falkenmark and Rockstrom (2006) bring about the distinction between the blue water that is directly withdrawn from lakes, rivers, and aquifers for human needs and the green water in soil moisture used by terrestrial ecosystems such as agriculture systems.<sup>124</sup> These authors contend that an excessive blue water withdrawal decreases water tables and affects the availability of green water, which can result in serious damage of terrestrial ecosystem function. Globally, about 1500km<sup>3</sup> of

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<sup>122</sup> "Environmental Flows," *The World Bank*, accessed August 27, 2013, <http://water.worldbank.org/topics/environmental-services/environmental-flows>.

<sup>123</sup> Ibid.

<sup>124</sup> Kenneth Strzepek and Brent Boehlert, "Competition for Water for the Food System," *Human Transactions of the Royal Society*, B 2010 365, doi: 10. 1098/rstb.2010.0152.

blue water go to irrigation annually while rain fed crops consume an estimated 5000 Km<sup>3</sup> of green water.<sup>125</sup>

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<sup>125</sup> Ibid.

## Food Insecurity Increases in Sub-Saharan Countries Deeply Affected by The Ever-Looming Water Scarcity

Water scarcity affects about 1.2 billion people in the world and another 1.6 billion people or one quarter of the global population are affected by an economic water shortage, a situation where a country lacks the necessary infrastructure to withdraw water from rivers and aquifers.<sup>126</sup> Though there appears not to be a major indicator of alarming global water scarcity, water use has been growing at more than twice the rate of population growth in the 20<sup>th</sup> century<sup>127</sup> in various parts of regions, such as Sub-Saharan Africa, experience chronic water shortages, which affects food security.

Water is a central variable in boosting food security. The tautological, true, and common reasons for this claim include the suggestion that both crops and livestock need water to grow and agriculture uses large volumes of water for irrigation.<sup>128</sup> Equally, the observation that agriculture feeds the world and contributes to produce a diverse spectrum of non-food crops, including cotton, rubber, and industrial oils is sufficient to provide necessary diagnostic data about the centrality of water to feed populations.<sup>129</sup>

Water withdrawals are central to agricultural productivity, but this comes at a price that involves developing infrastructure and building irrigation systems that meet the

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<sup>126</sup> “International Decade for Action ‘Water For Life,’” *United Nations Department of Economic and Social Affairs (UNDESA)*, accessed August 5, 2013, <http://www.un.org/waterforlifedecade/scarcity.shtml>.

<sup>127</sup> Ibid.

<sup>128</sup> “Water and Food Security,” *United Nations Department of Economic and Social Affairs (UNDESA)*, accessed August 5, 2013, <http://www.un.org/waterforlifedecade/scarcity.shtml>.

<sup>129</sup> Ibid.

standards of the new age. There is only 3% of irrigated land in Sub-Saharan Africa, which is less than 5% of arable land.<sup>130</sup> Irrigation is critical to boost agricultural yields, a policy that forms part of the three options regarded by many scholars as best alternatives to develop agriculture. John Gowing suggests that, in order for Sub-Saharan countries to reach high rates of agricultural growth, they need to create policies that are based on these options: expanding crop areas, increasing crop intensity, and boosting yield.<sup>131</sup>

Gowing goes on saying that the first option, expanding crop areas, is available for Sub-Saharan countries as they still have millions of hectares of arable and fertile land. According to FAO, expanding crop areas will boost Sub-Saharan agricultural production by 25% toward 2030. Similarly, boosting production from existing cropland through intensification will contribute to the remainder 75% of increase in agricultural growth.<sup>132</sup>

Currently, Sub-Saharan Africa's dependency on irrigated land is at minimal and rain fed agricultural plays a high profile role in sustaining rural livelihoods and meeting the requirements of subsistence agriculture. One challenge regarding rain fed agriculture, however, is to improve crop production per crop, which seems never to be a given due to change in precipitation patterns, soil erosion, and storms.

For example, in the disputed Sool Region of the self-declared Republic of Somaliland, (Somalia) about 3,000 households are experiencing water shortages as a result of poor rains. Some drought-affected rural families migrated to neighboring areas, such as

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<sup>130</sup> John Gowing, "Food Security for Sub-Saharan Africa: Does Water Scarcity Limit the Options?" *University of New Castle Upon Tyne*, accessed July 5, 2013, <http://www.luwrr.com/uploads/paper03-02.pdf>.

<sup>131</sup> Ibid.

<sup>132</sup> Ibid.

Togdheer and Buthole, where it typically rains from October to December. Hoping to find water and pasture in remote regions, other families went to further South.

Discussing this issue, Mohamed Moussa Awale, Chairman of Somaliland's NERAD<sup>133</sup> voices concern that "we are worried about the old people and the people who had no ability to move from the villages. They are in serious situation and need water and food."<sup>134</sup> Building on Awale's point, Sool's deputy governor Mohamed Abdi Dhimbil adds, "The water shortage has affected the whole region. The nearest water source is 94km away, inside Ethiopia, and we believe that about 200 pastoralist families are in search for water and pasture in Somalia's Mudug region."<sup>135</sup> He continues, "The food shortage has increased water bills. If someone's income is \$150 a month, he will pay \$45 for water, compared to \$22.38 last month, and will not be able to make ends meet."<sup>136</sup>

The water shortage in Somaliland is one particular case of how water shortages are affecting populations' livelihoods and food security at variable degrees of emphasis in Sub-Saharan countries. In Somaliland, where most rural communities are pastoralists, the water shortage has affected pastures, driving hundreds of families to move to remote areas to raise livestock and find water. Similar situations also occur in rural communities where individuals have been practicing agriculture for centuries. In agricultural communities, water shortages often affect agricultural productivity and, in some worse cases, drive

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<sup>133</sup> NERAD: Somaliland's National Environment Research and Disaster Preparedness and Management Authority.

<sup>134</sup> "Somalia: Water Scarcity Affects Somaliland Households," *New Partnership for Africa's Development (NEPAD) Water Center of Excellence*, <http://nepadwatercoe.org/somalia-water-scarcity-affects-somaliland-households/>.

<sup>135</sup> Ibid.

<sup>136</sup> Ibid.

individuals from their ancestral land to areas where they will grow crops necessary for their subsistence. To reverse the negative trends of water shortages Sub-Saharan governments need to create effective policies that incorporate or juxtapose ideas of models, such the market-based or the community-based approach.

#### Water Policies in Sub-Saharan Africa – Case Study of Tanzania

There is a huge potential for agricultural development in Tanzania, but the country continues to experience the pangs of low productivity in agricultural development. Small-scale farmers who practice subsistence agriculture in areas ranging from 0.9 to 3 hectares dominate the Tanzanian farming industry.<sup>137</sup> The few larger agricultural enterprises produce 80% of the country's exports.<sup>138</sup> Because local farmers lack large-scale resources, their contribution to the country's exports remains minimal.

Although Tanzania is not viewed as a food-deficient country because it produces over 90% of its population's food requirements,<sup>139</sup> local concerns do exist. The agricultural sector, especially in the semi-arid areas of the north and the center, depends on rainfall, so that access to food remains a challenge for many households in these areas. Among other factors contributing to food insecurity in Tanzania are high post-harvest losses (20% for perishables and 20% for grains), low income, and ineffective irrigation systems.

