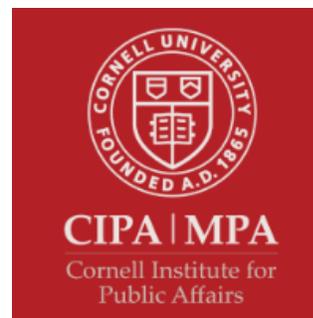


Phase III

Connecting Communities through Reintegration: Agricultural Vocational Opportunities in Lira, Uganda

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Executive Summary

During the Spring semester of 2017, the Cornell Institute of Public Affairs (CIPA) capstone team - Clifford Chen, Katharine Reeves, and Yasuyuki Tezuka - continued the research of previous capstone teams aimed at creating a reintegration program for former child soldiers (FCS) in Lira, Uganda. Partnering with the Global Livingston Institute (GLI), the capstone team's key tasks included compiling earlier reports to draft an article for publication, drafting a business plan for the creation and implementation of vocational programs for FCS in Lira, Uganda, and brainstorming plans for future consultation with GLI this summer and beyond. Based on the recommendations of the Fall 2016 capstone team and local stakeholders, these plans will focus on agricultural development and reflect the structure of community-based farmer groups in other regions of the world. The team's work ultimately aimed to reflect GLI's philosophy of listening and thinking before acting; research was guided by the work of former capstone teams on the needs of FCS and conducted under the premise that community input will be needed prior to implementation.

The CIPA capstone team reviewed reports from Phases I and II of the GLI-Cornell partnership containing results from 37 interviews with FCS in Lira and recommendations about possible vocational, educational and mental health programs to assist reintegration. The team also reviewed additional literature concerning a range of topics related to this project including case studies of vocational programs and challenges associated with the reintegration of FCS. In terms of primary research, the team conducted interviews with various stakeholders and subject matter experts from Uganda and at Cornell University. From these sources, the team determined that an agricultural program could help satisfy the needs of FCS in the region and other members of the Lira community. This conclusion was based on the potential for growth in the agricultural sector and the financial and food security benefits such growth could provide.

While developing a business plan for this model, the team discovered several factors that GLI and future capstone teams would need to take into account when creating this program. These factors include: (1) infrastructure development, (2) climate change concerns, and (3) case studies of existing community farmer groups.

Infrastructure: Academic literature reflects a significant correlation between agricultural performance and supply chain constraints such as transport, information technology, and storage capacity. This issue should be addressed by attracting more investment and increasing public spending to upgrade infrastructure. Connection between urban areas and rural communities is another key issue. Independently, urban development has little spillover effect on rural populations when there are not sufficient channels to connect people, goods, and information. Even if production levels were to rise dramatically, the result would likely be increased

production and decreased prices without expanding markets to rural areas. Thus, the integrated development of urban and rural areas is fundamental. Furthermore, provision of electricity is a major challenge for the modernization of agriculture. Use of new technologies including powered machines and equipment requires electricity, but not enough power is generated in the northern Uganda. Fortunately, Uganda has an advantageous geographical location, where lakes and rivers provide ample sources for hydroelectric power. Although the current Ugandan government plans to make infrastructure development its economic priority, it is difficult to be overly optimistic. It is imperative that local residents influence policy formulation collectively to support infrastructure as a policy priority. At the same time, communities should continue working toward innovative and efficient farming on their own.

Climate Change: Over the past several years, climate change has created less predictable growing seasons in sub-Saharan Africa. This has resulted in a decrease of farmable land and consistent water sources. As such, it is important to ensure that farms in the Lira region have a reliable irrigation system. Additionally, it may be prudent to keep climate change in mind while developing content for the agricultural vocational training program; for example, the program could teach FCS and community members about alternative crop varieties and irrigation methods for warmer temperatures or less rainfall. It could also include best practices for how to access and analyze weather information so farmers can take that into account when planning planting, growing, and harvesting seasons.

Case Studies: Community Markets for Conservation (COMACO) was launched in 2003 in Zambia's Luangwa Valley as a way to improve farmers' livelihoods, production outcomes, and conservation practices. In this model, participating farmers are organized into producer groups led by extension officers and lead farmers. Local depots facilitate the transportation of produce and profits between producer groups and regional trading centers. Farmers are required to abide by wildlife and watershed conservation practices in order to remain in producer groups, and survey research has suggested that members have experienced increased incomes, food security, and security against climate extremes. The community farming model in this case study was used to form the basis of a similar business plan in Lira, Uganda. Membership requirements for farmers in Lira could be tied to water conservation and irrigation practices. Additionally, a benefits system resembling that of the Kilimanjaro Native Co-operative Union (KNCU) could include a health plan and educational scholarship funds for members and vocational program trainees.

In order for the GLI-Cornell partnership to produce a relevant agricultural training program that also helps foster the reintegration of FCS into the community, the capstone team suggests that GLI adopt the following recommendations:

- Implement a community-based farmer group model that accomplishes the following:
 - provides agricultural vocational training to FCS and other community members;

consolidates management of produce and financial resources; promotes practices related to water conservation, irrigation, and soil rehabilitation; and partners with existing local NGOs such as Rachele Rehabilitation Center, Children of Peace Uganda, and others to offer health and educational benefits that promote the community's well-being.

