The Promise of Sack Farming

Promoting Urban Agriculture to Address Food Insecurity in West Africa

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The Project on International Peace and Security
Institute for the Theory and Practice of International Relations
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Deteriorating food security threatens to destabilize West African democracies by inciting anti-government violence and civil unrest, similar to recent food riots in Asia, the Middle East, and North Africa. In response, the United States should promote sack farming—an emerging form of urban agriculture—in poor, densely populated areas that are most susceptible to food insecurity. By growing seedlings in large sacks filled with soil, sack farming's innovative use of vertical space will increase food security for slum populations, lowering the risk of food riots.

In an age of austerity, sack farming gives the United States a new tool to address the issue of food insecurity in a practical, economical, and sustainable way. By promoting this practice in the most vulnerable urban areas, the United States will assist West African democracies in becoming more stable by mitigating chronic food insecurity. This report recommends Ghana as the ideal test case to demonstrate the promise of sack farming, with the ultimate goal of encouraging the widespread practice of urban agriculture in other African countries.

The Policy Challenge—Food Insecurity in West Africa

> *Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs.*[1]
>
> *—World Food Summit*
> *1996*

Developing countries continually have suffered from food insecurity, which refers to the unavailability and inaccessibility of food. Complemented by a lack of natural resources, low rainfall, and harsh climatic conditions, food insecurity could lead to mass starvation and undermine stability in these countries. Data collected between 1990 and 2008 in 47 African countries reveals a correlation between rainfall and socio-political unrest—including riots, anti-government violence, civil conflict, and even democratic failure.[2] Since 2007, food insecurity has been a catalyst for recent civil unrest in African countries.

In late 2007, the Nairobi slum Kibera turned into "a hotbed of violence" when supporters took to the streets claiming that the election had been stolen from Raila Odinga, who pledged to improve public services and food security in slum areas.[3] People flooded the streets of Senegal, one of Africa's most stable democracies, in the spring of 2008 to protest President Abdoulaye Wade's administration for lavish spending and its inability to reduce the high cost of living.[4] Demonstrators carried empty rice bags, tomato tins, and other food containers in response to the government's ban on street peddling, biofuel initiatives, and failure to raise the standard of living.[5] In 2008, Egypt experienced riots after a doubling of global wheat prices worldwide caused domestic price shocks.[6] Food prices rose again in 2010, and were among the stated

grievances of Arab Spring protestors in early 2011.[7] Mali underwent a severe political crisis in 2012 due to government neglect of its northern regions, which suffer from chronic food insecurity. Terrorist factions, ethnic minorities, and internal rebel groups exploited the opportunity to seize control of Mali's northern regions.[8]

An increase in urbanization, global food prices, and chronic poverty will worsen food insecurity conditions in the next decade, especially in densely populated cities. In response, the United States should promote sack farming, the practice of growing seedlings in large sacks filled with soil. Sack farming will increase food security for the most vulnerable populations, thereby lowering the risk of future food riots. In an age of austerity, the United States should focus on preventing the de-legitimization and destabilization of West African democracies by targeting the most food insecure populations in urban areas.

Factors that Exacerbate Food Insecurity

Food-related instability is a global phenomenon that will become more prevalent in the next decade, especially in developing countries. Three factors threaten to exacerbate food insecurity in Africa:

- *Increasing urbanization*. Urbanization is driven not only by natural population growth, but also by rural-to-urban migration.[9] Most sub-Saharan African countries are projected to become at least 50 percent urban by 2030.[10] The urban population of sub-Saharan Africa is expected to increase between 2005 and 2050 from 35 percent (300 million people) to over 67 percent (1 billion).[11] As urban populations increase relative to rural populations, there will be a higher share of net consumers relative to net producers of food. As a result, African countries will become more susceptible to food riots as increasing urbanization creates a higher demand for food, while reducing domestic food production.[12]

- *Rising global food prices*. Food prices have experienced a steady rise since 2000, with spikes in 2007 to 2008 and 2010 to 2011. Ray Bush, professor of African Studies and Development Politics at the University of Leeds, found that food prices were responsible for demonstrations and riots in over 30 countries between 2007 and 2008.[13] Idean Salehyan, co-director of the Social Conflict in Africa Database project at the University of Texas at Austin, found a similar correlation between food prices and social conflict in 12 African countries from 2010 to 2011.[14] Since people depend on political systems for access to international markets and protection from external threats to food supplies, rapid price spikes can trigger instability.[15] As global food prices continue to increase, net food importers are especially vulnerable, due to their dependence on the international economy.[16] Despite Africa's agricultural potential, the continent's switch from a net food exporter to a net importer in the 1980s made it especially sensitive to political instability caused by rapid food price spikes.[17]

- *Chronic poverty*. Sharp spikes in food prices, natural disasters, economic downturns, and drought may cause acute (temporary) food insecurity. However, chronic food insecurity

generally is caused by extreme poverty.[18] Such poverty is linked to enduring factors, including "[unemployment], lack of market access, and high levels of subsistence agriculture, coinciding with environmental degradation and marginal lands."[19] These factors trap populations in poverty, denying them opportunities to escape chronic food insecurity. Poor economic and health conditions render food unavailable or inaccessible to vulnerable populations, thereby perpetuating food insecurity in chronically poor areas.

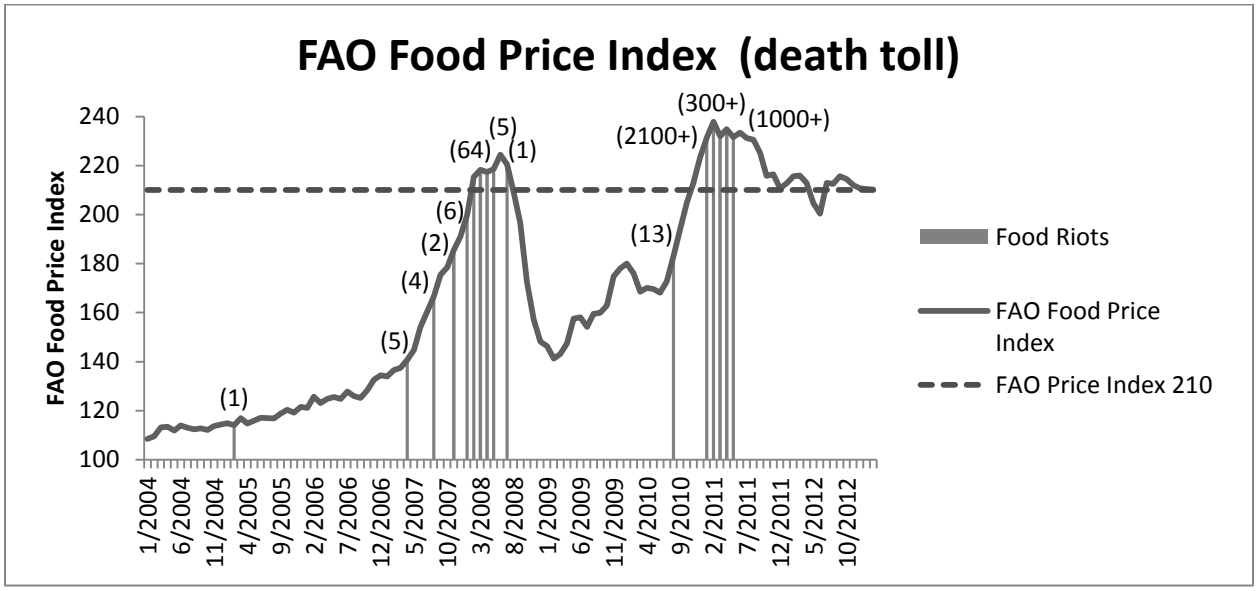
Impending Food Insecurity in West Africa