Another major threat to Tanzania's food security is land grabs. Increasingly, multinational companies acquire land legally or illegally to grow crops, such as *Jatropha*, a

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<sup>137</sup> Aida Mliga, "Food and Water Security in Tanzania," *Future Directions International*, last modified 26 July 2012, <http://www.futuredirections.org.au/publications/food-and-water-crises/615-food-and-water-security-in-tanzania.html>.

<sup>138</sup> Ibid.

<sup>139</sup> Ibid.



small American tree that produces seeds used to make biodiesel. Initially, investors pledge to improve social conditions and build infrastructure in local communities where they buy land. Most investors often do not realize these promises, which push local populations to lower their sights on the prospect that foreign investors will develop their lands. In many cases of land deals, local communities end up with undeveloped lands or degraded lands that affect both food and water security.<sup>140</sup>

Tanzania has enough ground and surface water to meet its various needs, but a lack of investments in infrastructure in this area has restricted access to water in some parts of this country, and contributed to water scarcity. The use of traditional irrigation techniques have also proven ineffective in servicing Tanzania's farming industry.

In the 1990s experts assessed the increasing water shortages in parts of Tanzania, such as the Pangani Basin, an area comprised of five sub basins fed by snow melt from the peaks of Mount Kilimanjaro that quench local farmers' crops. These rivers include the Pangani River (43650km<sup>2</sup>), the Umba River (8,070 km<sup>2</sup>), the Msangazi River (5,030 km<sup>2</sup>), the Zigi and coastal rivers including the Mkulumuzi (Basin 2080 km<sup>2</sup>).<sup>141</sup> Contributing factors include dwindling of snow levels on Mount Kilimanjaro, increased water demand and environmental degradation resulting from population growth.<sup>142</sup>

Other factors identified as drivers of water shortages in Tanzania include a lack of water storage, poor water management systems, and ineffective institutions and regulations.

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<sup>140</sup> Ibid.

<sup>141</sup> "Welcome to Pangani Basin Water Board," *Pangani Basin Water Board*, accessed June 3, 2013, <http://www.panganibasin.com/>.

<sup>142</sup> Susan Schneegans, "A World of Science" *United National Educational Scientific and Cultural Organization*, accessed July 15, 2013, [http://www.unesco.org/science/world\\_sc\\_jan02.pdf](http://www.unesco.org/science/world_sc_jan02.pdf).

Due to reasons, such as the prevalence of a dual land rights system in Tanzania, the lack of effective institutions and regulations have led to conflicts over water usage.

All these issues have led to an increase in water insecurity that affects social conditions, rural livelihoods (farming, herding, fishing, and artisanal mining), agriculture, energy, industry, and emerging sectors, including mining, tourism, and fisheries in Tanzania. A 2003 World Health Organization (WHO) reports explains that, in various parts of this country, one out six individuals lack access to safe drinking water. In some villages of Tanzania, people walk for 2 to 3 km daily in search for water from public taps or natural streams and carry water in heavy containers of 20 to 25 liters on their heads.<sup>143</sup>

The Tanzanian government has attempted to address water scarcity by implementing multiple strategies. Depending upon location, historical period, and culture, state authorities have depended upon one of three primary models for water allocation – the state, market, or community model. Taking into account her traditional cultural systems, colonial history, dual system of water rights, and the needs of the changing market place, Tanzania’s plan integrates aspects of all three models to address water issues and boost food security.

The state or technocratic model promotes a subjection of water resources to public planning and management within the framework of the river basin. Inspired by the Tennessee Valley Authority (TVA) and applied in many African countries since the 1960s, the state or technocratic model involves the idea that water belongs to the state, which is entitled to allocate water through administrative water rights or licenses.

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<sup>143</sup> “Water Shortage in Tanzania,” *Project Umoja Helping the People of Nyamuswa*, accessed August 6, 2013, <http://www.projectumoja.com/2012/04/30/water-shortage-in-rural-tanzania/>.

The market based, or neo-liberal model argues that markets are better positioned than bureaucrats and politicians to allocate scarce resources for economically efficient outcomes. Conversely, challenging both the market model and the technocratic approach, the community-based model promoted by a neo-populist platform since the 1980s, stresses the centrality of a community participation in development and natural resource management. According to this approach, there is no individual ownership and rights to land and access to water is determined by an individual’s affinity to the community, or contribution in the building or maintenance of infrastructure.<sup>144</sup> The following table presents a synopsis of the main elements of the three models of water management.<sup>145</sup>

**Table 4: Three Models of Water Management**

<i>Issues</i>	<i>Model Community</i>	<i>State</i>	<i>Market</i>
Principal agent	Community, civil society, water users associations	State (executive), planner, expert	Market, judiciary
Ownership of water	Commons with varying systems of rights of use	State property	Individual property, private enterprises
Mechanism for allocating water	Access to water through participation/investment in scheme, inheritance	Access to water through bureaucratic allocation of water licenses subject to fees	Access to water through purchase of a right in a market
Resource mobilization	Labor and local contributions to other water user groups	Taxes/water fees to government	Water fees and private investments
Ways of solving conflicts	Civil society: committee, hearings, general meetings, village elders	Executive: board representing elders Expert decisions	Market /judicial: market courts of law
Scale/regional focus	Local village, community, watershed	River basin	Individual user

<sup>144</sup> Hakoon Lein and Mathias Tagseth, “Tanzanian Water Policy Reforms—Between Principles and Practical Applications,” *Norwegian University of Science and Technology*, [capacity4dev.ec.europa.eu/system/files/file/17/02/2011\\_-\\_1137/...PDF](http://capacity4dev.ec.europa.eu/system/files/file/17/02/2011_-_1137/...PDF) file.

<sup>145</sup> Ibid.

Dominant professional perspective	NGOs, professionals, farmers	Hydrologists, Engineers, economists	Economists
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Ongoing water policy reform in Tanzania that builds on the elements from the technocratic, market-based, and community-based approaches to water management is critical to alleviating the threats of water scarcity and its consequences on agriculture. For example, in the Pangani Basin, all abstractions of water have been mapped and stored in a database. The assessment of water shortages in this Basin has led to the creation of 1000 water rights. The efficiency of the Pangani Basin has increased from 20% to 50% and flow levels of this basin have improved due especially to an installation of control gates. There has been the creation of organizations known as Water User Associations (WUAs) to prevent conflicts and promote sustainable use of water. Water users are required to pay annual fees for the total of amount of water use.<sup>146</sup>

### Conclusion

Like Tanzania, many Sub-Saharan governments have created multiple water policies to fight water scarcity and ensure effective agricultural food production. Most of these water policies, however, have proven ineffective due to the conflicting water rights, a failure to create and implement water management requirements, and the increasing realities of climate change. The failure to increase agricultural production through increasing water supplies has led many Sub-Saharan countries to consider improving food production through the importation of genetically modified seeds and crops from the West.

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<sup>146</sup> Diane E. Makule, “The Pangani Basin Water Resources Management,” *The World Bank/WBI’s CBNRM Initiative*, accessed August 3, 2013, <http://srdis.ciesin.columbia.edu/cases/tanzania-019.html>.