- Integrate climate change trends into any future planning for agricultural work in the Lira region. Data from recent years demonstrates that weather and climate patterns are shifting in Uganda. The lack of assured water sources and rising temperatures could have devastating effects on farming in the region, and as such, the vocational training program in agriculture should address the importance of crop diversification and intercropping, lessons in developing irrigation systems, and lessons in accessing and reading weather reports to predict impacts on crops.
- Adopt a biological approach to regenerate fertility in farmland in the region. The System of Crop Intensification (SCI) has been proven to be successful in fertilizing low nutrient soil. GLI's vocational program should incorporate this principle into its framework. The vocational program should seek to understand local farmland dynamics, analyze and apply recommended methods region wide, and share information.
- Establish a medium of communication between local people and local and national governments to communicate their interests to infrastructure policymakers in a collective manner. Forming farmer groups would be an ideal first step for this purpose because it could mobilize community members towards a shared goal and exercise influence on decision makers in government.
- Included in the appendix of this report is a set of potential focus group questions to test the feasibility of a community-based farmer group model in Lira. These questions are directed at different stakeholder groups, including community members, community leaders, and organizations (nonprofit, private, etc.) in the region.

The amalgamation of this approach will allow GLI to create a program that addresses numerous factors crucial to FCS reintegration efforts. A vocational training program that includes all of the abovementioned factors will ideally provide FCS in Lira access to agricultural training and promote sustainable farming practices in the region.

Introduction

The purpose of this report is to prepare an initiative of the Global Livingston Institute (GLI) to improve the socio-economic conditions of former child soldiers (FCS) in northern Uganda. Continuing the work of two previous student consultant teams from the Cornell Institute for Public Affairs, Phase III included primary and secondary research on challenges and recommendations for an agricultural vocational training program, which was recommended by the Phase II team.

The first team's interviews with FCS in Lira, Uganda informed GLI of the need for a program to help FCS develop professional skills and obtain employment. The second team further analyzed challenges for FCS from the perspectives of agricultural opportunities, mental health care, and education barriers. This group concluded that community-based agricultural skills training was necessary to address these issues. From February to May 2017, the Phase III CIPA team studied concerns about the agricultural sector in the region such as climate change and lack of infrastructure and also looked into model cases of farmer groups in developing countries, which can be applied to Uganda. Following this period of research, another team is scheduled to visit Uganda with GLI to investigate the perceptions of community leaders, business leaders, farmers, NGOs, and other private actors with regards to the reintegration of FCS.

Project Goals and Objectives

During spring 2017, the CIPA capstone team focused its research efforts on developing a business plan for an agriculture-based vocational training program for the FCS population. The team examined possible barriers to creating such a program in Lira, Uganda and also conducted case studies of existing community farming programs. Data collection consisted of interviews with GLI representatives, potential partner organizations, and academics with knowledge of farming in rural East Africa.

Our key tasks included:

- Analyze previous reports and interviews from Phase I and Phase II to develop a research strategy based on previous findings.
- Research aspects of agricultural vocational programs that could be implemented in Lira, Uganda.
- Research and develop a literature review on possible barriers to the implementation and success of such a program and develop recommendations to address and overcome these barriers.
- Draft a business plan outlining the potential agricultural vocational training program.

Literature Review

In 1987, the Lord's Resistance Army (LRA) emerged in Uganda as a Christian extremist insurgency group aiming to fight against the marginalization of the Acholi people and establish a theocracy (United Nations, 2012). Led by Joseph Kony, the rebel group expanded their operations over the next several decades into southern Sudan, the Democratic Republic of Congo, the Central African Republic, and Chad. As of 2004, the LRA was responsible for killing over 100,000, displacing over 1.6 million, and kidnapping upwards of 30,000 children to serve as child soldiers (Ross, 2004, October 25; United Nations, n.d.).¹ While the LRA has not been operational in Uganda since peace talks with the Ugandan government took place in 2006, the group remains active on a smaller scale in the Democratic Republic of Congo and the Central African Republic (United Nations, 2012).

In the wake of the LRA's departure from Uganda, the country faced a key humanitarian issue; thousands of child soldiers and abductees were left behind to struggle with reintegration into their respective communities. Many of these children emerged from their war experiences with physical and mental health disorders, serious deficiencies in education, and a lack of vocational skills required for financial self-sufficiency (Pham, Vinck, & Stover, 2009; Kawaura et al., 2016; Willis & Nagel, 2015). Although there are numerous international development organizations in the region providing education and health services, the Cornell Institute for Public Affairs (CIPA) team's review of literature suggests that existing services, while in many ways beneficial, fall short of achieving full reintegration of former child soldiers (FCS).

A growing body of literature has begun to raise questions about the effectiveness of FCS reintegration efforts, suggesting that it is insufficient to focus solely on psychological trauma. Rather, setbacks to FCS' educational and economic livelihoods are arguably even more detrimental to their attempts at reintegration (Blattman & Annan, 2008). A study jointly funded by the European Union and the government of Uganda cites a large demand for vocational training as a means for both learning and reintegration. The study suggests that vocational programs should seek to work with businesses and strive to adopt a sustainable approach to employment, which would entail skills training, provision of tools, and follow-up mechanisms. Proper implementation of such programs would not only be a response to the self-sufficiency challenges confronting FCS, but could also "contribute enormously to community healing and cohesiveness to outshine the social divides resulting from the war" (GUSCO, 2010, p. 3).

In 2016, the Global Livingston Institute, in collaboration with a CIPA capstone team, conducted interviews with FCS residing in Lira, Uganda, and crafted recommendations based on the needs and challenges they reported. This research presents a unique opportunity to formulate

¹ Note: This is an estimate - the number of abducted children and the number of children forced to serve the LRA as child soldiers vary from source to source.

reintegration efforts in the region based on recent findings.