> *In 2008, we saw world food prices hit new highs, driving 100 million more people into poverty—the first increase in poverty numbers in decades. Today, that pattern is repeating. Food prices and staples have hit all-time highs…Already this year, the World Bank estimates 44 million people who escaped a life of hunger and poverty have been forced back into a life of subsistence. And food riots have combined with protest movements, disrupting global stability.*[20]
>
> *—Dr. Rajiv Shah, Administrator for the United States Agency for International Development (USAID)*
> *June 28, 2011*

In general, a reliable food policy forms the basis of political stability. As a result, food riots often correlate with increases in global food prices, which are measured using price indices. As the UN Food and Agriculture Organization (FAO) food price index rose past 180 in 2008, more than 60 food riots occurred in 30 different countries across North Africa and the Middle East (see Figure 1). When the index decreased to 140 in late 2008, incidents of social unrest diminished.[21] This pattern repeated itself in late 2010 and early 2011 during the Arab Spring demonstrations—countries in North Africa that experienced protests include Tunisia, Egypt, Libya, Algeria, Morocco, Mauritania, and Djibouti.[22] While most food-related instability historically has occurred in Asia, the Middle East and North Africa, West African countries could face a similar fate.

According to Lagi et al., "[most] food riots occur above a threshold of the FAO price index of 210."[23] Combined with current youth bulges, the growing proportion of net consumers to net food producers in West Africa creates a situation where food-related violence is more likely.[24] Moreover, countries with younger populations are more predisposed to civil unrest and are less able to create or sustain democratic institutions.[25] Lagi et al. predict that riots will become more frequent after food prices eventually cross the FAO threshold of 210.[26] Consequently, factors like urbanization, chronic poverty, and youth bulges will increase the likelihood of food-related instability in the future. The solution, then, is finding an inexpensive, sustainable solution that will improve food security in developing countries—one that preemptively targets impoverished urban areas.

Figure 1 FAO Food Price Index since 2004



Preserving U.S. Interests in West Africa

> *We are heading for a very long period of rioting, conflicts, [and] waves of uncontrollable regional instability marked by the despair of the most vulnerable populations*.[27]
>
> *—Jean Ziegler, U.N. Special Rapporteur on the Right to Food*
> *April 14, 2008*

The United States has strategic interests in West Africa, including expanding trade, securing access to oil reserves and other resources, and ensuring the spread of democracy.[28] Food insecurity threatens this region, and by extension, the progress of U.S. strategic interests. Since government institutions are expected to provide for food security, even the most stable democracy could be at risk if food security deteriorates beyond a tolerable level. By acting as a catalyst for social conflict, food insecurity exacerbates political tensions and leads to civil unrest and anti-government violence. Factors like urbanization and rising food prices will aggravate food insecurity in the next decade, inducing riots and other forms of political violence. Ultimately, urban food riots could de-legitimize and destabilize West African democracies. If food insecurity damages the image of democracy, African populations may view democracy as an ineffective form of governance. Sack farming offers an ideal solution to address this problem by addressing the factors that exacerbate food insecurity in chronically poor areas.

The Policy Solution—Sack Farming

Sack farming is a recent innovation of container gardening that can be practiced in urban areas; it involves growing seedlings in large plastic sacks filled with soil, which maximizes the space

occupied by the sack.[29] This practice is distinct from traditional urban agriculture because "its application is more beneficial to slum populations or to people that [live in] densely populated environments [where] arable land is scarce."[30] Widespread use of sack farming in urban Africa will increase access to food for individuals that cannot benefit from more costly forms of urban agriculture.[31]

Benefits of Sack Farming

Sack farming will improve food security conditions in areas affected by urbanization, rising food prices, and chronic poverty. Sack farming is well-suited to address the agricultural needs of food insecure populations in poor, densely populated urban areas because:

1. *Sack farming is practical*. Sack farming's innovative use of vertical space is compatible with dense urban areas and slums, which are likely to become more vulnerable over time due to urbanization and increased food demand. Other forms of urban agriculture, like backyard gardening, are infeasible in urban areas where arable plots of land are not available.[32] The sack's structure offers further advantages. Though no formal studies have been conducted on water usage, the consensus is that sack farming's stone-spine irrigation is more efficient than conventional irrigation.[33] Moreover, the woven plastic sacks prevent water from leaching nutrients from the soil.[34] Since many slum inhabitants are rural migrants, sack farming utilizes their prior knowledge of farming, which makes the practice amenable to slum conditions. Additionally, sack farming's materials are commonplace; after knowledge of the practice spreads, local markets can offer access to existing resources—such as the woven plastic sacks.[35] Seeds already are available in local markets, whereas soil and stones can be found anywhere.[36] Finally, sack farming reduces the strain and reliance on rural-to-urban infrastructure. By growing food directly in the city, sack farming will reduce agricultural transportation costs, thereby lowering food prices for the chronically poor.

