Ally Babcock
Gilbert High School
Gilbert, Iowa
Zambia, Factor 6: Sustainable Agriculture

Integrating Soil Conservation for Zambia's Agricultural Sustainability

Located in south central Africa, Zambia is landlocked by Malawi, Mozambique, Zimbabwe, Botswana, Namibia, Angola, Democratic Republic of Congo, and Tanzania. Zambia is a nation with a current population of 16.2 million, a number predicted to grow to 25.3 million by 2030 ("Population Pyramids¨). Malnourishment is a major food security concern, currently affecting 35 percent of the country's population ("Hunger Map"). As the population grows, the people of Zambia will face a serious crisis.

Historically, Zambia has not focused on developing its local food production or agriculture. International demand for Zambian goods has primarily been for non-agricultural products, such as copper and ivory (Deininger and Olinto 3). In 1889, powerful mining interests convinced the British government to charter much of Africa to the British South Africa Company. When Britain became entangled in World War I, Zambia needed to produce more food, but its agricultural practices were inadequate. With much of the working male population at war, women became responsible for farming. Men were not available to clear trees for new ground, despite the tillable land being overworked by continuous planting. After the war, many Africans struggled with the pressures of a demanding copper economy ("Zambia"). Both Africans and white settlers provided food to the area known as the "copper belt." At the same time, the natives worked less desirable land. As years went by, Zambians constantly grappled with the foreign European government and international decision making. As a result, in 1958, Kenneth Kaunda led a movement for Zambian independence, and the British government voted in favor of it the next year. The newly established Republic of Zambia named Kaunda executive president.

At that time, a government-focused economy controlled much of the agricultural sector. When oil prices and inflation soared in 1975, the Zambian economy plummeted. The president made many attempts to shift the nation's economy from a reliance on mining to one more agriculturally focused. Most attempts at providing agriculture education were unsuccessful as a result of wasted international resources and corrupt policies ("Living Conditions Monitoring"). When Frederick Chiluba and the Movement for Multiparty Democracy took control of the government, new economic policies concerning trade were implemented ("Zambia"). According to Deininger and Olinto, the new economy shifted to a "more market-based and liberal economic paradigm" (1). The democratic economy subsidized maize to encourage crop production until the incentive was discontinued in 2013 due to rising national debt. This subsidy may have directly aided making maize more readily available; however, it also birthed the mono-cropping and over-plowing practices present today (Bhalla). These practices have contributed to low soil quality and erosion, which result in greatly reduced yields. Teaching soil conservation techniques will increase yields and provide superior food quality for the people of Zambia (Buffett 4).

Family is valued highly in Zambian culture ("Culture of Zambia"). Households are often very large, with the average family size of seven. The majority of homes have a male as the head; only 21.5 percent of households are headed by a female (Helmore). Due to large families and working parents, siblings are typically needed to care for infants and young children. Five and six-year-old children are routinely found caring for an infant while the parents work. Family structure is often highly dependent on extended family members. If a family is in need or crops are poor, extended family members are expected to aid their relatives ("Culture of Zambia").

In rural areas, most families grown their own food. Nshima, mashed maize cooked in boiling water with a texture similar to mashed potatoes, is a staple in every meal ("Culture of Zambia"). Nshima is served with

a relish typically consisting of goat, fish or chicken, and a vegetable. When meat is unavailable, the meal is served with beans. Common vegetables grown in Zambia include: tomatoes, onions, cabbage, and rape, a type of collard green ("Culture of Zambia"). Vegetables are scarce on many tables due to poverty and dependence on maize in rural areas. Groundnuts and chickpeas are a critical source of protein for families with minimal income (Kinzenbaw).

Education in Zambia is crucial to ending the nation's long cycle of poverty in the nation. The education system is split in three steps: primary, secondary, and undergraduate. Primary school consists of seven years of education and is an important factor in the continuation of learning. More than 250,000 children are never enrolled in primary school and 47 percent of those enrolled never complete all seven years ("Education"). According to UNICEF, secondary school participation involved 36.9 percent of children in the appropriate age group. Very few Zambian children complete secondary school and even fewer are able to attend undergraduate programs. Despite education being a human right around the globe, Zambian children are often denied it because they are needed at home to provide food and contribute to family income.

Healthcare in rural areas of Zambia is hard to reach and often lacks supplies. A free health care policy was implemented by the Zambian government in the late 1970s to make medical provision more affordable. While lowering costs, the policy did not solve the issue of access to clinics and hospitals ("Poverty"). Doctors or clinics are not accessible to people living in rural Zambia; the ratio of doctors to Zambians is a staggering 1:23,000 (Bohn). Such a low doctor to patient ratio makes it extremely difficult to receive proper medical care when and where it is needed.