The information in this literature review supports and expands on GLI's body of research regarding factors to consider when formulating a reintegration program for FCS. Within this document, the CIPA capstone team examines (1) reports produced by former CIPA capstone teams during previous phases of this project, and (2) the general body of research regarding challenges associated with reintegrating FCS. Previous reports were used as resources to summarize research from earlier phases of the GLI-CIPA partnership. Findings from these reports shed light on significant professional, mental health, and educational barriers to FCS reintegration and seek possible solutions and approaches to remedy them. For additional sources, the team selected literature from reputable academic journals, publishers, and government entities that addressed the plights of child soldiers and the reintegration process.

Summary of Previous Reports

This is Phase III of the GLI-Cornell partnership; previously two other Cornell Capstone groups have collaborated with the Global Livingston Institute. Over the previous two phases of the project, teams have worked to gather information regarding the current life situations of Former Child Soldiers in Uganda through interviews and secondary data collection.

Phase I:

As part of the first phase, Cornell University students traveled to Lira, Uganda and interviewed 37 former child soldiers; these interviews were then compiled into a data set for content analysis and a report that Phase II and III teams have used to guide their research into possible reintegration plans.

The first phase of the project focused on understanding the lives of former child soldiers in Uganda, through secondary research as well as the 37 interviews conducted by CIPA capstone students with GLI and researchers from Makerere University in January 2016. The interviews helped to develop a picture of the current daily lives of former child soldiers in Lira, including educational history and opportunities to date, employment or livelihood history and current activity, family and household characteristics, and plans for the future. This report uses the following definition of *child soldiers*: "a child soldier is any person under the age of 18 who engages in any kind of armed group, be it on a regular or irregular basis" (UNICEF, n.d.). It is important to note that the term does not necessarily imply combatant status. Though this was often the case for boys abducted by the LRA, the term also encompasses nonviolent abductees, particularly young girls who were forced into sexual slavery. The report then moves on to describe the armed group that recruited the child soldiers and the lasting effect this group has on former child soldiers today.

Civil war began in Uganda in 1986 when President Museveni took control of the Ugandan Government. In response to this shift in power, the *Lord's Resistance Army (LRA)* led by Joseph Kony began to kidnap young children to participate in a rebel army. Over a period of 20 years, an estimated 60,000 to 80,000 children were abducted and between 25,000 and 60,000 of these children were forced to participate in the war efforts (Kawaura et al., 2016).² During their term under the rule of the LRA, the child soldiers were forced to torture, rape, enslave and kill other civilians. Many of the child soldiers went long periods of time with limited food and water (Kawaura et al., 2016). The Phase I report discusses the traumatic physical, emotional, and sexual abuse of the child soldiers forced to participate in the Civil War. Participation in Kony's army left the former child soldiers with *mental health disorders* and lack of educational and job opportunities when they returned home (Kawaura et al., 2016).

The lack of opportunities to reintegrate into society, when combined with a lack of health services to combat PTSD, has left many of the former child soldiers ostracized and isolated from their communities. Without structured reintegration programs in post-conflict areas, many of the former child soldiers have little support in their new lives. The Global Livingston Institute is looking to fill this gap in support services by creating vocational programs that would provide training for future job opportunities.

In order to help establish effective, long-lasting reintegration programs, the Phase I team interviewed 37 former child soldiers between the age of 17 and 34; the participants were selected through a snowball sampling approach, i.e. a few former child soldiers were contacted, and then these participants spread the word to other former child soldiers. The interviews, or verbal surveys, were conducted by two Cornell Students and two students from Makerere University with the assistance of two interpreters (Kawaura et al., 2016).

The participants included 27 males and 10 females with a mean age of 23 years old. The majority of these former child soldiers had less than 11 full years of education, with the average being approximately 9 years. Half of the participants are not working or are in school; the other half is working in agriculture, the service industry or as a skilled worker. The large majority of participants (97.22%) live with other people; about one-third are living with their parents (Kawaura et al., 2016).

All 37 FCS stated that they desired additional job training in order to better prepare them to reintegrate into the community workforce. While the particular types of training varied greatly, there were several common themes; seven FCS stated interest in mechanical skills training, six in

² Note: This is an estimate - the number of abducted children and the number of children forced to serve the LRA as child soldiers vary from source to source.

tailoring and sewing skills training, five in agriculture skills training, four in engineering skills training, and four in general business skills training (Kawaura et al., 2016).

In regards to life stability, many of the FCS do not have adequate support systems. Of the 37 interviewees, only 2 stated that they had someone to give them food or money if they needed it. 12 FCS stated that they sometimes had support from family or peers and 13 FCS stated they did not have anybody that could offer such help. This demonstrates that the FCS were often isolated or on their own. Without full-time work and sufficient skills, it is difficult for the FCS to support themselves.

Based on the results of these interviews, Phase I concluded that there was a need for social, educational and vocational programs to aid the reintegration of former child soldiers into their communities (Kawaura et al., 2016).

Phase II:

Phase II of the GLI-Cornell partnership began in Fall 2016. This phase of the project focused on developing strategies to aid the reintegration of former child soldiers in Lira, Uganda. In order to determine what strategies would best support the former child soldiers, the Phase II team researched the socioeconomics of the Lira region and interviewed key stakeholders including GLI CEO Jamie Van Leeuwen and GLI research coordinator and Makerere University graduate student Jerry Amany.

The Phase II team then conducted a literature review that focused on three areas: mental health, vocational programs and agricultural opportunities. These three areas were highlighted as the most important themes in the 37 interviews.

In order to conduct research on the three aforementioned topics, the Phase II team used a mixture of qualitative and quantitative data and the 37 interviews from Phase I of the project.