2. *Sack farming is economical*. Sack farming's returns exceed its input costs.[37] During a 2008 sack farming program in the Kibera slums of Nairobi, the French aid organization Solidarités reported that sack farming increased weekly incomes by about $5 per week in an area where monthly rent is $6.[38] According to Peggy Pascal and Eunice Mwende's study of Kibera, sack farmers could produce two to three full meals on a weekly basis.[39] Some estimates calculate that three to four sacks will produce enough vegetables for *average household use*, while five to six provide enough for sale of excess crops.[40] According to Courtney Gallaher's study in the Kibera slums, the average household earns between 4,000 and 8,000 Ksh ($50 and $100) per month.[41] The study also found that "food is a major expense for most households in Kibera, with farmers and non-farmers spending 50-75% of their total income on food."[42] Sack farming can generate 1,700-2,500 Ksh (about $20-30) in revenue per month for farmers that sell some of their vegetables, excluding water expenses.[43] Although sack farming alone cannot fully support a household, it eases a family's financial burden by providing additional food at a low cost and by creating an extra income source if users decide to sell their vegetables.[44]

3. *Sack farming is sustainable*. At the local level, sack farming will boost social capital within communities, as neighbors work together to overcome challenges including crop theft and obtaining access to water, soil, fertilizer, and pesticides. In the long term, sack farming can produce a culture in developing countries that is receptive to urban agriculture. Given its success in Nairobi, sack farming has the potential to inspire an urban agriculture movement by generating support from African populations and their governments.[45] Studies show that knowledge of sack farming quickly spreads by word-of-mouth via friends, family members, and neighbors; sack farming's growing popularity will turn it into a political issue, thereby advancing urban agriculture reform.[46]

A Guide to Sack Farming

Sacks can be purchased from market vendors or found in local dumpsites because they are used to hold feed for livestock and to transport vegetables to local markets.[47] After sack farming is introduced in an area, households can purchase sacks for 10 Ksh (about $0.12) from local vendors and find soil and rocks for themselves.[48] Sacks vary between 0.1 m^3 and 0.5 m^3 and usually contain a stone spine to facilitate irrigation (see Figure 2).[49] Usually, sacks are placed outside of owners' houses—on rooftops, doorsteps, walls, or fences along houses—or at a communal site where sacks can be monitored by community members.[50] Common crops include kale, Swiss chard, spinach, tomatoes, coriander, green onions, cabbage, and indigenous vegetables.[51] Seedlings usually take no more than three weeks to transplant, because seeds with short growing periods are selected.[52] Sacks typically fit 30 to 40 seedlings of kale and spinach, or 20 tomato seedlings.[53] Historically, initial seedlings have been provided by a non-governmental organization (NGO) or governmental aid organization.[54] When mature, the seedlings are planted at the top of the sack and in holes cut into the side of the sack to maximize the use of vertical space. As the seedlings are transferred from the nursery to the sack, the organization that began the project will typically hold a demonstration to show the proper planting and watering techniques.[55] On average, weekly maintenance for sacks requires two hours for watering, weeding, and replanting seedlings.[56]

Figure 2 Cross Section of a Sack

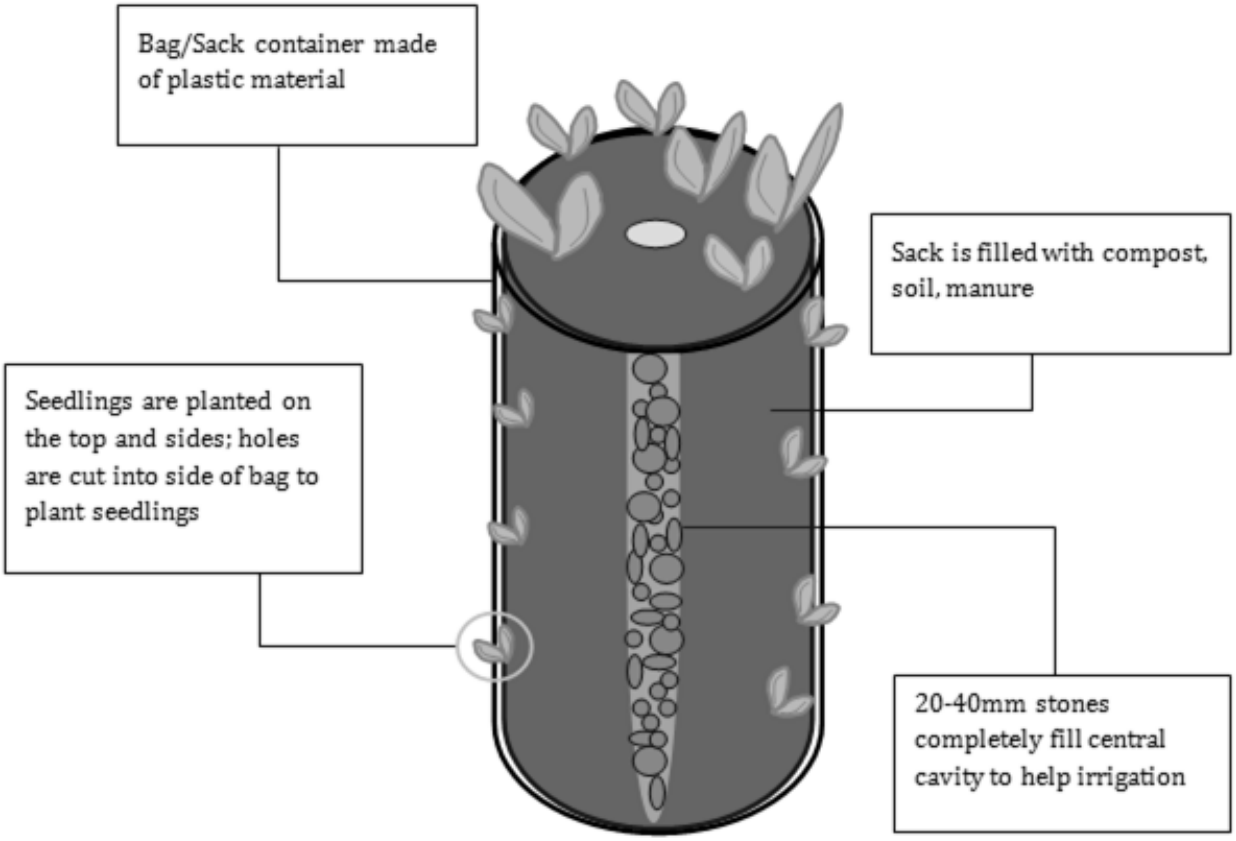


Table 1 lists sack farming's input costs once the practice is introduced.[57] According to Gallaher, local markets will respond to the practice by providing the necessary materials to sack farmers.[58] These materials add up to about $2.50—the initial cost of a sack. After a sack is built, incremental purchases of seeds and water must be made. The total fixed cost per sack below does not factor in water expenditures, which change during drought conditions; additionally, it does not include NGO wages for workers and community liaisons.[59]

Table 1 Input Costs of Sack Farming

Sack Farming Materials	**Cost in Kenyan schillings (Ksh)**	**Cost in U.S. dollars ($)**
Plastic woven stack	0 Ksh-10 Ksh	$0.00-$0.12
Soil	0 Ksh-50 Ksh	$0.00-$0.60
Stones	0 Ksh	$0.00
Seeds (48 seeds)	96 Ksh (2 Ksh each)	$1.14 ($0.024 each)
Building a sack (optional)	50 Ksh	$0.60
Water (variable cost)	Variable	Variable
Total Fixed Cost per Sack	**96 Ksh-206 Ksh**	**$1.14-$2.46**

The process by which organizations implement sack farming is outlined below:

1. *Find a target group*. Organizations should target chronically poor and food insecure populations, preferably those that have existing knowledge of farming. Because many slum inhabitants migrate from rural areas, they usually are familiar with farming practices.