## Chapter 4: GMOs

This chapter provides an overview of genetically modified organisms (GMOs) or genetically engineered organisms (GEOs) and addresses the advantages and disadvantages that GMO crops have on food security in Sub-Saharan Africa. Finally, the chapter discusses South Africa's model of GMOs' regulatory framework.

### Overview

Food security refers to a situation whereby all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.<sup>147</sup> Among the four dimensions of food security are: availability, access, stability and utilization of food. The availability dimension of food security involves the continuous supply of food by producing sufficient amounts of food, creating adequate stocks, and making trading agreements at both national and international levels. The access dimension emphasizes the centrality of effective household and individual demand for food. The utilization dimension of food security refers to the appropriate quality of food. The stability dimension indicates that the equilibrium of demand and food supply is not volatile.<sup>148</sup> A number of factors can affect these four dimensions of food security. These include growing global population, rising

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<sup>147</sup> "Food Security," *Department: Agriculture Forestry and Fisheries (Republic of South Africa)*, last modified March, 2011, <http://www.nda.agric.za/docs/GenReports/FoodSecurity.pdf>.

<sup>148</sup> "Food Security and Nutrition," *Food Security and Nutrition Information System in Cambodia*, accessed August 4, 2013, <http://www.foodsecurity.gov.kh/wifsan>.

demand for healthy and culturally accepted food, increasing food prices, and increasing global environmental change. Most of these factors negatively affect food security in the world and specifically in Sub-Saharan Africa where the Global Hunger Index is very high.

As there appears to be some effective links between food security and agricultural production, discussions on food security concerns in Sub-Saharan Africa tend to slip from purely food security literature to a broader mainstream debate over low productivity of African agriculture. A classic question that often comes to the table is why African agricultural production is so minimal. In an attempt to answer this question, Robert Paarlberg, expert on agriculture at Wellesley College and Harvard University notes that African farmers should not be blamed for low agricultural productivity in that they have been skillfully using their traditional agricultural techniques for millennia. These traditional techniques have helped African farmers practice subsistence agriculture, a type of farming in which farmers use the produce or subsistence crop and livestock to feed their families and sell any surplus.<sup>149</sup>

Paarlberg goes on to say that African traditional agricultural practices are good enough to keep farmers alive and roll back the specter of occasional situations of famine, but cannot lift Africans out of poverty.<sup>150</sup> In fact, no matter how much time and effort African farmers invest in agricultural production, their productivity and incomes remain minimally constant and cannot contribute to ensuring food security at a national level. For example, in 2005, African farmers produced 3% less per capita than in 2000 and 12% less

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<sup>149</sup> Dan Gardner, "Outdated Farming Methods Are Why African Agriculture Is So Unproductive," *African Agriculture*, last modified May 27, 2008, [http://www.africanagricultureblog.com/2008/05/outdated-farming-methods-are-why\\_27.html](http://www.africanagricultureblog.com/2008/05/outdated-farming-methods-are-why_27.html).

<sup>150</sup> Ibid.

than in 1975.<sup>151</sup> Indicating the minimal shares of African countries' farming industries in these countries' GDP, these statistics provide evidence that many Sub-Saharan nations remain home to low agricultural productivity. This situation translates into the urgent need of importing agricultural technologies from the West to develop agriculture and eradicate poverty and hunger.

Empirical evidence indicates that the introduction of synthetic fertilizers, pesticides, modern techniques of irrigation, and machinery put European and American farmers on the path to boost productivity and embrace prosperity. In the 1960s and 1970s, a large-scale application of similar technologies and introduction of seed varieties, such as strains of rice, in Asian countries, including China, India, South Korea, Singapore, and Taiwan, generated agricultural productivity and prosperity.<sup>152</sup> The introduction of hybrid strains of crops and adoption of technologies, including irrigation in Asia, became known as the Green Revolution. Research, development, and technology transfer initiatives of the Green Revolution occurred between the 1940s and the late 1970s and boosted agricultural production, especially in the developing world.<sup>153</sup> Norman Borlaug, known as the Father of the Green Revolution, is credited with pioneering initiatives of the "Green Revolution," a term coined by William Gaud, former director of the United States Agency for International Development (USAID). Gaud indicated that initiatives that led to the Green Revolution had the markings of a new revolution. For this reason, and to nuance these

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<sup>151</sup> Ibid.

<sup>152</sup> "Chapter Four: The Rise of Asia," *PovertyEducation.org*, accessed August 15, 2013, <http://www.povertyeducation.org/the-rise-of-asia.html>.

<sup>153</sup> Ibid.

initiatives from terms such as the Russian Red Revolution and the Sha of Iran White Revolution, Gaud termed this agriculturally based new revolution the Green Revolution.<sup>154</sup>

Why has the Green Revolution not made it to Africa? According to Dan Gardner, Asia was considered as the worst and the least hopeful case during the 1960s, not Africa. Among reasons, why the Green Revolution has not come to Africa is the high-income countries' obsession to address the critical economic situations of Asian countries in the 1960s. For example, the United States is credited with boosting the economic success of Korea and Taiwan because the United States subsidized Korean exports and gave millions in foreign aid to support Taiwanese agriculture. When Asian agricultural productivity increased, and the threats of the 1960s and 1970s food crisis passed, donors took their eyes off agricultural productivity and food security as potential urgent issues.<sup>155</sup> In the last two decades, donors have reduced investments in the modernization of agriculture in Africa, where between 60% and 70% of the population depends on agriculture for its livelihood.<sup>156</sup> For example, the World Bank has reduced the part of its agricultural investment budget that goes to Africa from 30% to 8%. With growing populations to feed and sizable percentages of subsistence farming systems within their borders, Sub-Saharan countries are also home to serious institutional and technological challenges to their infrastructure.<sup>157</sup>

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<sup>154</sup> Ibid.

<sup>155</sup> Dan Gardner, "Outdated Farming Methods Are Why African Agriculture Is So Unproductive," *African Agriculture*, last modified May 27, 2008, [http://www.africanagricultureblog.com/2008/05/outdated-farming-methods-are-why\\_27.html](http://www.africanagricultureblog.com/2008/05/outdated-farming-methods-are-why_27.html).

<sup>156</sup> Ibid.

<sup>157</sup> Ibid.



Other causes of food insecurity in Sub-Saharan Africa include changing rainfall patterns, which lead to water scarcity, drought, or flood that affect crops and livestock, and limit farmer-employer opportunities. An example of a Sub-Saharan country that has been home to chronic hunger in recent years is Ghana. This chronic hunger struck large numbers of Ghanaians between 2003, 2005 and 2007. In Ghana, roughly 28% of the population lives below the national poverty line and the country is home to a high prevalence of child malnutrition (stunted 30%, and underweight 21%).<sup>158</sup>

In light of the recent spike in food prices, the combination of chronic hunger, poverty, armed conflicts, civil unrest, drought, and poor government have created conditions where a food crisis may take hold in Sub-Saharan Africa. A recent study by Maplecroft, a risk analysis company, indicates that Africa accounts for 39 of the 59 most at risk countries in the Maplecroft's Food Security Index and hosts 9 of the 11 countries in the extreme risk category. These countries include Somalia, DRC, Ethiopia, South Sudan, and Sierra Leone.<sup>159</sup> As the chart below indicates, about 400 million or 42% of populations of 39 countries in Sub-Saharan Africa are estimated to suffer from food insecurity in 2012.<sup>160</sup>