Mental health data was gathered from various international organizations and NGOs. This data showed that very limited government resources were being spent on mental health. A range of reintegration and rehabilitation centers exist for FCS throughout Uganda, however, these programs are not equipped to deal with individualized needs and instead treat all FCS the same. This leaves many FCS without appropriate individualized services. For several years, the Rachele Rehabilitation Centre was the main organization that provided mental rehabilitation services in Lira. In addition to providing health services, Rachele provided basic education classes, vocational training programs and religious services (Kim, Song, Toregeldin, & Veglucci, 2016).

The Phase II team conducted research on the need for and requirements of vocational programs

for former child soldiers in the Lira region. Vocational training was one of the main needs listed by the 37 FCS interviewed during Phase I; the FCS are less able to obtain or retain job opportunities due to the stigma associated with their forced participation in the LRA. GLI is looking to create vocational programs that would provide FCS with marketable skills so they can be more desirable workers (Kawaura et al., 2016).

There are already several vocational training programs established in Uganda; the Phase II team used the the Business, Technical and Vocational Education and Training (BTVET) database to examine these existing programs. The BTVET-database was developed by the Ugandan Ministry of Education and Sport to track the different educational options throughout the country. As of 2016, this database listed that there were 75 vocational training institutes of which 20 were public and 55 were private (Kim et al., 2016).

The Phase II team divided the programs into three tiers depending on program level and application requirements:

- Tier-1 group (15 programs) requires participants have a college level education. Those institutions have specialties in advanced skills education e.g. electricity, programming, medical education.
- Tier-2 (48 programs) includes general level (junior or early craft) skill training programs that just require a basic course of education for those who can be supported by their family through the training process.
- Tier-3 (12 programs) institutions target other social vulnerable classes e.g. former child soldiers, orphans, disabled children, and young girls from very poor socioeconomic background especially school dropouts” (Kim, et al., 2016).

Of the 75 programs, there are four in the Lira region and only two of these target former child soldiers (Ave Maria Voc Training & Youth Development Centre and Children of Peace, Uganda) (Kim, et al., 2016).

In terms of agricultural opportunities in the Lira region, the Phase II team reported that the 2.2 million farms in Uganda are usually small, family-based and self-sufficient operations (Kim et al., 2016).

The Phase II team findings focused on matching FCS needs to current conditions and future possibilities in the Lira region. These findings were summarized in the form of several different Strength, Weakness, Opportunities, Threats (SWOT) Analyses.

Other Secondary Research

The reintegration process requires FCS to abandon their lives as combatants and return to civilian life by changing their mindsets, behaviors, roles, and identities in society. This substantial personal and societal transition cannot be achieved successfully without the combined efforts of individual FCS and community members (Wessells, 2006). Even though mutual understanding and cooperation are necessary, FCS face numerous challenges during their return to local communities and need considerable help. Building upon past findings and recommendations, the following secondary research highlights major difficulties emerging in the reintegration process - namely professional, mental health, and educational barriers - and clarifies what is needed alongside a vocational program to cope with these issues.

Professional Reintegration

One of the top priorities for a FCS in the process of reintegration is to be a full-fledged adult who can earn a living on his/her own. It is pointed out that former child soldiers are expected to take some responsibility to reintegrate themselves into society and survive on their own, especially in regions where war and poverty prevail and social safety nets are not established (Johannessen & Holgersen, 2014). In other words, unless they are ready to work and contribute to their communities, the locality will not credit them with full membership. Suggestions from previous CIPA capstone teams align with this assumption, because initiating a community-based vocational program to provide FCS with agricultural skills would assist them in becoming self-sufficient. This section aims to further examine that idea by studying specific examples and practices and draw lessons which can be applied to GLI's initiative so that FCS can smoothly and seamlessly join the vocational program and start new lives.

KadAfrica—Uganda

The Kadurus couple, the founders of this program, found it significantly difficult to make a good living with farming in Uganda due to various problems such as insufficient infrastructure and little expertise of modern farming. Despite such hardship, Kadurus recognized passion fruit as a high potential investment product as its demand had been rapidly growing in the country, yet the supply had largely relied on imports. Modern agricultural techniques were incorporated so that their farm could produce passion fruit year-round. With the help of financing, they established a commercial farm named KadAfrica in 2011. They sought to build relationships with other small farmers and commercial buyers in the region. Thanks to all of those factors, this effort bore fruit.

Having heard about their great success, Uganda's Catholic Relief Services offered large tracts for farming on the condition that KadAfrica assisted employment of local young women ages 14 to 20. Given this opportunity, KadAfrica embarked on a new initiative called Girls Agro Investment (GAIN). The Kadurus and their employees began providing local girls with agricultural knowledge, lending land, and helping them become independent farmers. Today,

those girls earn more than the national average income (Beard, 2014).

While this program is not designed for FCS, it demonstrates potential for success for GLI's agricultural vocational program. In this case, the profitability of passion fruit farming formed the foundation for the GAIN initiative. Key determinants were insight into what agricultural product would generate high profit, introduction of advanced techniques, cooperative relationships between suppliers and consumers, and partnerships with other institutions and funds. If a program attempted to do the same without a promising crop in which to invest and techniques leading to higher productivity, it would likely be unsuccessful. Where there are few markets to sell or little land area to cultivate, high profits will not be possible. Finally, when faced with limited resources, partners and collaborators are fundamental to achieving program goals.

The Initiative for the Development of Former Child Soldiers (IDEFOCS)—Liberia

Instead of the Disarmament, Demobilization, Rehabilitation, and Reintegration (DDRR) framework primarily upheld by the UN, the IDEFOCS, which was founded by a former child soldier, adopts a different, holistic approach. Concerned with failures experienced by UN programs in Liberia, which resulted in the recurrence of armed conflict, re-recruitment of child soldiers, and other security issues, this organization uses the Survey, De-traumatization, Rehabilitation, and Reintegration (SDRR) metric. This process begins with surveying FCS to identify them among the local population, understand their needs, and create a program to satisfy those needs. As a recent case, the Botanical Reintegration Village project carried out surveying, mental health and career counseling, vocational training, agriculture, education, recreation, and so forth.