2. *Mobilize resources*. Beforehand, organizations should assess resource availability to determine which resources to provide. These input factors include sacks, seeds, soil, and sometimes fertilizers and pesticides. Seeds with short germination periods (three weeks) are selected and planted; eventually, these will be placed in the soil after they mature. Stones, which form the irrigation spine, can be found anywhere. Generally, resource mobilization should be coordinated by communicating with locals in the target region.

3. *Attract potential sack farmers by holding group sessions*. Usually, group sessions are held during the day to demonstrate not only how to build the sack, but also how to care for the seedlings. An official representative will teach prospective sack farmers about irrigation, fertilization, and pest control. Organizations can improve session turnout by partnering with existing aid/development initiatives; past sack farming projects have been implemented with women's health and education initiatives.[60] Additionally, organizations can pay community members to be liaisons between the organization and the sack farmers.[61]

4. *Distribute or collect materials*. During the group session, organizations can distribute sack farming materials. Otherwise, sack farmers can obtain these inputs at the local level.[62] Initially, the organization also will distribute the mature seedlings, which were planted earlier. Sometimes, a community will set aside a shared plot of land reserved for sack farming; sacks can be constructed in this space, or elsewhere at the user's discretion.

5. *Allow the practice of sack farming to spread*. Sack farming acts as a catalyst for social and economic change—sack farmers will share the practice with friends, family members, and neighbors. As this information is disseminated, local economies will self-organize around sack farming. Thus, sack farming materials will become more available and more accessible.[63] According to Gallaher, plastic woven sacks and seeds are available in local markets, whereas soil and stones can be found anywhere.[64] Sometimes, an organization may follow up by hosting another group session for sack farmers to distribute surveys and ask questions. Meanwhile, knowledge of sack farming spreads via word-of-mouth, exposing other individuals to the practice.

Challenges of Sack Farming

Physical challenges associated with sack farming include securing access to water sources, uncontaminated soil, fertilizers, and pesticides. Additionally, sack farming sometimes faces local bans on urban agriculture.

- *Water Access*. Ensuring access to water is the most important challenge for sack farmers—rainfall or other consistent sources of irrigation can be scarce. Consequently, local populations have developed innovative ways of obtaining water access. In the Kibera slums in Nairobi, Kenya, an informal water system has developed, "whereby people access water through small, individually-owned pipes which are illegally collected to small mains that serve nearby residential areas."[65] Similar irrigation systems have developed in most slum areas in Africa; beyond these informal systems, other urban water sources include the collection of rainwater from barrels or gutters.[66] Additionally, sack farmers can practice wastewater irrigation by filtering dishwater and cooking water through charcoal dust—a common method of filtration.[67] Another irrigation technique involves watering sacks at the beginning and end of every day—water that is boiled during the cooking process could then be used to irrigate crops in the evening.[68] Water access will continue to be a challenge in West Africa; however, sack farming maximizes the use of limited water resources.[69]

- *Soil Access*. Even though sack farming efficiently uses physical space, it still requires fertile, uncontaminated soil for its seedlings. Soil must be free of heavy metals, which otherwise could render vegetables inedible due to the bioaccumulation of harmful compounds.[70] In the past, some NGOs coordinated the initial distribution of soil; if a reliable soil source is not provided, sack farmers will have to find soil on an *ad hoc* basis. Common soil sources in slum areas include open fields, dumpsites, and areas near railroad tracks, streams, and river banks.[71]

- *Fertilizer and Pesticides*. Although scarcity and low income limit access to fertilizer and pesticides, many sack farmers find natural alternatives for both. For example, sack farmers may purchase manure from local cattle or poultry farmers to use as fertilizer.[72] As a substitute for commercial pesticides, sack farmers employ various traditional methods of pest control: planting spring onions, sprinkling charcoal ash on plant leaves, and spraying a water-based pepper solution on plant leaves.[73] Challenges often have been solved through group action—in the past, farmers have purchased fertilizers and pesticides for collective use, which is cheaper.[74]

- *Legality of Sack Farming*. In some localities, governments discourage or outlaw urban agriculture in an attempt to project an image of modernity. By banning "backward" practices, some African governments hope to attract foreign direct investment by modeling their cities after those of first world countries.[75] Consequently, capital intensive projects often supplant other development initiatives—including urban agriculture—to preserve the image of progress and development.[76] However, sack farming can have broad social effects within democracies. Local bans on backyard gardening in Accra, Ghana disappeared after public support for urban agriculture gradually influenced politicians to support the practice.[77] Because of its success, sack farming tends to gain popularity as it gains more exposure. Thus, reluctant governments may ease restrictions on urban agriculture as awareness of sack farming spreads among local populations.

The application of sack farming must take into account the "local or traditional knowledge, climatic and environmental conditions, as well as social and resource supply conditions."[78] Each

locality faces different challenges, including pest control plant disease prevention, in addition to common problems like water access and soil quality. However, input factors like sacks and seeds are readily available in local marketplaces, making sack farming amenable to urban areas.[79]

Building on the Past Success of Sack Farming

In the last two decades, aid/development organizations worldwide have embraced innovative urban agriculture techniques as a way to alleviate food insecurity. Although sack farming is relatively new, USAID has already worked with the AIDS care organization HACOCA (Huruma AIDS Concern and Care) to help women and children maintain sack gardens in Tanzania.[80] USAID has also launched other agricultural projects such as the Urban Gardens Project in Ethiopia, as well as a container gardening project using tires in Haiti.[81] International aid organizations such as COOPI and Solidarités successfully implemented "garden in a bag" projects in Nairobi, Kenya in 2010 and 2011, respectively.[82] A six month FAO-Netherlands Partnership Programme (FNPP) initiative tested sack farming in Gaza, a province of Mozambique. There, the local population rapidly adopted sack farming, especially in the Northern Districts, "where drought and chronic malnutrition are [widespread]."[83] Organizations such as South Africa's CL4 and Uganda's Action Against Hunger/ACF International also promoted container gardening in their projects. This record of success demonstrates the potential for sack farming to increase food insecurity in urban areas without arable plots of land.[84]

Alternative Strategies to Address Food Insecurity

Governments and NGOs have implemented a variety of solutions to alleviate food insecurity; however, most attempts have failed to address its fundamental causes.[85] Domestic policies within food insecure countries have targeted dwindling agricultural inputs and trade instead of focusing on chronic poverty, market access, subsistence agriculture, and other political barriers to food.[86] While newer proposals focus on creating sustainable agricultural projects, many still do not accommodate the needs of people in chronic poverty.