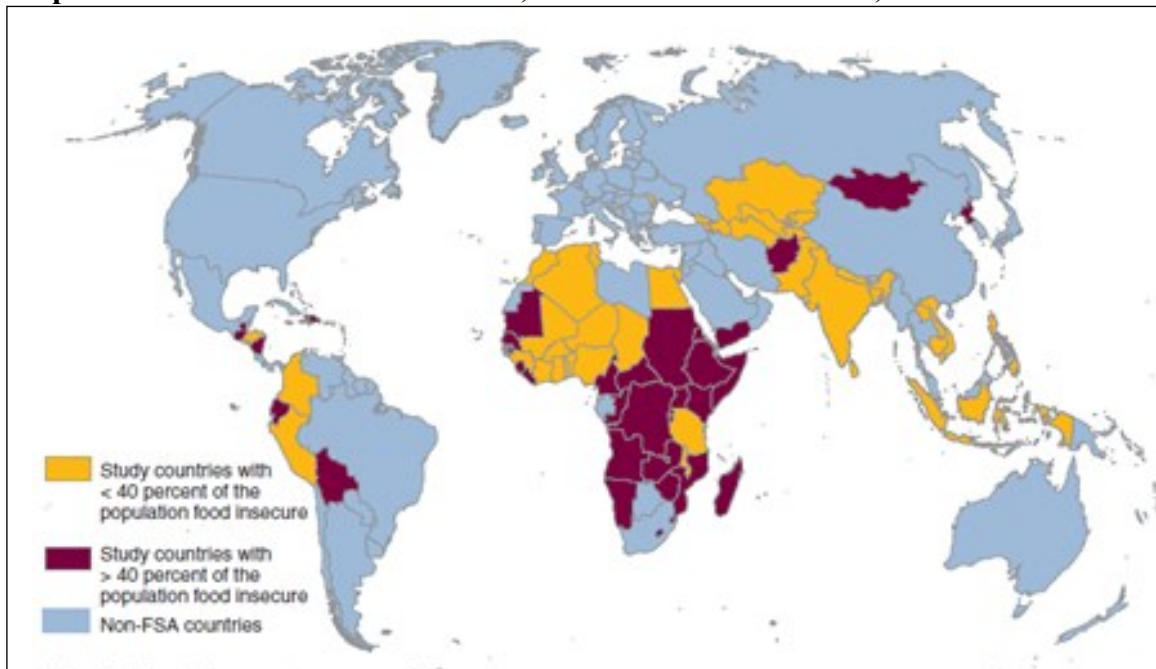
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<sup>158</sup> Whileimina Quaye, Godfred Frempong, Joost Jongerdon, and Guido Ruivenkamp, "Exploring Possibilities to Enhance Food Sovereignty Within the Cowpea Production-Consumption Network in Northern Ghana," *Food Research Institute, Science and Technology Policy Research Institute*, last modified 2009, <http://www.krepublishers.com/02-Journals/JHE/JHE-28-0-000-09-Web/JHE-28-2-000-09-Abst-PDF/JHE-28-02-083-09-1972-Quaye-W/JHE-28-02-083-09-1972-Quaye-W-Tt.pdf>.

<sup>159</sup> "New Products and Analysis," *Maplecroft*, accessed August 15, 2013, [http://maplecroft.com/about/news/food\\_security\\_risk\\_index\\_2013.html](http://maplecroft.com/about/news/food_security_risk_index_2013.html).

<sup>160</sup> "Food Insecurity is Concentrated in Sub-Saharan Africa in 2012," *United States Department of Agriculture*, last modified July 25, 2012, <http://www.ers.usda.gov/data-products/chart-gallery/detail.aspx?chartId=29155&ref=collection#.UjydQZx0ICI>.

**Map 3: Distribution of Lower Income, Food Insecure Countries, 2012**



Note: FSA = Food Security Assessment

Source: Calculations by USDA, Economic Research Service

If Sub-Saharan countries can reduce the current decline in food production, they will considerably progress on the process of reversing current negative trends in food security, poverty, and social and political instability. To achieve this goal, Sub-Saharan countries need to import the Green Revolution technologies and expand an irrigated area that will contribute to a 45% increase in food production. With the use of techniques such as seed varieties of crops Sub-Saharan countries will also boost agricultural production in cultivated land that will contribute to another 55% increase in food production.<sup>161</sup>

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<sup>161</sup> Whilemina Quaye, Godfred Frempong, Joost Jongerdon, and Guido Ruivenkamp, “Exploring Possibilities to Enhance Food Sovereignty Within the Cowpea Production-Consumption Network in Northern Ghana,” *Food Research Institute, Science and Technology Policy Research Institute*, last modified 2009, <http://www.krepublishers.com/02-Journals/JHE/JHE-28-0-000-09-Web/JHE-28-2-000-09-Abst-PDF/JHE-28-02-083-09-1972-Quaye-W/JHE-28-02-083-09-1972-Quaye-W-Tt.pdf>

However, a number of the Green Revolution technologies including the use of pesticides and seed varieties of crops are falling into obsolescence due to the emergence of biotechnology and GMOs.

Biotechnology refers to the manipulation of genetic makeups of plants or animals to create new organisms.<sup>162</sup> Technically, it involves the use of a recombinant DNA technology to transfer genetic material from one organism to another in order to produce plants, animals, enzymes, drugs, and vaccines.<sup>163</sup> Increasingly, most countries appear to be considering adoption of biotechnology as a significant alternative to reverse the trend of increasing food insecurity. According to the biotech industry, GMO products contribute to poverty reduction by increasing crop productivity, generating income, ensuring a safer environment, and fostering sustainable agricultural development. For example, in the United States, the adoption of plant biotechnology of major crops led to considerable yield increases, savings for growers, and a decrease in pesticide use. In this country, biotechnology has substantially increased the ratio of grain per acre. For example, in 2007, an additional amount of grain that resulted from an increase in biotech crop yields led to the production of an extra 366 million gallons of ethanol. Increasingly, biotechnology allows farmers to produce more corn, soybeans, and many other kinds of crops on the same acre, thus providing supply for both food and biofuels.<sup>164</sup> GMOs increase crop yields and help farmers produce greater amounts of crops. According to the biotech industry, an

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<sup>162</sup> “Genetically Engineered Food: An Overview,” *Food and Water Watch*, last modified September 29, 2011, <http://www.foodandwaterwatch.org/reports/genetically-engineered-food/>.

<sup>163</sup> *Ibid.*

<sup>164</sup> *Ibid.*

adoption of GMOs in the developing world can help low income countries to produce as much as high income countries in regards to selected crops including bananas, corn, rice, and sorghum.

For several centuries many societies have used a variety of techniques to modify crops and agricultural practices, and those techniques led to the development of plant breeding in biotechnology in the modern era. Humans have domesticated crops and animals in order to meet the needs of improved production, to resist diseases and pests, and to serve human preferences. The domestication process, also known as counter-Darwinian selection, led to improved crops. Although the domestication process has made considerable progress over the years, the majority of present crops never existed in a wild environment and could not survive without human care. Today, many crops including strawberries, wheat, cabbage, and corn are very different from the ancestors they descend from. As modern agriculture emerged, crop plants improved because of breeding methods that build on seminal research in genetics. Charles Darwin, who characterized hybridization between plant species, and Gregor Johann Mendel, who demonstrated that the inheritance of certain traits in pea plants follow particular patterns, are credited for laying the foundation of the modern age of plant breeding.

