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## **Kenya: Sustainability in Agriculture**

### Introduction

The Green Revolution of the 1960s was a powerful source of inspiration and hope for much of the developing world, but especially so for Kenya. It was Kenya's hope to become a leader in agricultural production in Africa, as it boasts an unusually fertile western region. After Norman Borlaug's high yielding breakthrough stimulated the Green Revolution, Kenya began adopting Western strategies and was poised to prove its potential.

However, much of the early success Africa experienced as a result of the Green Revolution "has faltered" (Roberts, 147). Consequently, African farmers are still harder pressed to compete against low-cost producers in a global market. In fact, the food economy of today is so dependent on "large-scale, low-cost production" that the "gap between what the global food economy demands and what the LDCs [least developed countries]" are able to supply is creating "an extraordinary divide" (Roberts, 147). Unlike the massive crop production operations that are constantly consolidating costs in order to lower their prices, rural farmers cannot afford to sell their crops for less (Roberts, 146). Instead, they are forced to sell their product for less than they spent to produce it, which pushes them further into debt. Therefore, the farmers' inability to compete only perpetuates their poverty.

Furthermore, as food prices increase, families in Kenya, as in the rest of the developing world, are struggling to survive. 58.3 percent of Kenyans live below US\$2 a day, with 22.8 percent living under US\$1 a day. This suggests severe implications as a result, not only of price increases, but of climate change. To illustrate, Kenya experiences continual drought and flooding, depending on the season ("Kenya"). Climate change only worsens those extremes, and causes weather to be unpredictable. Mango Mutisya, a Kenyan farmer, recalls a recent drought that crippled local farmers: "As food shortages spread...shopkeepers raised their prices, forcing farmers to sell their main assets-livestock-to buy maize simply to eat" (Roberts, 145). The dual burden of food price increases and climate change is setting up Kenya and other LDCs for disaster. As Kenyan farmers are forced to sell off their tools and animals in order to prevent starvation, they are simultaneously destroying any potential for future profit, which only increases their dependence on the government and foreign aid.

Following that, the biggest effort must be to decrease dependence and help farmers become self-sufficient. This is no small task, considering the long list of obstacles to overcome. (This list includes, among others, adjustment to climate change, focus on increasing yields, improving soil quality, and combating water scarcity.) However, it is absolutely essential that we help to eradicate poverty in Africa. As Jeffrey Sachs said in a 2004 NPR interview, "We have to help Africans to get there [self-sufficiency]; we have to help by targeting extreme poverty" (Flatow). Increasing food security, along with the education of Kenyans, will give families the "confidence to choose to have fewer children (Flatow). Reducing population growth is a crucial strategy for an already overburdened planet; a planet that is expecting 2.5 billion more people by 2050. Having experienced a huge population growth (Kenya more than quadrupled its population since 1960), Kenya understands all too well the serious burden that extra people create (Roberts, 231). Therefore, it is imperative that Kenya addresses its poverty-by resolving its issues of soil degradation, water scarcity, and climate change.

### Families in rural and urban Kenya

To further comprehend the magnitude of Kenya's situation, one must understand the typical Kenyan family. About 80 percent of the population is rural; including 75 percent of Kenya's poor ("Rural Poverty in Kenya"). Kenya has a labor force of 11.85 million, with 75 percent of workers in agriculture and the other 25 percent in industry and services. Kenya has the 15<sup>th</sup> highest unemployment rate in the world at 40 percent ("Kenya"). This high unemployment rate only serves to create a restless and desperate situation for a large portion of Kenyan families. Ineffective government and the AIDS epidemic are major factors of high unemployment rates. According to the watchdog group Transparency International, Kenya is repeatedly "ranked among the ten most corrupt countries in the world" ("Kenya: History"). Kenyans have suffered under the rule of various corrupt leaders since Kenya gained independence from Britain in 1963 ("Kenya"). This political unrest and instability only hinders the progress of food security among Kenya's poor.