Agricultural Proposals

Agricultural solutions to food insecurity in Africa are constrained by limited financial resources and infrastructure. Most agricultural research benefits the first world and involves expensive machinery, advanced irrigation techniques, large quantities of fertilizer, and genetically-modified organisms. Existing agricultural policies directed at developing countries generally focus on rural areas, where most farming occurs; consequently, these policies pay too little attention to mitigating food insecurity in sprawling African cities.

- *Community gardens*. Community members collectively plant and tend plots of arable land within city limits. While community gardens address food insecurity in a sustainable, localized way, they require an arable plot of land, which may not be available or accessible in urban areas. In contrast, sack farming utilizes vertical space effectively and can be practiced anywhere; thus, sack farming is more amenable to the circumstances of chronically poor slum inhabitants.

- *Improvements to Conventional Farming*. Attempts to increase crop yields in developing countries are ongoing. According to Cullen Hendrix, senior fellow at the Peterson Institute for International Economics, "public investment in yield-increasing technologies in the developing world is badly needed, especially in Africa."[87] New improvements to conventional farming include the use of genetically-modified seeds, agrochemicals, irrigation techniques, and farm machinery. Though these modern yield-increasing innovations are significant, urban agriculture should receive attention as well. Given the rural-to-urban shift occurring in West African countries, it is important to consider the difficulty of making food accessible to growing urban populations. Often, transporting food from rural areas to urban centers unnecessarily increases the price of food; solutions that improve rural agricultural practices do not address the chronic poverty experienced in slum areas, where the most food insecure populations live.[88] Even if agricultural yields increase and food is more abundant, these food insecure populations may not be able to afford food if global prices continue to increase. Sack farming can solve this potential problem by providing the means to grow food where it will be consumed.

- *Vertical farming*. Crops are cultivated on a large scale within buildings or on other vertically-inclined surfaces.[89] This agricultural practice borrows components from a traditional greenhouse—glass windows, conveyor belts, and an electricity supply in some cases. Though vertical farming can increase crop yields year-round in urban areas, this

solution is limited to developed countries due to the costly technologies involved. Countries like the United States, Canada, Sweden, and Japan have made investments in vertical farming; however, the technique is cost prohibitive for West African countries.[90] Sack farming is a better alternative for the chronically food insecure due to its low cost.

Non-Agricultural Proposals

Some proposals that attempt to improve food security in Africa do not focus on agricultural production. These non-agricultural approaches often fall short because they fail to address food security in chronically poor areas. These proposals tend to focus on food consumption instead of food production, favor short-term fixes over long-term solutions, and do not enable more people to grow food for themselves and their households.

- *Economy-wide government policies*. Such policies include tax reductions on food grains, export restrictions, price controls, and consumer subsidies.[91] Government safety nets and food price stabilization measures can be effective in ensuring short-term food security in developing African countries; however, these government policies can create food insecurity problems in the long run.[92] After a significant food price spike, governments may implement reactionary macroeconomic policies without considering their impact on long-term food access. For example, export restrictions undermine trust in the global food market and aggravate food shortages although they might temporarily increase food stocks domestically.[93] Developing countries in Africa often cannot afford policies that offset sudden spikes in international food prices—essentially, African countries lack the finances to stabilize domestic food prices during severe price spikes.[94] In sum, economy-wide government policies, though well-intentioned, often are expensive solutions that can damage long-term food access for the chronically poor.

- *Social protection programs*. These programs include cash transfers, food for work, food rations, food stamps, and school meals.[95] While social protection programs often are aligned with long-term food security goals, their effect is limited in developing countries because they are subject to corruption and require financial monitoring institutions.[96] Overall, these policies are constructive because they help alleviate food insecurity; however, they sometimes do not reach the most food insecure populations. Social protection programs do not enable chronically poor populations to feed themselves, thereby overlooking the root causes of food insecurity.

- *Foreign food donations*. Food donations can be distributed by governments or non-profit organizations and can occur routinely, or during a humanitarian crisis. While these donations provide a short-term solution to solving hunger, food donations will disrupt the local market economy by forcing food prices to fall, thereby harming the livelihood of farmers. Additionally, foreign food donations discourage agricultural development and innovation, which prolongs chronic food insecurity in densely populated urban areas.

Current outlooks suggest that non-agricultural solutions to food insecurity in Africa will be marginally effective: "despite calls for increased food self-sufficiency in the developing world,

imports are likely to account for a rising share of total consumption in the future, potentially increasing vulnerability to international price shocks."[97] Increasing worldwide food demand and international price shocks require a long-term solution for Africa that directly addresses chronic food insecurity by encouraging food production in densely populated urban areas. Sack farming's unique strengths offer a practical, economical, and sustainable way to address food insecurity.

A Targeted U.S. Response in West Africa

Taken together, rapid urbanization, rising global food prices, and chronic poverty in slum areas will threaten African food security in the next decade.[98] In recent years, food-related unrest occurred in Senegal (2008) and Mali (2012); in both cases, food insecurity contributed to instability in these democracies.[99] Since the worsening of food security conditions in West Africa will increase the likelihood of food-related unrest in the future, the threat of instability requires a targeted U.S. response to food insecurity in poor, densely populated urban areas.

West Africa contains some of the fastest growing cities on the continent, which contributes to larger food insecure populations. Existing sectarian and economic divides in West Africa could be exacerbated by chronic food insecurity in one area, fueling resentment of the government and increasing the likelihood of civil unrest. West Africa's integration into the global economy makes it especially vulnerable to spikes in global food prices, which are becoming more frequent. Given these trends, even the most stable African democracies in West Africa could experience food-related instability in the next decade. In an age of austerity, sack farming is a practical, economical, and sustainable solution to food insecurity in the region.

Sack Farming and U.S. Strategic Interests in West Africa

Through sack farming, the United States can uphold its stated goal of "strengthening the ability of governments…to manage development challenges and investing in strong institutions that foster the democratic accountability that helps sustain development."[100]

The United States has three clear strategic interests in West Africa:

1. Preventing the destabilization of democratic governments.[101]

2. Promoting sustainable methods of agricultural development.[102]

3. Building future partnerships with African democracies.[103]

In the 2010 National Security Strategy (NSS), the Obama administration articulated a goal of initiating "long-term investments that recognize and reward governments that demonstrate the capacity and political will to pursue sustainable development strategies."[104] Food insecurity not only jeopardizes political and economic stability in Africa, but also hinders the progress of

developing countries toward maintaining stable democratic institutions. Thus, food insecurity will weaken the United States' ability to partner with stable democracies on the continent. The failure of democracies to ensure food security will also damage the reputation of democratic institutions in Africa and impede their spread. Food insecurity in West Africa undermines U.S. interests because it threatens political and social instability within developing democracies.