In the mid-19<sup>th</sup> century, research found a class of cellular molecules that codes all the traits or features that constitute an organism. Each of these traits is encoded by a gene, which is the functional unit of nucleic acids including DNA or RNA and is made of nitrogenous bases such as purine or pyrimidine. A transfer of traits could occur during a transfer of DNA from a cell donor to any given recipient. In 1943, Oswald Avery proved that DNA was the genetic material. The description of the structure of DNA was made

possible by the works of Watson and Crick in 1953. The works of these researchers proved to be critical to the development of modern biology.<sup>165</sup> Discovery of the DNA and RNA led to a more detailed understanding of these basic elements of cells and more importantly provided research for agricultural development.

Over the years, there were many findings on how genes function and on the synthesis of DNA, RNA, and proteins. In 1963, Nobel laureate Marshal Nirenberg and his team deciphered the genetic code. Later on, other researchers employed the technique of inserting rDNA into a living cell, which gained momentum as genetic engineering and led to the development of the biotechnology industry.<sup>166</sup>

### Pros and Cons of GMOs to Food Security

#### *Advantages of GMOs to Food Security*

Today, benefits of genetic engineering in agriculture include increasing crop yields, reducing costs for food or drug production, and reducing needs for pesticides. Similarly, enhancing nutrient composition, improving food quality, resisting pests and diseases, ensuring greater food security, and providing medical benefits to the world's growing population emerge as some of the benefits of genetic engineering.<sup>167</sup>

Genetic engineering has also developed crops that mature faster and tolerate aluminum, boron, salt, drought, frost, and many other environmental stressors thus allowing plants to germinate and grow in an environment where they would otherwise not

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<sup>165</sup> Bill Ganzel, "Farming 1970s to Today" *The Ganzel Group*, last modified 2009, [http://www.livinghistoryfarm.org/farminginthe70s/crops\\_10.html](http://www.livinghistoryfarm.org/farminginthe70s/crops_10.html).

<sup>166</sup> Ibid.

<sup>167</sup> "Food Safety" *World Health Organization (WHO)*, accessed August 10, 2013, <http://www.who.int/foodsafety/publications/biotech/20questions/en/>.

flourish. Other benefits of genetic engineering include the production of nonprotein (bioplastic) and nonindustrial (ornamental plants) products. Genetic engineering also develops biotech crops that are either herbicide tolerant, allowing herbicides to kill weeds without harming crops, or insect resistant, which provide protection from destructive pests.<sup>168</sup>

Recently, a number of biology corporations have developed genetically engineered animals including hogs and salmon to increase yields and decrease susceptibility to diseases. These corporations have engineered salmon to grow larger and mature faster. Likewise, they have engineered cattle to boost their immune systems against mad cow disease. The following table offers a better idea of GMOs results from agricultural biotechnologies.<sup>169</sup>

**Table 5: Examples Of GMO Products Resulting From Agricultural Biotechnology**

<i>Genetically Conferred Trait</i>	<i>Example Organism</i>	<i>Genetic Change</i>
Herbicide tolerance	Soybean	Glyphosate herbicide (Roundup) tolerance conferred by expression of a glyphosate-tolerant form of the plant enzyme 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) isolated from the soil bacterium <i>Agrobacterium tumefaciens</i> , strain CP4
Insect resistance	Corn	Resistance to insect pests, specifically the European corn borer, through expression of the insecticidal protein Cry1Ab from

<sup>168</sup> “Genetically Engineered Food: An Overview,” *Food and Water Watch*, last modified September 29, 2011, <http://www.foodandwaterwatch.org/reports/genetically-engineered-food/>.

<sup>169</sup> Theresa Phillips, “Scitable,” *Genetically Modified Organisms (GMOs): Transgenic Crops and Recombinant DNA Technology*, accessed August 21, 2013, <http://www.nature.com/scitable/topicpage/genetically-modified-organisms-gmos-transgenic-crops-and-732>.

		Bacillus thuringiensis
Altered fatty acid composition	Canola	High laurate levels achieved by inserting the gene for ACP thioesterase from the California bay tree <i>Umbellularia californica</i>
Virus resistance	Plum	Resistance to plum pox virus conferred by insertion of a coat protein (CP) gene from the virus

Source: Theresa Phillips, “Scitable,” *Genetically Modified Organisms (GMOs): Transgenic Crops and Recombinant DNA Technology*, p 1.1

### *Disadvantages of GMOs to Food Security*

Most biotechnical engineers agree that manipulations made in genetic engineering are critical improvements because these manipulations add new features to the genome of engineered organisms.<sup>170</sup> Yet, the iceberg effect of the practice of biotechnologies might involve multiple unintended consequences.

An explicit example of a clash over the use of biotechnologies is a 2012 French food safety officials’ decision of not banning a United States-based multinational agricultural biotechnology corporation called Monsanto’s variety of genetically modified corn after dismissing the conclusions of a recent study.<sup>171</sup> According to the French Food safety authority (ANSES),<sup>172</sup> the data presented by a team led by biotech-critic Gilles Eric Seralini did not prove its author’s controversial claim that Monsanto corn caused health issues in lab rats. The two-year study found that lab rats that were fed a diet of 33%

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<sup>170</sup> “Genetically Engineered Food: An Overview,” *Food and Water Watch*, last modified September 29, 2011, <http://www.foodandwaterwatch.org/reports/genetically-engineered-food/>.

<sup>171</sup> Mike Ludwig, “Inside the Monsanto Information War,” *Truthout Report*, last modified October 24, 2012, <http://truth-out.org/news/item/12284-inside-the-controversy-over-a-french-gmo-study-and-the-monsanto-information-war>.

<sup>172</sup> ANSES: National Agency for Sanitary Safety of Food, Environment and Labor (France).

genetically modified Monsanto's corn called NK603 developed tumors the size of ping pong balls, liver damage, and digestive issues. These devastating effects on the health of lab rats could be indicators of risks for humans and other biological creatures (Policymic). The French officials who analyzed this claim, however, concluded that it did not meet standard validity tests of grounds for accusing Monsanto for infringing regulations about food safety.<sup>173</sup>

Séralini publicized the cancer conclusions and suggested that more research needed to be done on this issue after being notified of the French Food officials' decision. Part of what constituted Séralini's plea was the allegation that the study was a long-term toxicology study modeled from short-term type industries similar to those funded by Monsanto when seeking regulatory approval in Europe. The study did not really meet standards of a carcinogenicity study. Séralini and his supporters claimed that the sample size they used met international protocols for toxicology studies, and Monsanto's own 90-day studies analyzed test groups of the same size.<sup>174</sup>

Supporting Séralini, Hansen and the Union of Concerned Scientists alleged that the biotech industry has a long history of suppressing and discrediting independent research on GMOs. On a similar note, he goes on to say that pro-biotechnology industry scientists stand ready to attack independent, Séralini-type researchers whenever their studies come out, but when a poorly designed industry study is released, pro-biotech scientists do not criticize it. Hansen adds that "People are guinea pigs, and if you want to be a part of this experiment,

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<sup>173</sup> Mike Ludwig, "Inside the Monsanto Information War," *Truthout Report*, last modified October 24, 2012, <http://truth-out.org/news/item/12284-inside-the-controversy-over-a-french-gmo-study-and-the-monsanto-information-war>.