AIDS is also a crippling factor in food insecurity and high unemployment rates. In Sub-Saharan Africa, HIV/AIDS is "striking the most productive center of the farming population" ("Listening to the Voices of Kenya"). The disease is affecting the family structure in Sub-Saharan Africa. Each day, HIV/AIDS robs 700 Kenyans of their lives. As a result, "almost half of the people in Kenya are under 15 years of age" and life expectancy has decreased from 59 years in 1989 to only 46 years in 2008 ("Rural Poverty in Kenya"). In 1999, 13 million children became orphans because of HIV/AIDS; over 95 percent live in Sub-Saharan Africa. All too frequently, the children are too young to learn farming techniques from their parents. Consequently, "in macroeconomic terms, the impact on the agricultural workforce [in Kenya] is brutal" ("Listening to the Voices of Kenya"). Unfortunately, the sheer magnitude of the negative effects of HIV/AIDS, malaria, and water-borne diseases on families permeates households across Kenya, "affecting income, food security, and development potential" ("Rural Poverty in Kenya"). The implications of HIV/AIDS and other diseases are hindering progress for Kenya's food security and continue the vicious cycle of poverty.

Kenya's problems are further compounded when considering the situation of the rural population. Kenya's rural population includes: "small farmers, herders, farm laborers, unskilled and semi-skilled workers, people with disabilities, AIDS orphans, and households headed by women" ("Rural Poverty in Kenya"). Most of Kenyan families "live and work in rural areas where facilities are limited" and women account for the majority of the farm labor at 60-80% ("The Nature"). Moreover, subsistence farming is the primary, and often only, source of income for 70 percent of Kenyan women ("Rural Poverty in Kenya"). Therefore, it is essential that not only subsistence farmers are educated on successful farming techniques, but a special effort be made to teach and empower women. In addition, women are left considerably vulnerable, as they "do not have equal access to social and economic assets" ("Key note address"). Resources such as micro-credit must be made available to rural farmers, with an emphasis on serving women. This solution has already been implemented and has demonstrated early success, as IFAD today provides US\$200 million a year to help poor farmers ("Soaring food prices"). Ideally, the program would expand over the next few decades to cover many more rural farmers, as population numbers burgeon.

A direct result of Kenya's rapid population growth is poverty. However, Kenya is considered to have "the best-developed economy in eastern Africa" as it has "relatively advanced agricultural exports and tourism" ("Rural Poverty in Kenya"). Unfortunately, the tourism industry has suffered a massive blow recently, as violence erupted from election results earlier this year. Tourism is one of Kenya's "biggest industries; its collapse could push millions into poverty" (Gettlemen). Ironically, Kenya's poverty issue is an underlying cause of the election violence in the first place (Gettlemen). Kenyans are fed up with government corruption, and the election results inspired a wave of backlash resulting from the utter frustration Kenyans feel. As a consequence of the election riots, "at least 200,000 people" have been

affected, most being displaced from their homes (“Kenya: IDPs”). Furthermore, “the majority [of internationally displaced persons, or IDPs] lived in urban areas where they rented houses” (“Kenya: IDPs”). The brunt of the tragedy is suffered by the urban poor, many of whom have nowhere to turn to. Instead, they are forced to live in settlement camps until housing is available. Recently, Kenya’s government moved to shut down the camps, which creates a desperate situation for those involved (“Kenya: IDPs”).

Furthermore, Kenya is ranked a poor 148<sup>th</sup> out of 177 countries in the UN Development Programme’s human development index. The index “measures a country’s development in terms of life expectancy, educational attainment and standard of living” (“Rural Poverty in Kenya”). Despite recent success, Kenya’s education system requires major improvement. In 2003, Kenyan primary schools (representing the first eight years of education) were switched to being funded by the government, thus abolishing the previous system of tuition fees. As a result, 1.2 million children were able to receive an education that they would have otherwise been too poor to afford. Now, almost half of all children in primary school are female- a stunning statistic. Unfortunately, secondary school requires tuition, which seriously hinders educational opportunities for women. For instance, as poverty forces families to choose which child they will send to school, “families frequently choose to educate their sons” (“Poverty”). Sadly, a female’s education is placed second to a male’s on a basis founded from the widespread belief that educating a daughter is like “watering someone else’s lawn” (“Poverty”). As a consequence, few girls ever advance past primary school (“Poverty”).

Meanwhile, income is depressingly low for a country with relatively high potential. The average income is less than US\$400 (“Stories”). Kenyans find themselves strapped for cash, as the average woman has roughly five children, or 4.7 children born per woman (“Kenya”). If current trends continue, poverty will become even more widespread. Kenya’s population growth rate is 2.758 percent per year; whereas, developed nations are generally calculated well below one percent (“Kenya”). As the implications of both population growth and rising food prices become increasingly severe, Kenyan families are cutting down on their amount of food intake. In a country where 31 percent of the population is undernourished, the situation rapidly snowballs (“Kenya, FAO”). Not only are Kenyans in poverty limiting the number of meals they consume, they are “leaving out the more costly, but nutritious, food items (meat, dairy, poultry, fruits and vegetables)” (“The new face”).