Given the prospect of destabilization in West Africa, sack farming is an effective solution. Its implementation in densely populated urban areas will improve food security conditions since it allows the production of food to occur where it is needed most. These areas are beset by chronic poverty and youth bulges, which increase the likelihood of food riots and organized anti-government violence.[105] Apart from the clear humanitarian benefits from enabling food insecure populations to feed themselves, the United States will advance its interests by instituting sack farming:

- *Preventing destabilization*. Sack farming will help prevent the destabilization of African democracies given the impending threat of food insecurity. Swift action could preclude this threat if a long-term urban agriculture movement is encouraged. Shared interests between the United States and democratic governments—including freedom, peace, and prosperity—will help ensure the initial success of U.S. food initiatives.

- *Promoting sustainable agriculture*. Sack farming enables individuals trapped in chronic poverty to become food secure. The returns from sack farming—marginal food security for those on the edge of starvation—will help stabilize areas that are most prone to civil unrest when food prices are high. Sack farming alone cannot ensure complete food security; however, it is an effective supplement for food insecure individuals and families when food prices are high. Such an initiative that reaches the most food insecure populations would not only fulfill humanitarian goals, but also further U.S. interests.

- *Building democratic partnerships and facilitating the spread of democracy*. Sack farming initiatives will create a reservoir of goodwill in targeted countries that will serve as the basis for strong partnerships in the future. The U.S.-led propagation of sack farming will provide immediate benefits, including continued access to strategic resources, the strengthening of trade, and enhanced diplomatic ties. Additionally, improving food insecurity will help strengthen the legitimacy of democracy on the continent if African democracies are food secure relative to non-democratic countries. Finally, democracies are most likely to cooperate with the United States in areas such as human rights, humanitarian missions, maritime security, and anti-piracy operations. U.S. strategic interests on the African continent require forging lasting partnerships with stable democracies; thus, sack farming initiatives can help realize this goal.

In an age of austerity, the United States has limited resources—especially when it comes to foreign aid, which presently comprises less than one percent of the would-be U.S. budget.[106] Sack farming is a viable policy choice for the United States because it is practical, economical, and sustainable.

Promoting Sack Farming: A Focus on Democracy

The United States should focus future sack farming initiatives on democracies in the developing world for two reasons.

First, democracies can be more susceptible to anti-government violence and civil unrest than are non-democracies during times of food insecurity.[107] Since developing countries tend to be more vulnerable to the global economy and are more likely to rely on food imports, rising food prices and price spikes could have a greater destabilizing effect on developing democracies.[108]

Second, democratic governments usually are more receptive to urban agriculture than other types of governments and will be more likely to permit the practice, as they have a greater sensitivity to popular will.[109] If sack farming produces the promised benefits, this form of agriculture likely will gain popular support, thereby inspiring a long-term urban agriculture movement along the Gold Coast.

Ghana: An Ideal Test Case for Sack Farming

The United States should encourage democratic African governments to take steps toward alleviating food insecurity for its most vulnerable urban populations. By promoting sack farming, the United States can inspire a greater acceptance of urban agriculture among urban populations and West African democracies. The United States' commitment to West Africa is evidenced by significant USAID outflows to the region. In particular, this paper recommends Ghana as the ideal test case to demonstrate the promise of sack farming. Already a U.S. Partner for Growth, Ghana is positioned to become a successful example of urban agriculture, from which innovative ideas can spread to other cities and countries.

One of the most stable democracies in Africa, Ghana represents the forefront of food security experimentation by the United States and is poised to become a stable democracy in the Gold Coast region.[110] Compared to other countries, Ghana's government is tolerant of urban agriculture—making Ghana the ideal location to implement sack farming. The country is an exemplary model for developing democracies—in 2012, Ghana received a 1.5/7 rating in Freedom House's democracy index, the second-best score awarded in Africa, behind Cape Verde.[111] Ghana is the fifth largest USAID recipient in Africa and one of four countries participating in the Partnership for Growth program with the U.S. government; U.S./Ghana relations are consistently friendly.[112] Ghana already uses social protection programs such as cash transfers, food rationing, and school feeding to alleviate insecurity, all of which are "consistent with longer run policies to food security."[113]

Ghana's capital city, Accra, is an ideal location to implement sack farming. Urban agriculture already is an important informal sector in Accra's economy—currently, an estimated 50 to 60 percent of households in Accra are engaged in some form of urban agriculture.[114] Kwaku Obosu-Mensah, Associate Professor of Sociology and International Studies at Lorain County Community College, shows how urban agriculture can affect community opinion in his study of Accra.[115] Accordingly, Practices like backyard gardening became popular when middle-class

citizens began growing and selling crops to foreign nationals at local markets. As a result, the local officials in Accra now take a neutral stance toward urban agriculture—they are not opposed to these practices, but do not promote or encourage them either.

Many developing countries have a narrow perception of the characteristics of a Western, modernized city. Leaders believe their largest cities should fit this mold in order to attract foreign direct investment. As a result, governments focus on capital-intensive projects to promote the image of progress and development. Consequently, urban agriculture often is discouraged or even outlawed in some countries because these practices are considered "backward."[116] However, Obosu-Mensah's study offers a narrative of how negative perceptions of urban agriculture can change. Officials in Accra initially were opposed to urban agriculture, but became more open to the idea over time. Specifically, urban agriculture gained popularity among middle and upper-class residents of Accra over the past few decades, which led politicians to tolerate the practice.[117]During difficult economic times, officials were more likely to view urban agriculture as "one way to alleviate hardships related to food shortages and unemployment."[118] Additionally,

Building on Current USAID Programs in Ghana

The United States must address food insecurity in West Africa as a threat to democratic stability before trends such as urbanization and increasing worldwide food demand worsen the problem. Since food insecurity will persist in chronically poor areas in West African cities, the United States should promote and support sack farming as a long-term solution to food insecurity.

Sack farming would be an inexpensive addition to USAID's Feed the Future (FTF) Initiative, which has an estimated budget of $1 billion from 2011 to 2015.[119] FTF focuses on private sector development, resource/environmental protection, and modernizing the agricultural sector in Ghana.[120] One of FTF's principal goals is "promoting sustainable food security, as Ghana's government estimates that 2 million people are food insecure.[121] Given Ghana's 3.5 percent urban growth rate, sack farming is a practice that can benefit the most vulnerable urban populations, where food often is expensive and inaccessible.[122]

In its diplomatic interactions with African democracies, the United States should emphasize the following points:

- *Urbanization, increasing food prices, and chronic poverty likely will worsen food insecurity in the next decade*. In response, African democracies should commit to a long-term food security strategy that reaches densely populated urban areas. The United States should encourage democratic governments to adopt a more-favorable view of urban agriculture to enable food production in vulnerable urban areas. One possible recommendation for Ghana is earmarking future oil and natural gas revenues toward urban agriculture and food security initiatives.[123] If Ghana sets aside part of these revenues to pursue food security initiatives, the government will enjoy greater stability despite urbanization, rising food prices, and chronic urban poverty.