The IDEFOCS raised the Child Soldiers Reintegration Fund (CSRF) and offered counseling and vocational training programs to 450 FCS using the SDRR approach. In addition, due to enhanced global awareness about the issue, they garnered volunteer support and provided skills trainings to nearly 40 women afflicted with war experiences in cooperation with the 21st Century Survey with Youth Action International (Matadi, n.d.).

The program emphasizes identifying individual FCS first and assessing their needs before formulating a program design. Furthermore, as its SDRR method and the example of the Botanical Reintegration Village indicate, a holistic approach integrating efforts for mental health care, education, and job skills training, strengthens programs.

UNICEF D&R Project—Afghanistan

UNICEF's four-year project funded by the United States Department of Labor was implemented to provide support for mental health issues, education, and economic reintegration of FCS and war-affected children. It was composed of three categories of reintegration programs: literacy and numeracy education, psychosocial education and activities, and vocational education. During

a nine-month period, students were required to attend literacy training two to three hours a day, six days a week. As part of the training, students also learned what was called “life skills” covering a broad range of subjects that included history, geography, basic health, human relationships, team sports, etc. At the same time, children participated in vocational education for four hours a day, six days a week. They chose one vocational area they liked from several options varying from region to region and learned the skill through training courses or an apprenticeship. Agriculture and skilled crafts (carpentry, tailoring, electricity mechanics, etc.) were the two categories of vocational fields offered, the former of which was the most popular choice, particularly among men. Female students preferred tailoring. Teachers of job skills training were local residents who were familiar with their communities’ economic situation. Although the quality of their expertise varied, before starting instruction, they attended UN-offered trainings corresponding to their field. After graduation, some students went to formal schools and others started their own businesses or joined the workforce.

When the D&R project finished in 2007, having educated 11,479 children (7,563 boys and 3,916 girls) in 164 districts, an independent evaluation of the program was conducted and the evaluator reported several problems and concerns. One critique focused on the length of the program. Depending on an individual’s level of literacy and intelligence, nine months may be considered too extensive or conversely, incomplete. Another problem was unexpected dropout. Approximately 11% of boys discontinued the program mostly because their families needed them to work and generate income for the family’s survival. Additionally, even if children successfully completed the program, the question of whether they could get a secure job in the long term remained. Unless there is enough demand for labor through sustained economic development, graduates equipped with good skills may end up unemployed.

The evaluation paper recommended several steps to strengthen the program, including ensuring the local community’s participation, resolution of family income constraint, and a well-established transition from the vocational program to future employment (Macro International Inc., 2007).

Application to GLI vocational training

Analysis of these three programs illustrates the ways in which a reintegration program for FCS could be designed and implemented. Whereas the details must depend on specific community characteristics, common principles are evident from these programs which can be applied to a new vocational program. The vocational training program design recommended in the past report fundamentally aligns with the findings above. Evidently, each of the programs above raised important concerns to address in the current plan.

First, a deeper investigation of agribusiness in Lira and Gulu is necessary. It is imperative to identify crops with high potential in terms of sales. Agricultural training needs to include

products that are not only popular and in great demand in Uganda, but also profitable and efficient to produce. If possible, introduction of modern agricultural knowledge including tools and techniques should be within the scope of the program. Once mastered, modern methods would make production more efficient. Since these factors largely depend on resource availability, judgements must be made in accordance with thorough field research.

Second, GLI should make sure that there will be plenty opportunities for employment in agribusiness before launching the vocational program. In prior research, the previous CIPA capstone team believed that a breakthrough for commercialized agriculture in Uganda is highly possible but has not happened yet. The promise of a secure job after the completion of training lays the basis for this initiative, and therefore GLI has to be confident about the prospect of FCS' transition from learning skills to earning incomes.

Third, because individual FCS, ages 15 to over 30, have different levels of educational attainment, it would be ideal if they are treated accordingly. Those who have already attained sufficient literacy education would be able to enroll in vocational training soon. On the other hand, those who have poor ability to write and read need to attend primary education first for life skills mastery. Such basic skills are indispensable in the areas of computers, accounting, and even agriculture when transitioning from subsistence farming to commercialized agribusiness. In this way, the vocational program would be able to concentrate on skills training without the need for remedial education.

Mental Health Barriers for FCS

Children that undergo traumatic experiences often carry psychopathological symptoms and suffering into their adult lives, which can severely affect their livelihood and quality of life (Schid, Petermann, & Fegert, 2013). Given the well-documented traumas that many FCS faced (murder, rape, physical abuse, etc.), mental health issues have become a focal point of research with regards to reintegration. In a study of 2,875 Ugandans, Pham et al. (2009) found that of the 946 formerly abducted individuals in their study, over two-thirds of them demonstrated signs of post-traumatic stress disorder (PTSD). Using multivariate analysis, the researchers found that PTSD and depression symptoms among former LRA abductees could be related to factors such as gender (females had higher rates), exposure to or participation in traumatic events, and struggles associated with reintegration. An interview study of 72 former abductees, 62 of whom were FCS, reinforced these findings; 49% of study participants had PTSD, 70% displayed symptoms of depression, and 59% displayed symptoms of anxiety (Pfeiffer & Elbert, 2011).