<sup>174</sup> Ibid.



that's fine, but you have a right to choose not to.”<sup>175</sup> Genetically engineered products have potential side effects that might be lethal for humans and devastating for animals and plants. If individuals do not stand up and voice their concerns about the dangers of these manipulated organisms, they might find themselves needing legal redress for damage caused by GMOs.

The Séralini study spread across the world and rapidly drew criticism from scientists in the United States and the United Kingdom and pro-business publications such as Forbes.com and Monsanto itself. Séralini’s detractors alleged that his study was deeply flawed. In an instance of sharp criticism of this study, the European Food Safety Authority (EFSA) and other European regulators argued that Séralini’s study did not meet international protocols. Therefore, ruling in the case of the accusation of Séralini against Monsanto, ANSES cautioned that there is a need to conduct more research on the rarely investigated subject of the long-term health effects of consuming GMO crops and the pesticides associated with them.<sup>176</sup>

In line with this suggestion, the European Network of Scientists for Social and Environmental Responsibility (ENSSER) admitted that Séralini's rat study was not perfect, but contributed to the scientific debate over GMOs. The group made the case that the controversy Séralini stirred up reveals an underlying lack of scientific standards for conducting safety studies. ENSSER makes the argument that though many scientists have

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<sup>175</sup> Ibid.

<sup>176</sup> Ibid.

called for international authorities to agree on a set of standard methodologies involving genetically engineered crops, industry lobbyists routinely block these scientists' efforts.<sup>177</sup>

The debate about the safety of GMO products has sustained the skepticism of many Sub-Saharan countries regarding the import GMO products or technologies from the West. Due to a multitude of reasons including economic, social, and political factors, most policies and action plans, put in place to address food security concerns in Sub-Saharan Africa, have not matured to their full potential as their framers expected. Yet, among all solutions brought to the table to combat hunger in Sub-Saharan countries, the use of genetically modified organisms (GMOs) is at the center of the controve

#### Adoption of GMOs in Sub-Saharan Africa

##### *Use of GMOs in South Africa*

While many experts claim that GMOs could help Africa ensure food security by increasing crop yields, producing hardier crop varieties, improving crops' nutritional value, and enhancing storability, most Sub-Saharan countries still number among nations that use the smallest amount of fertilizers, pesticides, and GMO seeds. Burkina Faso and South Africa are currently the only countries that have engaged in the use of GMO seeds for planting in Sub-Saharan Africa. For example, in South Africa, over 70% of the country's latest corn crop and the largest for ten years has been genetically engineered. In South Africa, the adoption of Biotech cotton (BGII) since 2001 has successfully benefited both commercial and small-scale farmers in the Makhathini Flats in northern Kwazulu Natal, South Africa. Adoption of GMO products in the Makhathini Flats led to an increase of crop

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<sup>177</sup> Ibid.

yields by 25% and a reduction of spraying costs by 66%.<sup>178</sup> At the same time, South African farmers' average income increased by \$117 per hectare. The Biotechnology industry, scientists, and many policymakers quoted the Makhatini farmers' successful experience with GMOs to showcase the benefits of GMOs for African farmers.

With the successful use of GMO products in South Africa as a frame of reference, the United States government and a league of American corporations have urged African countries to stop opposition and accept the adoption of GMO crops to feed their populations. In 2006, the Bill and Melinda Gates Foundation also took similar steps by setting up the Alliance for a Green Revolution in Africa, an organization that deals with agricultural products in Africa. Recently, this foundation has funded a research project to develop a more drought-resistant corn in Africa. The United States government and the Bill and Melinda Gates Foundation's efforts to urge African countries to use GMO crops appear to have not matured into their full potentials yet, and many Sub-Saharan countries still show skepticism about the adoption of GMOs.

#### *Use of GMOs in Burkina Faso*

Based on scientific evidence such as the works of Séralini discussed earlier, many countries, such as Burkina Faso, have selected a few biotech techniques to boost non-food sectors of their farming industries, such as the cotton sector. In 2009, Burkina Faso producers planted roughly 125,000 hectares of a second-generation insect-protected Biotech cotton (Bolgard II from Monsanto), a project that became known as the largest-

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<sup>178</sup> Elfrieda, Pshorn-Srauss, "Bt Cotton In South Africa: The Case Of The Makhathini Farmers," *Grain*, Last modified April 26, 2005, <http://www.grain.org/fr/article/entries/492-bt-cotton-in-south-africa-the-case-of-the-makhathini-farmers>.

ever introduction of Biotechnology in Africa.<sup>179</sup> Compared to conventional cotton, this biotech cotton led to an increase in cotton yield by 18.2%. Biotech cotton producers received an income of between \$9.00 per hectare and earn a \$61.88 per hectare increase in cotton over conventional cotton.<sup>180</sup> The successful adoption of Biotech cotton in Burkina Faso can create incentives for neighboring countries that have similar ecological zones, farming systems, and cotton industries to adopt biotechnology.<sup>181</sup>

Why then is Burkina Faso skeptic about replicating the adoption of biotech cotton success by developing biotechnology-derived foods? Evidently, the Burkina Faso people's attitude towards GMOs ascribe to the growing literature on the safety of GMO products. Anne Maina, advocacy coordinator for an international charity known as African Biodiversity Network, points out that "everything that genetic engineering has claimed to offer can easily be achieved through safer methods such as non-GM breeding, intercropping, and creative innovation."<sup>182</sup> She goes on to say that "GMOs do not belong anywhere on the continent of Africa, and the only groups for their implementation are multinational biotechnology companies like Monsanto whose insatiable lust for new 'frankencrop' markets is never ending."<sup>183</sup> As noted earlier, critics of GMOs claim that

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<sup>179</sup> Jeffrey D. Vitale, "The Commercial Applications of GMO crops in Africa: Burkina Faso's Decade of Experience with Bt Cotton," *AgBioForum*, accessed July 7, 2013, <http://www.agbioforum.org/v13n4/v13n4a05-vitale.htm>.

<sup>180</sup> Ibid.

<sup>181</sup> Ibid.

<sup>182</sup> Gift Chanda, "Africa is not a Place for GMOs" *The Post Online*, last modified July 12, 2011, [http://www.postzambia.com/post-read\\_article.php?articleId=21952](http://www.postzambia.com/post-read_article.php?articleId=21952).

<sup>183</sup> Ibid.

Biotechnology products are not environmentally friendly and can cause damage to humans and animals' health. Often times, these critics accuse multinational corporations, such as Monsanto, of pushing Sub-Saharan countries to adopt GMO products in order for these corporations to secure their own profits.