- *Sack farming alleviates food insecurity for vulnerable populations*. Individuals in Accra that inhabit densely populated urban areas or slums often do not have access to arable plots of land. Additionally, these populations suffer from chronic poverty, which hinders food security even when food is readily available in the marketplace.[124] Increasing urbanization in developing countries suggests a decreasing amount of rural farmers, which may lead to a greater dependence on food imports.[125] Sack farming addresses the challenges of changing demographics by bringing an innovative form of food production to densely populated areas, allowing food insecure individuals to meet their agricultural needs. Sack farming is an innovative practice that can enable food production for most vulnerable populations in Ghana.

- *Sack farming organizes local economies and utilizes local expertise*. Seeds, sacks, and soil are readily available in local markets.[126] Sack farming leads to the development of *ad hoc* economy which provides greater access to sack farming materials to an expanding population base. In addition, the practice indirectly provides men with alternative sources of income in the informal sector—in the Kibera slums, for example, men transported soil and built sacks for 50 Ksh per sack.[127] Sack farming is easy to implement because it is understood and appreciated by rural migrants who already have farming skills. Furthermore, sack farming has the potential to increase social capital within communities by fostering cooperation between neighbors that practice sack farming.[128] Because sack farming quickly spreads by word-of-mouth via friends and neighbors, knowledge of the practice will become accessible to others.[129]

- *Access to clean water and uncontaminated soil are important factors that contribute to sack farming's success*. Sack farming's efficient use of water lessens the strain on water supply relative to conventional agriculture; however, other initiatives still should pursue improvements to water quality and access. Additionally, pollution and zoning laws often prevent populations from finding access to a source of uncontaminated soil, which is a necessary component of urban agriculture. African democracies can increase governmental stability and political support by providing public goods that enable the success of urban agriculture for food insecure populations. One possible idea involves governments providing access to uncontaminated soil in conjunction with a U.S.-sponsored sack farming project; politicians could please voters by providing inexpensive input factors for sack farming.

Conclusion

In the past decade, food riots and anti-government violence have intensified across Asia, the Middle East, and North Africa. These riots are correlated with sharp increases in global food prices because populations increasingly resort to violence during severe food shortages. These riots could spread to West African democracies, as food security conditions in the region worsen in the next decade due to increasing urbanization, spikes in global food prices, and chronic poverty. As a result, food insecurity could de-legitimize and ultimately destabilize West African

democracies. In response, the United States should promote urban agriculture in chronically poor urban areas where food insecurity could have the most destabilizing effects.

To prevent future food riots, the United States can support sack farming, an emerging form of urban agriculture, which involves planting seedlings into large plastic sacks filled with soil. Sack farming's innovative use of vertical space will help maintain food security in densely populated urban areas, where the most vulnerable populations live. Thus, sack farming can help prevent potential food riots and bolster democratic stability in West Africa. In an age of austerity, sack farming is a practical, economical, and sustainable solution to future food insecurity for West African democracies. In response, the United States should encourage Ghana and other Gold Coast countries to pursue a long-term food security strategy—with the ultimate goal of inspiring the widespread practice of urban agriculture.

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[27] Jean Ziegler, interview by staff of *Liberation*, April 14, 2008. *See* http://www.webofdebt.com/articles/global-food-crisis.php.

[28] The U.S. Agency for International Development (USAID), *Where Does the Money Go? Obligations for FY 2012*, accessed April 10, 2013, downloaded from http://www.usaid.gov/results-and-data/budget-spending/where-does-money-go. In cell C30, click on the drop-down menu and select AFR for Africa. The U.S. Agency for International Development (USAID) already has focused much of its resources in West Africa—especially in Ghana, Liberia, Senegal, and Nigeria: Ghana is #5 in Africa, Liberia is #7, Senegal is #9, and Nigeria is #11.

[29] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 3. Since seedlings can be planted in the top of the sack and through the side of the sack, sack farming efficiently uses *vertical space*. This advantage is important in densely populated urban areas where arable plots of land do not exist and space is scarce.

[30] "Sack gardening," TKProject at the Tropeninstitute of the University of Applied Sciences in Cologne, posted September 24, 2009, http://tk.noblogs.org/post/2009/09/24/sack-gardening.

[31] This is because other types of urban agriculture require arable plots of land.

[32] "Sack gardening," TKProject at the Tropeninstitute of the University of Applied Sciences in Cologne, posted September 24, 2009, http://tk.noblogs.org/post/2009/09/24/sack-gardening; *see* also "Garden in a Sack" (free

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[33] Courtney Maloof Gallaher, phone call with author, March 4, 2013.

[34] "Sack gardening," TKProject at the Tropeninstitute of the University of Applied Sciences in Cologne, posted September 24, 2009, http://tk.noblogs.org/post/2009/09/24/sack-gardening; *see also* Gabriel Deesohu Saydee and Sebastine Ujereh, "Rooftop Gardening in Senegal," *Urban Agriculture Magazine*, August 2003, 16-17, http://amalthea.kevio.gr/wp-content/uploads/2011/09/Rooftop-Gardening-in-Senegal.pdf.

[35] Courtney Maloof Gallaher, phone call with author, March 4, 2013.

[36] Courtney Maloof Gallaher, phone call with author, March 4, 2013.

[37] Katy Fentress, "Sack Farms in Mathare," *Urb.im* (blog), February 20, 2012, http://urb.im/nr/120220sa. COOPI, an Italian aid organization implemented sack farming in the Kibera slums of Nairobi in 2008. This organization reported a cost of $10 per sack, which includes sack, seeds, and soil. According to Gallaher, this $10 figure likely included the wage of the person doing the group demonstrations. This figure could also include fertilizer and pesticide costs, though the exact breakdown of the materials is unknown.

[38] Peggy Pascal and Eunice Mwende, "A Garden in a Sack: Experiences in Kibera, Nairobi," *Urban Agriculture Magazine*, January 29, 2009, 39, http://www.ruaf.org/sites/default/files/UAM21%20p.38-40.pdf; *see also* Solidarités International, "Urban Agriculture Program" (presentation, Regional workshop in East Africa—FAO—Food for the Cities, Nairobi, December 13-14, 2011), http://www.fao.org/fileadmin/templates/FCIT/workshops/Nairobi-2011/presentations/12-Nairobi-SolidaritesInternationale-communityresilience.pdf.