FCS face a wide range of effects resulting from their time at war. Service providers from World Vision in Gulu, Uganda reported that FCS “in their care experienced nightmares, insomnia, bedwetting, eating disorders, and difficulty concentrating, and exhibited behavioral problems when interacting with others. Some...resort[ed] to violence to solve problems, while others

became depressed and suicidal” (Russell & Gozdzia, 2006, p.60). In many cases, young girls who were forced into sexual slavery returned exhibiting unhealthy sexual behaviors, such as using sex as a medium of exchange or fearing sexual contact altogether. Common trends of drug and alcohol abuse among FCS during their time in the LRA also resulted in addiction problems (Russell & Gozdzia, 2006).

Due to the breadth of issues that FCS experience, Russell and Gozdzia (2006) propose using psychosocial approaches to properly address their emotional and social well-being. Such approaches include, but are not limited to, mental health services, which have been criticized as being too narrow in scope to single-handedly address FCS’ problems. Instead, while incorporating mental health support, psychosocial programming can address “emotions, behavior, thoughts, memory, learning ability, perceptions, and understanding” (Duncan & Arnston, 2004, p.14). This approach to mental and social well-being encourages a diversity of interventions, which could include religious activities, vocational programs, and other means of assistance.

Mental health conditions can severely hinder quality of life and one’s ability to function in society. Given the prevalence of such conditions among FCS, it is important to account for these challenges when considering reintegration efforts. Consequently, a vocational program for FCS could be structured to provide mental health benefits or programs to provide a well-rounded approach to reintegration.

Educational Barriers for FCS

Many former child soldiers were school-aged when they were abducted and forced to serve the LRA. As such, they missed a large portion of their time in school due to the conflict resulting in a fragmented education. Additionally, school-aged children are especially susceptible to physical and mental health issues as a result of participating in the war. PTSD and antisocial behavior are common in the life of a former child soldier. When subjected to stressors (i.e. HIV/AIDS, absence of parents, etc.), a child’s ability to succeed in school is severely diminished. For children that were still school-aged when they returned to their communities, these stressors were barriers to their success in school. For those former child soldiers who aged out of the school system before they returned to their communities, there were few opportunities to obtain an education (Willis & Nagel, 2015). Due to the disrupted education these FCS experienced, in order to establish effective rehabilitation centers for FCS, it is important to include educational opportunities in any future programs.

Willis & Nagel (2015) suggest that teachers in Ugandan schools be utilized as a resource to help acclimate students into the classroom. The study demonstrates that a good relationship between teachers and students can act as a stable part of children’s lives. This is especially important in a war-torn country. Teachers can build the “esteem, security, and health” of the children, thereby

reintegrating them into a school setting (Willis & Nagel, 2015). This tactic could also be used in vocational skills training programs; by providing mentors (in the form of teachers, community leaders, and skilled workers) to former child soldiers, it is possible that they will reintegrate into their communities more successfully. At the same time, if these mentors also provide skills training to non-FCS members of society, the skills training vocational programs would then act as a connection between the FCS and the rest of the community.

Data Collection & Methodology

In order to gather information for the GLI initiative, the capstone team utilized a combination of both secondary and primary research. Secondary research focused on examining the reports and research of previous capstone teams that worked on the GLI-Cornell Partnership. These reports outlined interviews and research conducted about the current lives of former child soldiers in Lira, Uganda. In addition, the Phase III capstone team conducted additional research into different possibilities for reintegration programs for the FCS in this area. Primary research consisted of interviews with local stakeholders and subject matter experts in order to gain perspective on the challenges facing the agricultural sector in Uganda and ways to address these challenges.

Secondary Research

A substantial portion of the CIPA capstone team's data collection and methodology consisted of secondary research on previous studies and other literature. Information from these sources were used to complement primary research findings, elaborate on factors that could impact the success of vocational programs, and identify a holistic approach to FCS reintegration.

Previous Capstone Reports

The spring 2017 Capstone team utilized data and information from both previous phases of the Cornell-GLI partnership. This included the transcripts of the interviews conducted with the 37 Former Child Soldiers from the Lira region and the analysis conducted on those interviews. In addition to the interviews, the Phase I and Phase II teams also utilized quantitative methods to analyze employment information throughout the Lira region.

The previous Cornell Capstone teams also conducted interviews with several stakeholders; these include the GLI CEO Jamie Van Leeuwen, GLI Research Coordinator Jerry Amany and the Founder of Children of Peace Uganda Jane Ekayu. Through these conversations, the teams were able to garner insight and information about the current economic status of the region and its inhabitants. This offered more background information about the situation in Uganda and helped guide the Phase I and Phase II research.

The Phase II team also used a SWOT (Strength, Weakness, Opportunities, Threat) analysis to create a framework for future research. This led to the team conducting four case studies of other sub-Saharan African countries; these case studies looked at programs from Angola, Mozambique, Liberia, and Sierra Leone that could be adapted to fit the needs of the Lira region.

The Phase III team utilized the information from the previous two phases as a guide for research and stakeholder interview processes.

Additional Sources

As part of the secondary research process, the capstone team reviewed literature related to factors that could impact the success of an agricultural vocational program. Research topics included, but were not limited to: other fields for vocational training (tailoring, sewing, engineering, etc.); existing reintegration efforts in other regions of the country and the world; case studies of vocational programs; health and educational considerations for FCS; community farming models; the impact of local climate on agribusiness; and potential business models. Through the examination of a wide range of topics, the team aimed to develop a holistic understanding of the challenges associated with vocational reintegration, both specific to Lira and in the general context of such efforts.

Sources of information for this project consisted of both the academic and nonacademic variety. First, the team examined the existing body of literature on FCS in academic journals, as numerous periodicals concerning international development, child psychology, and global health published relevant studies. Second, the team collected information from the reports of various government, nonprofit, and private organizations devoted to international development and reintegration. These organizations ranged from international bodies such as UNICEF to non-governmental organizations established in Lira. Third, the team gathered data from government websites and reputable media outlets to fill any remaining gaps in information.