GMOs also affect local communities' food security on small-scale areas. According to Maina, "eighty percent of Africa's small-scale farmers depend on seed saving, so patented crops present a threat to their food security and way of life." Similarly, she adds that, "we have clearly seen how farmers who grow a diversity of crops using organic farming techniques become much more food secure than on conventional or GM varieties, where expensive seeds and chemicals must be purchased each year." GMO products appear to be less safe and a threat for most African low-income farmers' food security. Organic farming techniques have proven to be more effective in ensuring food security than costly GMO products that African farmers cannot afford yearly.<sup>184</sup>

#### *Decision Making Process about the Use of GMOs*

The use of GMO mosquitoes as a proposed strategy for malaria control in Mali, a country located in West Africa, provides a better model of how a decision making process about the adoption of GMO products should occur. Aware of the widespread skepticism about GMOs in Sub-Saharan Africa, the University of California, Los Angeles (UCLA) supported a qualitative survey of public attitudes to using GMO mosquitoes in rural and urban areas of Mali to combat malaria. The sample involved 30 individuals from rural areas, 30 individuals from urban areas, and 20 Western-trained and traditional health professionals in service in Mali. The questionnaire involved causes of malaria, heredity,

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<sup>184</sup> Ibid.

and selective breeding, which led to genetic engineering issues and acceptable conditions for a release of pest-resistant GMO corn and malaria-refractory GMO mosquitoes.<sup>185</sup>

The survey indicated that participants identified mosquitoes as vectors of malaria, but that all of them did not fully understand the concept of genes. Participants also understood selective breeding, but most of them vaguely associate genetic engineering with a grafting practice. While grafting involves the fusion of the scions of one variety of plant into the rootstock of another variety, a number of these participants viewed grafting mangoes as a genetically modified process through which grafting two varieties of mangoes could produce larger mangoes.<sup>186</sup>

Many participants viewed genetically engineered products as acceptable because of their experiences of mango grafting practices. Questioned on how to best introduce GMOs in rural communities, one group of participants emphasized the relevance of creating a subject science course on GMO mosquitoes, funding education, and improving the population's living standards. Lastly, participants stressed the need to involve women in the decision-making process and increase awareness about GMO mosquitoes and GMO corn through media outlets.<sup>187</sup>

#### *South Africa's Model of GMOs Regulatory Framework*

As Sub-Saharan Africa is likely to be home to unorthodox genetic engineering practices, Sub-Saharan governments need to create legal and regulatory frameworks that

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<sup>185</sup> John M. Marshall, Mahamoudou B. Toure, Mohamed M. Traore, Shannon Famenini, and Charles E. Taylor, "Perspectives of People in Mali Towards Genetically-Modified Mosquitoes for Malaria Control," *BioMed Central, Malar J* v.9, DOI:10.1186/1475-2875-9-128.

<sup>186</sup> Ibid.

<sup>187</sup> Ibid.

hold land investors accountable for these practices. One way to do this is to ratify the Cartagena protocol, an international agreement on biosafety and the convention on biodiversity, or create national, regional, legal, and/or institutional frameworks that model the South African GMOs regulatory framework.

In 1979, the South African government created the Committee on Genetic Engineering (SAGENE).<sup>188</sup> This commission was tasked to act as a scientific advisory body to the government and pave the way for the use of GMOs in food, agriculture, and medicine.<sup>189</sup> In 1989, on the advice of SAGENE, the first genetically engineered (GE) experiments in open field trials were conducted in South Africa. In 1994, the South African government expanded SAGENE's responsibilities. The Commission then acquired legal authority to advise any ministry and governmental body on legislations regarding GMOs.

SAGENE helped the South African government to draft the 1997 GMO Act. SAGENE had a record of granting a GE application permit to Monsanto, which allowed this US corporation to commercialize GE cotton and GE corn seed. An executive council took over SAGENE and was commissioned to pursue SAGENE's agenda. To help this Executive Council to be effective in its task, the South African government used the provisions of the GMO Act to pass bills that created a decision-making body, an advisory body, and an administrative body, or GMO registrar. The main tasks of these entities are the following:

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<sup>188</sup> "Agricultural Biotechnology Annual Biotechnology in South Africa," *USDA Foreign Agricultural Service*, last modified August 12, 2013, [Bhttp://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20Biotechnology%20Annual\\_Pretoria\\_South%20Africa%20-%20Republic%20of\\_8-12-2013.pdf](http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20Biotechnology%20Annual_Pretoria_South%20Africa%20-%20Republic%20of_8-12-2013.pdf).

<sup>189</sup> *Ibid.*

- Provide measures to promote the responsible development, production, use and application of GE products.
- Ensure that all activities involving the use of GE products be carried out in such a way as to limit possible harmful consequences to environmental, human, and animal health.
- Give attention to the prevention of accidents and the effective management of waste.
- Establish mutual measures for the evolution and reduction of the potential risks arising from activities involving the use of GE products.
- Lay down the necessary requirements and criteria for risk assessments.
- Establish appropriate procedures for the notification of specific activities involving the use of GE products.

Due to the extraordinarily complex nature of the issue of GMOs, the South African government has ratified a number of international instruments to exercise rights conferred by the statutes of these instruments on issues that involve GMOs. Among these instruments are the Agreement on the Application of Sanitary and Phytosanitary Measures of the World Trade Organization, the FAO's International Plant Protection Convention (IPPC), and the Cartagena Convention.<sup>190</sup>

The private sector has ignored research on tropical and subtropical staple foods that are the mainstay of low-income individuals' daily diets in Sub-Saharan Africa. Research on GM crops appears to push forward the agenda of large land-scale farmers in high-income countries. Multinational corporations, such as Monsanto, Dupont, and Yara, are being accused of using the G-8 initiative that involves lifting Africa out of poverty through agribusiness investments to gain a foothold in Africa and sell pricey agrichemicals and other inputs to local farmers. These firms are also associated with producing export crops

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<sup>190</sup> Ibid.



that do not contribute to the creation of a resilient and abundant food system in Sub-Saharan Africa. Thus, the private sector abuses nationwide initiatives and agreements to increase their profits in ways that can permanently scar Sub-Saharan Africa's agricultural production.

To address these issues, Sub-Saharan countries that consider the avenue of adopting GMO products as an alternative to boost food security need to create legal and institutional frameworks that build on the South African model. As mentioned earlier, ratifying international instruments, such as the Cartagena convention will also give Sub-Saharan jurisdictions greater leeway and flexibility to provide legal redress for cases that involve biosafety concerns.

## **Conclusion**

This thesis has recognized and briefly examined many of the policies that scholars and international organizations have proposed to improve agricultural productivity in Sub-Saharan Africa. As Chapter One reviewed, many of these strategies are credited with assisting the developed nations of the world in attaining the “golden” agricultural surplus, which allowed their progress to industrialization and modernization. This thesis does not dispute the efficacy of expanding infrastructure, improving agricultural practices, and instituting marketing and economic reforms. Rather, this thesis seeks to underscore policymakers’ need to recognize and understand the impact of three new challenges on Sub-Saharan African food security: land transactions; increasing water scarcity due to climate change; and the unknown impact of adopting genetically modified crops.