Though many Kenyans have to sacrifice nutrition, diet continues to be an important aspect of Kenyan life. The national dish of East Africa is ugali, “a cornmeal cooked with water to a thick consistency and poured onto a board or plate for everyone to eat from” (“Kenya Cultures”). Ugali plays a central role in the Kenyan diet. Though generally tasteless, ugali is consumed daily by Kenyans (Eberle). Maize is also a staple dish in Kenya. Kenyans eat maize “at least twice a day,” and consider a meal wasted “unless it includes maize” (Roberts, 153-154). Along with maize, Kenya’s agricultural products include: “tea, coffee, wheat, sugarcane, fruit, and vegetables” (“Kenya”). In addition, “cattle raising for dairying and for meat is very important” (Stewart). Kenyans generally consume only a small amount of meat; conversely, Kenyans consume generous amounts of whole milk and green leafy vegetables (Eberle). The average farm size in Kenya is about 2.5 ha. Farm size has made a “phenomenal decline...especially in the high and medium agricultural potential areas” (“The Effect”). Rapid population growth, along with land inheritance policies, has limited the amount of new, fertile land that Kenyan farmers can buy. Therefore, as farms become smaller, it is imperative for each farmer to increase their outputs by improving yields (“The Effect”).

### Soil degradation, water scarcity, and climate change

The Green Revolution held a promise for Africa; one that Kenya had to abandon after failure. By the late 1980s, “Kenya’s per-acre maize yields fell back nearly to their 1960s levels, while the number of farmer acres shrank” (Roberts, 152). Some experts thought corrupt governments, as well as some major donors with changing anti-hunger strategies, were the culprits. Others believed that expecting Africa to adopt the massive Western input system demonstrated complete ignorance “to the social and physical realities of African agriculture” (Roberts, 152). For instance, high-yielding crops, such as maize, generally require large amounts of water. Unfortunately, “85 percent of Kenya’s arable land isn’t reachable at all by irrigation and depends entirely on rainfall [which isn’t much]” (Roberts, 153). However, since maize is so important in Kenyan culture, many farmers refuse to grow anything else, despite their unsuited farmland. In addition, the “seeds themselves were hugely problematic” (Roberts, 154). A hybridized seed generally tends to lose its disease resistance and fast growth after it has been recycled through a few generations. So to keep yields high, farmers would have to “buy new seeds every few years,” which is impossible when the farmers do not have any cash reserves (Roberts, 154).

However, the major failure is, and continues to be, fertilizer. It is estimated that “more than a third of the Green Revolution yield increases came directly from using more fertilizer” (Roberts, 154). Moreover, within two decades, soils required twice as much nitrogen application, simply to maintain the same yield as before. The reason for this was a depletion in “carbon-rich organic matter left over by decaying plants and animals” (Roberts, 154). Without organic matter, soils would hold less water and be subject to water and wind erosion. Simply stated, the soil was being depleted before its nutrients were replenished with cover crops, manure, or other fertilizer (Roberts, 155). Ultimately, the model based on fertilizer became out of the question as fertilizer became less available and fuel prices began to rise. Western governments, worried about the impact of chemicals on the agriculture, removed their funding from the developing nations’ subsidies’ plans. Consequently, “fertilizer use in Africa has plummeted—the average farmer uses less than ten pounds, far below the global average” (Roberts, 155). The real difference between then and now, though, is that the farmers are supporting four times as many people.

As population numbers swell, so does the sustainability of our water system. Indeed, the world does not have a food shortage: It “has a water shortage” (“Running dry”). Already, 1.2 billion people live in areas with a water shortage. Farming accounts for 70 percent of total human water consumption. Unfortunately, “in many farming regions, water is scarce and likely to get scarcer as global warming worsens” (“Running dry”).

The projected effects of climate change, especially on the developing world, are grim. Crops bred for extremely specific situations will see “dramatic changes in yields” as climate change will bring hotter, drier, and more unstable weather (Roberts, 226). Higher temperatures give rise to pests, damaging plants in areas that were not previously affected. Moreover, “it will take decades for surplus CO<sub>2</sub> to leave the atmosphere.” This means that climate change is inevitable, though to what extent is subject to debate (Roberts, 225).