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[41] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 69. Dr. Gallaher is an assistant professor at Northern Illinois University in the Department of Geography.

[42] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 74.

[43] Courtney Maloof Gallaher, phone call with author, April 10, 2013. Gallaher said that about 1/3 of sack farmers sold their vegetables.

[44] Courtney Maloof Gallaher, phone call with author, April 10, 2013. Additionally, sack farming can create sources of income for men that inhabit slums. According to Gallaher, sack farmers occasionally pay men to transport soil and build sacks—usually for 50 Ksh per sack (in both cases).

[45] Katy Fentress, "Sack Farms in Mathare," *Urb.im* (blog), February 20, 2012, http://urb.im/nr/120220sa.

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[47] Rosemary Nyaole-Kowuor, "Sack farming: Unlimited vegetable harvest!," Farm Radio International, April 1, 2010, radio broadcast transcript, ed. Takawira Mubvami, http://www.farmradio.org/radio-resource-packs/package-90/sack-farming-unlimited-vegetable-harvest; *See also* Peggy Pascal and Eunice Mwende, "A Garden in a Sack: Experiences in Kibera, Nairobi," *Urban Agriculture Magazine*, January 29, 2009, 38, http://www.ruaf.org/sites/default/files/UAM21%20p.38-40.pdf; *for feed sacks, see* "Urban Agriculture: A guide to Container Gardens," Technology for the Poor, accessed March 16, 2013, http://www.technologyforthepoor.com/UrbanAgriculture/Garden.htm; *for vegetables at local markets,* Courtney Maloof Gallaher, phone call with author, March 4, 2013.

[48] Peggy Pascal and Eunice Mwende, "A Garden in a Sack: Experiences in Kibera, Nairobi," *Urban Agriculture Magazine*, January 29, 2009, 39, http://www.ruaf.org/sites/default/files/UAM21%20p.38-40.pdf.

[49] "Sack gardening," TKProject at the Tropeninstitute of the University of Applied Sciences in Cologne, posted September 24, 2009, http://tk.noblogs.org/post/2009/09/24/sack-gardening.

[50] Courtney Maloof Gallaher, phone call with author, March 4, 2013.

[51] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 54.
[52] Peggy Pascal and Eunice Mwende, "A Garden in a Sack: Experiences in Kibera, Nairobi," *Urban Agriculture Magazine*, January 29, 2009, 38, http://www.ruaf.org/sites/default/files/UAM21%20p.38-40.pdf.
[53] Peggy Pascal and Eunice Mwende, "A Garden in a Sack: Experiences in Kibera, Nairobi," *Urban Agriculture Magazine*, January 29, 2009, 39, http://www.ruaf.org/sites/default/files/UAM21%20p.38-40.pdf.
[54] Courtney Maloof Gallaher, phone call with author, March 4, 2013; *see also* Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 75-79. Often, the community sets aside a piece of land to serve as a nursery (if land is available) to germinate seeds for future use. Individuals also may germinate their own seeds.
[55] Sacks are initially watered twice a day, but as the seedlings grow the sacks only need to be watered once a week. Sacks initially watered twice a day, but eventually can be watered once a week.
[56] "Sack gardening," TKProject at the Tropeninstitute of the University of Applied Sciences in Cologne, posted September 24, 2009, http://tk.noblogs.org/post/2009/09/24/sack-gardening.
[57] Courtney Maloof Gallaher, phone call with author, April 10, 2013. These estimates come from Gallaher's study in the Kibera slums; water expenditures and associated wages/salaries are not included in this estimate. Any value of 0 Ksh denotes a sack farmer's ability to find or access a resource free of charge; however, this is not always the case. Thus, some values in the table give a high-low range.
[58] Courtney Maloof Gallaher, phone call with author, March 4, 2013.
[59] COOPI's disclosed cost of $10 per sack diverges from Gallaher's estimate. Though COOPI's exact cost breakdown was unavailable, we assume (Gallaher and I) that this cost per sack includes wages for NGO workers, as well as community liaisons. Additionally, this figure could contain fertilizer and pesticide costs; these costs can be averted through natural means, which are discussed later in this paper.
[60] *See* "Garden in a Sack" (free discussion, Food Security and Nutrition Forum of the FAO, 2008), 3, http://km.fao.org/fileadmin/user_upload/fsn/docs/SUMMARY_Garden_in_a_sack_comments_final.doc.
[61] Peggy Pascal and Eunice Mwende, "A Garden in a Sack: Experiences in Kibera, Nairobi," *Urban Agriculture Magazine*, January 29, 2009, 39, http://www.ruaf.org/sites/default/files/UAM21%20p.38-40.pdf.
[62] Courtney Maloof Gallaher, phone call with author, March 4, 2013. Materials are readily accessible; see "A Guide to Sack Farming" section.
[63] Courtney Maloof Gallaher, phone call with author, March 4, 2013. Local markets organize around sack farming for various reasons—among these, profit motive and the availability of materials. Profit motive can drive local vendors to provide materials such as sacks, seeds, and soil to willing buyers for a small price—this is made easier due to the fact that sacks and seeds already are available in local markets in just about every African city.
[64] Courtney Maloof Gallaher, phone call with author, March 4, 2013.
[65] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 26.
[66] Stephanie White, phone call with the author, March 27, 2013; *see also* Courtney Maloof Gallaher, phone call with author, April 10, 2013.
[67] Charcoal dust is a byproduct of charcoal, which is a common fuel source.
[68] Rosemary Nyaole-Kowuor, "Sack Farming: Unlimited Vegetable Harvest!," Farm Radio International, April 1, 2010, radio broadcast transcript, ed. Takawira Mubvami, http://www.farmradio.org/radio-resource-packs/package-90/sack-farming-unlimited-vegetable-harvest.
[69] Based on consensus, sack farming's water usage is more efficient relative to conventional farming irrigation techniques. This is because sack farming is practiced on a smaller scale, which allows for targeted irrigation. Additionally, sack farming's stone spines allow water to efficiently reach seedlings.
[70] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 131.
[71] Courtney Maloof Gallaher, "Livelihoods, Food Security, and Environmental Risk: Sack Gardening in the Kibera Slums of Nairobi, Kenya" (PhD diss., Michigan State University, 2012), 36, 55-56. These sources often can contain impurities and heavy metals that could be harmful to sack farmers through bioaccumulation. Though it is better to have a soil source that is deemed safe, most sack farmers prefer to assume this risk. However, it is important to note that all sack farmers are not necessarily aware of this risk.
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[73] Natural fertilizers include kitchen waste, organic material, intercropping, and crusted wild sunflower. Natural pest controls include garlic, glack jack, pepper powder, local pungent plants for bio-pesticide, and crushed Mexican marigolds guards against fungal diseases and nematodes.
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