Primary Research

From former CIPA consulting teams' reports and an academic and professional literature review, the team gained an overall understanding about issues to address, possible solutions and approaches, and the scope of a suggested vocational program. When considering the feasibility and applicability of findings from secondary research, analysis of the specific socioeconomic circumstances of FCS in Lira must be conducted. For this purpose, the consulting team sought broader and deeper input from stakeholders and experts who are familiar with the Ugandan economy, vocational programs designed for FCS, and opportunities for employment. With the help of GLI's professional connections in Uganda and Cornell's academic network, the CIPA capstone team had access to valuable sources of information.

Interviews were arranged through introductions by GLI and CIPA. Conversations with Ugandan stakeholders took place over the phone or videoconference due to physical distance while meetings with Cornell personnel took place on campus in person. The team utilized semi-structured interviews, preparing questions to ask in advance depending on the specialties of interviewees. The semi-structured format created opportunities for follow-up conversations based on interviewees' responses. Each meeting lasted for about 30 minutes to an hour.

Interviewees included the following in chronological order:

- Jerry Amany, GLI Uganda Research Coordinator. The conversation with Jerry focused on his past research, vocational needs and opportunities in Lira, and local stakeholders that could be included in further research.
- Adam Defaa, a current Humphrey Fellow at Cornell, climate scientist, hydrologist, and refugee resettlement expert. Adam discussed the potential impact of climate change on water resources and the agricultural sector in sub-Saharan Africa. He also emphasized the importance of being mindful of community structures and existing services when trying to implement a new program.
- Kwame Rugunda, son of Prime Minister of Uganda. Kwame discussed his personal connection to the civil war in Uganda and provided insight on challenges and opportunities facing the country's agricultural sector.
- Norman Uphoff, Cornell Professor of Government and International Agriculture. Professor Uphoff offered recommendations on how to address the impact of climate change on the agricultural sector in Africa. He placed special emphasis on the use of natural methods, which are more environment-friendly and affordable.
- Jane Ekayu, Founder and Executive Director of Children of Peace Uganda. Similar to Kwame, Jane provided insight on the state of the agricultural sector, particularly in northern Uganda and the Lira region. She also discussed the work of her organization, Children of Peace Uganda, and its goal to establish an agricultural skills training program for youth and FCS.

Findings

Interviews

The capstone team conducted numerous interviews with regional stakeholders and subject matter experts. These individuals include professors from Cornell University, fellows and scholars with personal and professional backgrounds in Africa, and affiliates of GLI in Uganda.

Jerry Amany, Research Coordinator at the Global Livingston Institute

As a Ugandan native and a member of the GLI team, Jerry Amany offered significant insights that helped guide the capstone team's secondary research. Contrary to some of the literature on the experience of FCS in various regions, Jerry discussed how members of the Ugandan community have typically been very receptive of these individuals, understanding that the actions of FCS were coerced and against their will. Many people were overjoyed to have their children back, and those who continue to harbor negative perceptions of FCS could be addressed through additional community education and understanding of FCS' experiences.

Jerry confirmed that there is a strong need for vocational training programs in Lira. Agricultural skills training is particularly relevant, given the size of the agricultural industry in Uganda. Such training could help improve the socioeconomic status of FCS, as produce can be a source of both sustenance and income. In addition, he highlighted the need for continued mental health services, as FCS still face psychological challenges stemming from their time in the war.

In terms of potential partnerships, Jerry noted the importance of having the support of the public sector when implementing a vocational training program. He mentioned previously acquired funds from the Mastercard Foundation through the U.S. Embassy, citing these organizations as potential partners or sources of funding for this project. He also mentioned having numerous contacts from the agricultural sector, which could potentially be accessed for field research moving forward.

Adam Defaa, Humphrey Fellow and Fulbright Scholar

The capstone team had an interview with Adam Defaa, a Humphrey fellow and Fulbright Scholar studying at Cornell. Adam's career has focused on refugee work in Africa and Iraq with Save the Children International and the American Refugee Committee. He has also studied water resource management and climate science in relation to refugee camps and internally displaced people (IDP) camps.

One of the main takeaways from the conversation with Adam surrounded the importance of recognizing the impact climate change will have on the agricultural sector of the sub-Saharan region of Africa. He stated that farmers in Uganda may be vulnerable to the huge risk of drought

caused by climate change and excessive reliance on rainwater. In recent years, there has been a decrease in readily available water sources as rivers are diverted or dry up and the rainy season is cut short. Both of these result in drought which can cause conflict over remaining water sources and affect the agricultural sector. Adam further pointed out the importance of cultural considerations for women because approximately 85% of small farm agricultural work is done by women in Uganda and at the same time, they also have to shoulder the burden of housework at home.

Regarding how to involve local community members who may participate in FCS reintegration efforts, Adam stated that it is important to recognize the existing programs in the Lira region to ensure that there is no large overlap between these programs conducted by community members and GLI's new project. Overlap could lead to competition and would not foster friendly relationships. Additionally, when GLI implements the new programs, there should be a large focus on integrating them into the existing set of programs in each community. Adam stressed that often times there are families and groups from multiple cultures and/or tribes grouped into a single community; as such, it is important to recognize that not every member of a community or resident in a displaced persons camp will have the same wants and needs. There must be differentiation in programs that can address a wide array of different circumstances.