### Recommended solutions and conclusion

Soil degradation, water scarcity, and climate change are negatively impacting the quality of life in Kenya; however, all are solvable. Soil degradation can be fixed by teaching farmers not to overspray their plants with fertilizer and to replenish nutrients in the soil after each harvest. For example, farmers should be taught to dig ditches across their fields, as this “curbs soil erosion” and raises productivity (Roberts, 144). A method of farming known as “no-till farming” is another way to prevent soil from eroding. Instead, of scraping the fields clean after each harvest, the farmer just leaves on the various “stubble and other plant matter from the previous crop” (Roberts, 277). This not only “minimizes erosion but

substantially reduces the amount of nitrogen leaching from the soil” (Roberts, 278). Farmers need to be taught agricultural techniques like these in order to increase yields. International aid groups such as the World Food Program and the UN need to establish sessions with rural farmers so that farmers can learn how to prevent soil erosion.

In addition, the Kenyan government and foreign aid groups need to “carry out research and develop appropriate labor and time saving tools and equipment for the tasks performed by rural women both in their homes and on their farms” (“The Nature”). Since the women perform the majority of the farm labor, it is imperative that they are taught efficiency and tips on how to increase yields. As of now, “the yields are about a third or a fourth of what they would be under similar agronomic conditions, but with soils that held nutrients” (Flatow). Soil quality can be greatly improved (and yields dramatically increased) if farmers are taught how to maintain nutrients in the soil. Fertilizer, such as manure, should be mixed with the soil after each harvest to prevent degradation and erosion. Foreign governments and aid groups must help the Kenyan government to reestablish the subsidies on fertilizer that existed at the start of the Green Revolution (Roberts, 147). Subsidies are essential—after “petrochemical fertilizer had more than doubled in price,” Kenya’s Rift Valley was forced to plant a “third less of their land than last year” (Friedman, 41). Farmers’ access to credit is just as important. Programs such as micro-credit should continue to expand and flourish in serving Kenya’s subsistence farmers. Kenya requires support from aid groups, especially when implementing new technology and research. For instance, Dr. Pedro Sanchez, former World Food Prize laureate, developed an “organic agroforestry approach where you use leguminous trees that are nitrogen fixing that replenishes the soil nutrients and can triple yields” (Flatow). Such technology demands both financial and moral support from the Kenyan government and foreign aid groups. Moreover, it is highly important that Kenyan farmers are taught how to use fertilizer and farming techniques such as “no-till farming” (Roberts, 277).

Moreover, Kenyans must be taught how to prevent water scarcity and adapt to climate change. Farmers must learn how to conserve water. It is estimated that “as much as 70 percent of water used by farmers never gets to crops, perhaps lost through leaky irrigation channels or by draining into rivers or groundwater” (“Running Dry”). A simple solution to this is to invest in drip irrigation, as well as “repairing the worst leaks, [which] could bring huge savings” (“Running Dry”). About 80 percent of Kenya cannot be irrigated; in those cases, building water storages or “pumping water into natural aquifers for seasonal storage” can greatly serve farmers during dry periods (“Running Dry”). Furthermore, agronomists have begun to design tools to measure the efficiency of water use. For instance, some agronomists “have designed algorithms that use satellite data on surface temperatures to calculate the rate at which plants are absorbing and transpiring water” (“Running Dry”). That will help pinpoint which areas are in the best condition for producing high yields. Most importantly, farmers must use good quality seeds and enough fertilizer, in addition to using the right amount of water (“Running Dry”). Aid groups would be instrumental in teaching farmers to conserve water and establishing structures such as water storages or the drip irrigation system throughout Kenya’s farmlands.

Ultimately, a successful Green Revolution in Africa requires both long-term support and commitment. In Kenya, the main effort must be exerted by the government, with back-up from “international organizations, NGOs and, importantly, also the private sector” (“Soaring food”). Africa needs a new Green Revolution, which requires commitment from all players.