As discussed in Chapter Two, Sub-Saharan Africa over the last decade has witnessed an unprecedented and unregulated land grab that has allowed land to pass from the traditional, local owners to foreign states and multinational corporations. To date, these transactions, whether through sale or lease, have failed to bring improved agricultural productivity to Sub-Saharan populations, and/or local community development. Rather, research by a variety of international organizations, such as the Oakland Institute, has indicated that many purchasers and lessees have failed to implement promised improvements. The only individuals who have benefitted from these transactions besides the foreign investors are the Sub-Saharan national governments’ leaders who have profited from the land’s sale or lease. Many local farmers and community owners have been forcefully removed from their homes. Previously productive agricultural land is left unplanted as investors wait for the price of land to increase, or is used to plant

commercially profitable, non-food crops such as roses. In other cases, the purchases were undertaken to acquire water rights or non-agricultural resources. In both instances, the development of these resources has negatively impacted the surrounding environment and decreased agricultural production. In addition to the agricultural, environmental, and economic havoc that many of these land transactions have caused, these land grabs have seriously undermined traditional African land rights and cultural practices, and violated international norms. Governments must recognize and protect the rights of their peoples.

To protect food security and land rights, the thesis proposes that national and local governments adopt the following recommendations regarding land transactions:

- Provide due weight to the African traditional land rights system.
- Create community-based land ownership administrations.
- Consult with local communities prior to the transfer of land to foreign investors to avoid asymmetric information, a situation where imperfect-knowledge impairs local or indigenous people to make informed decisions during land deal negotiations.
- Prevent opportunistic corporations from taking advantage of existing unclear land purchasing procedures.
- Require companies to conduct environmental and social impact assessments and meet corporate social responsibility standards in order to reduce their inflexibility in regard to traditional customs (for example, allow individuals to attend traditional ceremonies, such as marriages, to avoid uprisings) and give workers decent wages.
- Introduce a two-shift work system in rural communities to hire more local people.
- Create conditions to prevent communities affected by land deals from experiencing internal or external competition over scarce land resources in areas where these communities are resettled.
- Draft land policies that take into account feedback from local and indigenous people, as well as foreign investors.
- Draft land reforms that take into consideration existing dual land right systems.
- Review existing land leases that do not meet relevant legal standards.

- Prioritize the interests of local communities over those of private corporations, especially in post-conflict zones, such as the South Sudan, to prevent undermining peace efforts.
- Ratify international instruments regarding land purchasing, such as the United Nations Guidelines on Land Grabs.
- Provide legal redress for individuals illegally deprived of their lands.
- Enact sufficient criminal penalties on parties involved in illegal land transfers.

As discussed, increasing the use of water and irrigated lands under cultivation enabled many nations to produce agricultural surpluses. As Chapter 3 demonstrated, this process may no longer be the easy fix that it proved to be in areas such as North America. The nations of Sub-Saharan Africa face cumulative water usage pressures from population increases, industrialization, urbanization, and a number of other factors discussed in the chapter. Added to these factors is the rising concern of climate change on the availability of water, as shown in the discussion of the melting glaciers and decreased river flow to the agricultural lands around Mount Kilimanjaro.

To protect water rights and ensure sufficient water for agricultural production and food security, this research proposes that national and local governments adopt the following recommendations regarding water rights:

- Educate people to empower them to adopt new behaviors in regard to water consumption.
- Develop innovative water conservation technologies (desalination technologies and traditional irrigation practices).
- Establish water-pricing regimes that meet local people's living standards.
- Improve water catchment systems.

- Create community-government based water management policies that take into consideration the traditional state model, neo-populist approach, and neo-liberal approach of natural resources management.
- Improve water distribution infrastructure and impose a special tax on water foot printing (water directly or indirectly used for goods' production).
- Address water pollution to improve agricultural productivity.
- Create incentives for multinational corporations to transfer water conservation technologies to Sub-Saharan countries.
- Design urbanization plans that reflect changing demographic patterns.
- Invest in scientific studies to better understand and prepare for the impact of climate change on water scarcity and food production.
- Mitigate detrimental effects of global warming by using alternative sources of energy, such as solar power.

Lastly, discussed in Chapter 4 is the unknown impact of adopting genetically modified seeds and crops on the future of Sub-Saharan African agriculture. Monsanto, Du Pont, the US government, and various international organizations cite the adoption of GMO technology as the answer to increasing agricultural production and surpluses, and to creating food security. As Chapter 4 reviewed, this technology remains highly controversial, and to its critics, understudied. GMO crops may well increase agricultural production in the short-term, but they may also create longer-range and more expensive obstacles to agricultural production. To better understand and implement policies associated with the adoption of genetically engineered agriculture, several studies, along with this one, propose that national and local governments adopt the following recommendations regarding GMO technology:

- Equip local populations with knowledge about GMOs through education, such as in community workshops, extension programs, and agricultural degree programs or courses.
- Develop locally based research on GMO products and conciliate GMO products with small-scale farming systems.
- Develop regional and international cooperation with countries that have GMO experience, such as South Africa.
- Create regulatory frameworks for GMO products.
- Develop and provide protection for organic farming systems against GMO contamination.
- Ensure avenues of legal redress for health and environmental complications resulting from the adoption of GMO technology.

As alluded to throughout this thesis, the challenges of land grabs, water scarcity, and GMO technology may not only have unknown and unforeseen negative environmental and economic consequences, but legal ramifications as well. As the brief discussion of colonialism revealed, Africa was forced to regain control of her lands through revolution and independence movements. Neocolonialism is now forcing Africa to regain control of resources and markets through nationalization and other policies. The fundamental question raised by the research presented in this thesis is whether the policies related to land grabs, water, and GMOs represent another, more subtle transfer of African resources to wealthier nations of the globe. To protect against this outcome, this work argues that the nations of Sub-Saharan Africa must recognize the negative potentials of these policies and ensure the availability of scientific knowledge before making informed consent.

In addition, the African nations must avail themselves of the international system of human rights protection developed over the last fifty years. As discussed, a number of

legally binding human rights treaties exist to protect individual and community land rights, cultural practices, water rights, and resources. The peoples of Sub-Saharan African must ensure that their national and local governments, and multinational corporations are forced to recognize and protect these rights, whether found in the African Convention on Human Rights, the United Nations Declaration on the Rights of Indigenous People, or the Cartagena Convention on Biosafety.

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### Appendix 1: List of Acronyms

AISP	Agricultural Input Subsidy Program
ANSES	French Agency for Food, Environmental and Occupational Health & Safety
DNA	Deoxyribonucleic acid
DRC	Democratic Republic of Congo
EFR	Environmentally Flow Requirement
EFSA	The European Food Safety Authority
FAO	Food and Agriculture Organization
FW	First World
GDP	Gross Domestic Product
GEO	Genetically Engineered Organisms
GMO	Genetically Modified Organism
GNP	Gross National Product
Ha	Hectare
HABP	Household Asset Building Program
HAI	Human Asset Index
HRW	Human Rights Watch
IMF	International Monetary Fund
IPPC	International Plant Protection Convention
LDC	Least Developed Countries
NK6o <sub>3</sub>	potassium ions K + and nitrate ions NO <sub>3</sub>
PNSNP	Productive Net Safety Net Program PNSNP
RNA	Ribonucleic acid
SAGENE	South African Committee for Genetic Experimentation
SSA	Sub-Saharan Africa
TVA	Tennessee Valley Authority
TW	Third World
USAID	United States Agency for International Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN	United Nations
UNDH	The Universal Declaration of Human Rights (UNDH)
US	United States
WB	World Bank
WHO	World Health Organization