Agriculture is Zambia's largest and most important work sector, employing 66 percent of the population. Most farms are very small-scale with the average farm size in Zambia as 3.27 hectares--equal to just over eight acres. Despite this national average, a majority of the Zambian population farms 2.5 hectares or fewer (Tembo and Sitko). Zambia is highly dependent on its agricultural sector and small-scale farm family members contribute to 53 percent of the entire population (Tembo and Sitko). Almost all small-scale farms produce a single crop, maize, a food staple in Zambia. Other crops, such as cassava and groundnuts, are less widely cultivated but still serve as Zambian staples. The people of Zambia raise similar livestock to those in the United States; cattle, goats, sheep, and chickens are among the most common species. In contrast to the United States, livestock are raised free-range and rarely kept in pens.

For the people of Zambia, many factors not considered in the U.S. are barriers to their agricultural productivity. As a result, only 13 percent of Zambia's gross domestic product comes from agriculture (Tembo and Sitko 3). A past filled with poor conservation and overworking the soil laid the foundation for agriculture in Zambia today. While farmers may recognize the need for change, if food is at risk they may not be willing to implement new farming methods. Pests are a constant struggle as termites ravage crops every year (Kinzenbaw). Many methods of tilling, burning chaff, and fertilization have been used for centuries but contribute to poor soil quality and low yields (Buffett 1). A major problem concerning agricultural productivity is the needs of farmers. When barely enough crops are grown to eat for a year, it is difficult to sell product and make a profit for other needs.

Unemployment is also very high in urban areas, while in the rural population, 80 percent of Zambians are living in poverty (Tembo and Sitko 2). Despite growth in the economy, living conditions have yet to improve for the average person. A low manufacturing base, lack of diversification, and failure to invest in highly employable sectors are contributing factors to the employment struggle facing Zambians (Shamenda 4). When income is hindered due to employment difficulties, families cannot access proper nutrition.

Sustainable agriculture directly provides income for nearly half the Zambian population and is important in feeding the entire nation. In order for families to produce the food they need, it is vital to implement sustainable cropping methods. Families are at risk of starvation if crops fail in the monocropping system; in addition, the monocropping of maize constantly removes nutrients from the soil. The Zambian soil is overworked and lacks nutrients in many areas. Soil conditions affect plant growth, yield, crop quality, and the cost of producing crops (Buffett 1). When yields are low, families have less food to eat and even less to sell for income.

An average Zambian family, living in poverty conditions, requires (15)-50 kilogram bags of nshima to eat for a year, the yield for one poorly producing hectare of maize (Kinzenbaw). Lower yields due to monocropping or crop failure mean a family is left with much less maize to use for nshima. Excess maize is typically sold for income to provide for other needs. If crops do not grow well, a family not only does not have income, but also has barely enough to eat. If farmers were to diversify their crops, a family would not be as dependent on a single food source (Buffett 1).

As the population in Zambia grows, more families will be dependent on farms for nutrition. The Indaba Agricultural Policy Research Institute (IAPRI) recognizes the challenge Zambian agriculture faces. Crop yields are generally low and far below global averages; however, 10 percent of top smallholder producers in Zambia have been able to grow four tons more than the global average (Tembo and Sitko 2). Sustainable agriculture in Zambia has hope, if proper techniques are implemented yields can compete with that of established nations.

Current trends in Zambian agriculture will lead to the continuous lack of production in smallholder farms. While international agencies are working hard to improve the situation, it requires the support of the Zambian government. Until recently, monocropping of maize was promoted with subsidies. Government policy has treated agriculture with the idea that if more is grown there will be more profit (Buffett 3). This is not in the best interest of farmers. More than 45 percent of farmers do not use fertilizer on fields and 40 percent do not use hybrid seeds (Tembo and Sitko). While growing more crops may seem to contribute directly to eliminating hunger, it does not address long-standing issues.

For conditions to change in Zambia, farmers need to implement new techniques in the field of agriculture, which will lead to higher yields, more food, economic growth, and better living conditions. If agriculture were to grow as an industry, more families could make a living from growing quality crops. Proper nutrition directly impacts every aspect of an individual's life. The Zambian economy would also benefit by taking advantage of the nation's bountiful natural resources. Land is plentiful and fertile if cared for properly.