## Works Cited

1. "The Effect of Farm Size on Agricultural Intensification and Resource Allocation Decisions: Evidence from Smallholder Farms in Embu District, Kenya." Science Links Japan. Japan Science and Technology Agency. 15 Sep 2008 <<http://sciencelinks.jp/j-east/article/200523/000020052305A0973732.php>>.
2. "Listen to the Voices of Kenya." Rural Poverty Portal. 17 Sept 2008. IFAD. 26 Sep 2008 <<ftp://ext-ftp.fao.org/video/2436-AIDS.mpeg>>.
3. "Key note address by Lennart Båge to the African Green Revolution Conference." IFAD. 22 Sep 2008. IFAD. 22 Sep 2008 <<http://www.ifad.org/events/op/2008/oslo.htm>>.
4. "Kenya." CIA- The World Factbook. 04 Sept 2008. Central Intelligence Agency. 29 Sep 2008 <<https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html>>.
5. "Kenya Cultures." kenyatravelideas.com. 2008. Kenya Travel Ideas. 13 Sep 2008 <<http://www.kenyatravelideas.com/kenya-cultures.html>>.
6. "Kenya." Food and Agriculture Organization of the United Nations. 09 Mar 2006. FAO. 15 Sep 2008 <[http://www.fao.org/FAOSTAT/foodsecurity/MDG/EN/Kenya\\_e.pdf](http://www.fao.org/FAOSTAT/foodsecurity/MDG/EN/Kenya_e.pdf)>
7. "Kenya: History, Geography, Government, and Culture." infoplease. 2008. Information Please Database. 12 Sep 2008 <<http://www.infoplease.com/ipa/A0107678.html>>.
8. "Kenya: IDPs struggle to rebuild their lives." IRIN. 29 Sep 2008. UN Office for the Coordination of Humanitarian Affairs. 29 Sep 2008 <<http://www.irinnews.org/Report.aspx?ReportId=8066kj>>.
9. "The Nature of Work and Problems of Rural Women in Kenya: Implication for Home Economics." Education Resources Information Center. ERIC. 15 Sep 2008 <[http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?\\_nfpb=true&\\_&ERICExtSearch\\_SearchValue\\_0=ED322455&ERICExtSearch\\_SearchType\\_0=no&accno=ED322455](http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED322455&ERICExtSearch_SearchType_0=no&accno=ED322455)>.
10. "The new face of hunger." The Economist 17 Apr 2008 01 Sep 2008 <[http://www.economist.com/printedition/displaystory.cfm?story\\_id=11049284](http://www.economist.com/printedition/displaystory.cfm?story_id=11049284)>.
11. "Poverty and girls' education in Kenya." Akili Dada. Akili Dada. 15 Sep 2008 <<http://akilidada.googlepages.com/education>>.
12. "Running dry". The Economist 20 Sep 2008:
13. "Rural Poverty in Kenya." Rural Poverty Portal. 07 Mar 2007. IFAD. 14 Sep 2008 <<http://www.ruralpovertyportal.org/english/regions/africa/ken/index.htm>>.
14. "Soaring food prices and the rural poor: feedback from the field." Rising Food Prices. 11 Aug 2008. IFAD. 11 Sep 2008 <<http://www.ifad.org/operations/food/food.htm>>.
15. "Stories of Hope: Lake Baringo, Kenya." Journey to Planet Earth. PBS. 14 Sep 2008 <<http://www.pbs.org/journeytoplanetearth/hope/baringo.html>>.

16. Flatow, Ira. "Addressing Hunger and Poverty." NPR. 20 May 2005. National Public Radio. 11 Sep 2008 <<http://www.npr.org/templates/story/story.php?storyId=4660415>>.
17. Eberle, Suzanne Girard. "Eat like a Kenyan." Running Times 01 Oct 2000 17 Sep 2008 <<http://runningtimes.com/Article.aspx?ArticleID=3955>>.
18. Friedman, Thomas L.. Hot, Flat, and Crowded. First. New York City: Farrar, Straus, and Giroux, 2008.
19. Gettleman, Jeffrey. "Kenya's Tourism Industry in Shambles." The New York Times . 29 Sep 2008. NY Times. 29 Sep 2008 <[http://video.on.nytimes.com/?fr\\_story=f8ffefc886ef76ea42dd9651c564d8c05273b9ac](http://video.on.nytimes.com/?fr_story=f8ffefc886ef76ea42dd9651c564d8c05273b9ac)>.
20. Roberts, Paul. The End of Food. New York City: Houghton Mifflin Company, 2008.
21. Stewart, Akilah. "Agriculture in Kenya." AfricaSpeaks.com. 05 Aug 2006. AfricaSpeaks. 1 Oct 2008 <<http://www.africaspeaks.com/kenya/05082006.html>>.