Many factors, beside the desire to improve land, will affect agricultural sustainability in Zambia. Cultural and economic components contribute to current farming methods. For years, a single way of farming has been practiced. Burning chaff in fields is viewed as a community event; however, this results in more effort from farmers to plant crops without tillage and it is more work to remove weeds (Buffett 2). Fertilization with manure is considered dirty and beneath the average person, and since cattle are not penned, the animals remove a majority of beneficial organic matter in fields as they roam (Kinzenbaw). Transitioning to conservation agriculture requires extra input from the farmer and a change in thinking for farmers and citizens alike. Changes will not happen unless the government and other organizations encourage the benefits of maintaining land quality.

Typical farming practices in Zambia can only be changed if issues of sustainable cropping are addressed at the local level. The typical farming family in Zambia can create change by implementing conservation practices which will alter the way they work the soil and care for crops. A conservation based initiative states, "Smallholder farmers who adopt integrated conservation practices can realize a higher return on

investment in terms of labor savings, net income and improved soil quality" ("Ten Facts About Conservation Agriculture and Smallholder Farmers"). First, the matter of monocropping should be considered, as 47 percent of farms in Zambia harvest one or two crops, maize and cassava. Diversification will allow for protection when a single crop fails (Tembo and Sitko 27). A secondary benefit of diversification is the improvement of the Zambian diet; while maize is used as a food staple, it provides only carbohydrates, adding groundnuts and legumes provides critical dietary protein ("Agriculture"). The soil would also benefit as nitrogen-fixing legumes enhance soil quality (Buffett 27).

A second change farmers could make is implementing no-till fields. According to an article evaluating tillage in the United States, "Reduced tillage has two powerful soil benefits. It leaves residue on the soil surface for cover, and it keeps the soil structure" (Goerge). Maintaining soil quality is particularly important in areas that lack nutrient rich topsoil. Farmers in Zambia struggling with the loss of valuable soil and organic matter would benefit from this most. Utilizing livestock manure fertilization would add to the soil and is an option for families that have access to what would typically be considered an unimportant animal waste product. Even if a family does not raise livestock it can conserve organic matter through maintaining chaff on fields. Rather than burning plant matter, chaff can be used to contribute to soil quality while also preventing water run-off (Kinzenbaw).

A variety of organizations are working locally in Zambia to increasingly promote sustainable agriculture through both large- and small-scale projects. USAID is currently working to implement projects through the Feed the Future initiative. This program supports activities and pursuits focused on promoting conservation agriculture while improving the use of inputs such as fertilizers, equipment, and education ("Agriculture and Food Security"). Feed the Future collaborates with the Comprehensive Africa Agriculture Development Programme (CAADP) in Zambia. The CAADP works to facilitate the National Agriculture Policy set out by the Zambian Ministry of Agriculture. The state policy highlights many areas of conservation agriculture that will benefit farmers across the nation. However, due to the amount of very rural farming communities, large projects often struggle to have a direct impact on farmers. AgriHope, a much smaller project, works individually with farmers and invests in communities by teaching the importance of three main concepts: little soil disturbance, incorporation of organic residues, and biodiversity of species ("Agriculture"). This approach values crop management and taking advantage of natural resources. The organization's mission states, "that it is within the power of each person we serve to play a part in bringing Africa out of the ashes of poverty." Such a personal approach is most effective because it addresses issues at their core.

Addressing the matter of agricultural sustainability requires active involvement from governments, communities, and organizations. The Zambian government should support recent policies by enacting items that encourage quality of production more than quantity of production. Subsidizing inputs, rather than seeds, encourages better practices (Lal and Stewart 7). Organizations should focus locally rather than in large areas where plans are difficult for farmers to implement on their own. Working directly with Zambia's small-scale producers ensures processes are adequately explained. Communities have the role of encouraging conservation agriculture. Change takes time and is not often easy, but members of a community should make a genuine effort to find a solution to poverty through their crops.

Conservation agriculture is relatively simple to implement, yet it requires patience and hard work over time. In a statement from the Brown Revolution it was pointed out, "Smallholder farmers themselves must participate as partners in the research, development and demonstration efforts to advance conservation agriculture adoption" ("Ten Facts About Conservation Agriculture and Smallholder Farmers"). Local farmers can choose not to plow soil and to leave behind organic matter. These measures require no extra effort and can greatly affect soil quality. Naturally unplowed fields will contain more weeds but weed control is a small price to pay for better soil quality. "Reduced tillage has two powerful soil benefits. It leaves residue on the soil surface for cover, and it keeps the soil structure" (Goerge).

Fertilizer can be implemented by educating farmers on the benefits of increased field inputs. As fields gain nutrients and maintain organic matter, they will produce higher yielding crops.

Producing quality crops is vital to feeding a nation. Fields without viable nutrients and good soil cannot support a growing nation. George Monbiot bluntly states, “War and pestilence might kill large numbers of people, but in most cases the population recovers. But lose the soil and everything goes with it.” Conservation agriculture introduces the methods of cropping necessary to sustaining individual farmers and Zambia at large. Preserving soil through crop rotation and soil protection is the best way to ensure positive crop growth conditions. As organizations and farmers work together to improve productivity, agriculture in Zambia will have the potential to thrive. As Mickey Kinzenbaw of AgriHope noted, “The consensus is that this is the foundation that Africa will be fed on.” Zambia will only be capable of addressing food security issues if it addresses the land on which food is grown.

Works Cited

“Agriculture and Food Security.” USAID. 23 November. 2015. Web. 22 March. 2016. <https://www.usaid.gov/>

“Agriculture: Fighting Hunger at it’s Roots.” AgriHope. Web. 21 March. 2016. <http://www.agrihope.org/> (“Agriculture”)

Bhalla, Jonathan. “Maize dependency and agricultural subsidies in Zambia: In conversation with Rhoda Mofya-Mukuka.” Africa Research Institute. 11 July. 2013. Web. 15 March. 2016. <http://www.africaresearchinstitute.org/>

Bohn, Lauren. “How Zambia survives on one doctor for every 23,000 people.” Lusaka Voice. 28 June. 2014. Web. 17 March. 2016. <http://lusakavoice.com/>

Buffett, Howard G. “A Discussion about Small-scale Agriculture.” Brown Revolution. The Howard G. Buffett Foundation. Web. 17 March. 2016..

“Culture of Zambia.” Countries and their Cultures. Advameg Inc. 2016. Web. 10 March. 2016. <http://www.everyculture.com/>

Deininger, Klaus, and Olinto, Pedro. “Why Liberalization Alone Has Not Improved Agricultural Productivity in Zambia.” The World Bank. 2000. Print. 10 March. 2016.

“Education.” UNICEF Zambia. 2011. Web. 16 March. 2016. <http://www.unicef.org/>

Goerge, Dee. “Keep Your Topsoil.” AGRICULTURE.COM. 28 January. 2015. Web. 22 March. 2016 <http://www.agriculture.com/>

Helmore, Kristin. “Reaching Out to Women in Rural Zambia.” United Nations Population Fund. 18 September. 2012. Web. 15 March. 2016. <http://www.unfpa.org/>

“Hunger Map 2015.” World Food Programme. 2015. Web. 15 March. 2016. <http://www.wfp.org/> (“Hunger Map”)

Kinzenbaw, Mickey. Personal Interview. 16 March. 2016

Lal, Rattan and Stewart, B.A. “Soil Management of Smallholder Agriculture.” CRC Press. 2010. Print. 21 March. 2016.

¨Living Conditions Monitoring Survey Report.” Zamstats. 2010. Central Statistical Office. Web. 4 March. 2016. <www.zamstats.gov.zm/> (“Living Conditions Monitoring”)

Monbiot, George. “We’re treating soil like dirt. It’s a fatal mistake.” Brown Revolution. The Howard G. Buffett Foundation. Web. 29 July. 2016

“National Agriculture Policy.” MINISTRY OF AGRICULTURE AND CO-OPERATIVES. Republic of Zambia. October. 2004. Print. 22 March. 2016

¨Population Pyramids of the World from 1950 to 2100.” Population Pyramid. Web. 4 March. 2016. <https://populationpyramid.net/> (“Population Pyramids”)

“Poverty & Healthcare.” Our Africa. SOS Children’s Villages. Web. 17 March. 2016. <http://www.our-africa.org/> (“Poverty”)

Shamenda, Hon Fackson.“Employment Creation Policies and Strategies in Zambia, Prospects, Challenges and Future Outlook.” International Monetary Fund. 21 May. 2012. Web. 19 March. 2016. <www.imf.org/>

Tembo, Solomon and Sitko, Nicholas. “Technical Compendium: Descriptive Agricultural Statistics and Analysis for Zambia.” Indaba Agricultural Policy Research Institute. August. 2013. Web. 16 March. 2016. <http://ageconsearch.umn.edu/>

“Ten Facts About Conservation Agriculture and Smallholder Farmers”. Brown Revolution. The Howard G. Buffett Foundation. Web. 29 July. 2016.

"Zambia". Encyclopædia Britannica. Encyclopædia Britannica Online.Encyclopædia Britannica Inc. 2016. Web. 5 Mar. 2016. <http://www.britannica.com/place/Zambia>