Kwame Rugunda, Edward Mason Fellow

On May 24, 2017, the capstone team spoke with Kwame Rugunda, an Edward Mason Fellow studying at the Harvard Kennedy School and son of Uganda's current Prime Minister Ruhakana Rugunda. As a Ugandan native, Kwame has a personal connection to the conflict that took place during the LRA insurgency. Due to the civil war, he spent years living in exile in Kenya and Sweden. His father was also a lead negotiator on behalf of the Ugandan government when peace talks with the LRA took place in southern Sudan.

Kwame provided valuable insight on Uganda's agricultural industry, describing it as the backbone of the nation's economy. In the northern region of the country, there is a large supply of fertile soil and high demand for labor subsequently. He also highlighted several challenges currently facing the sector, most notably turbulent weather, natural hazards, and disruptions of exports to South Sudan due to civil war in the region. The government recognizes the importance of these issues, providing equipment and support to the industry while centralizing district-level commerce operations. Increased focus on infrastructure in rural areas could also begin to help mitigate the effects of poor weather. Ongoing infrastructure development efforts include internet-connectivity, electricity, and roads.

With regards to technical and vocational training, Kwame discussed how the Ugandan government has campaigned for the creation of technical and vocational training institutes in its efforts to increase employment, income, and educational attainment. Both public and private

institutes have arisen around the country and there are potential opportunities for partnership with institutes in Lira. Upon further investigation, current and former capstone teams have come across a shortage of agricultural training, suggesting there could be a potential market for such a program (Kim et al., 2016).

Professor Norman Uphoff (Department of Government and the former director of the Cornell International Institute for Food, Agriculture, and Development)

Recognizing the challenges of climate change, a lack of infrastructure, and reliance on subsistence farming would impact the agriculture vocational training program, the CIPA capstone team interviewed Professor Norman Uphoff, a prestigious scholar in international agriculture policy. Despite obvious challenges such as climate change and lack of infrastructure, he had a positive attitude toward the scope of GLI's agriculture vocational program. As one of the solutions to deal with the issues of instability and low productivity of farming, he suggested prioritizing land instead of water resource management and using high-tech machines. If farmers use poor quality land for agriculture, he added, their yields remain limited due to low levels of soil fertility. Furthermore, if land is not managed carefully, it becomes more susceptible to natural disasters including drought. Thus, land is an essential part of farming, he stressed.

Land is not composed of a single element. Rather, it contains various substances: oxygen, hydrogen, water, mineral particles, and organic matter. In Africa, due to the hot sun, land often lacks these important elements and consequently has little capacity to nurture crops. To make matters worse, without careful management, soil becomes solid and does not absorb rainwater; thereby, farming productivity drops alarmingly.

Professor Uphoff recommended a biological approach using natural means to regenerate soil. He has developed agro-ecological strategies that improve the productivity and resilience of crops, called the System of Crop Intensification (SCI). For instance, high quality seeds and optimal spacing of plants ensure the strong growth of crops. Leaves can be used to cover the soil as a shield from sunlight and later as a fertilizer. Putting living matters including microbes inside the soil would work to revive it. Once the land acquires the capacity suitable for agriculture, it needs less maintenance. Looking back on his agriculture project in Ghana, he explained the process. His team and farmers needed to water the land every day in the first year, every other day in the second, and every week in the third year. In this way, poor land can be transformed into fertile soil in five years and foster increasingly productive crops.

This approach serves as a countermeasure against climate change as well. With good soil, plants can develop their root systems more fully, reaching deeper into the ground. Since there is much more water deep underground, even during drought, they can survive without relying on rain.

What is necessary to implement this method is labor, skills, and knowledge. As long as those

requirements are met, the method does not require large capital investments and therefore, is one of the cheapest ways to innovate rural farming in Lira and Gulu. He added that, when trying to provide trainings to FCS, instructors should be skillful and knowledgeable about this practice so that FCS can understand it and carry it out after completing the training.

He also provided insights on desirable markets for agricultural products made in Lira. He emphasized that every crop is not equally perishable. Markets for crops should be determined based on the state or pace of crops spoiling. Regarding foreign markets, he was reluctant to advocate for export due to uncertainty such as price fluctuation.

Jane Ekayu, Director of Children of Peace Uganda

The first theme of the capstone team's conversation with Jane focused on the state of the agricultural sector in northern Uganda. Jane heavily emphasized the personnel-related challenges facing the sector, citing a lack of information, knowledge, and skills necessary to maximize the region's output. Many people in the region currently produce goods on a small scale, which needs to be expanded upon if farmers in the region are to access larger markets. In order to accomplish this goal, people need access to agricultural skills training, which can help them produce on a larger scale and mitigate the impact of volatile water conditions. Water conservation and sustainable farming techniques could be especially important in this regard, as they could help farmers retain water during drought and preserve the quality of soil following seasonal downpours.

When discussing access to larger markets, Jane mentioned that she did not know of any regional centers where goods could be collected, processed, and traded. Such a center could be crucial for efforts to consolidate the region's agricultural resources and push them into national and international markets.

Lastly, Jane described some of the logistics behind establishing Children of Peace Uganda's Peace Centre, a facility that will include psychosocial support services, peacebuilding activities, primary education, and agricultural skills training. A concern associated with establishing the center is the cost of hiring international experts to provide agricultural training, who she believes will be necessary due to a lack of knowledge in the region. Potential funding could come for organizations such as universities and international organizations such as the Food and Agricultural Organization of the United Nations.

The general takeaway from this interview was that a number of factors hinder Lira's presence in agricultural markets. A volatile climate can create difficult conditions for farmers to work under, and producers in the region require skills and sustainability training to handle these circumstances and expand production. Additionally, Lira is a relatively poor region with limited access to power and transportation. Many of these issues may need to be addressed if the

region's agricultural sector is to support and influx of laborers.

Secondary Research

In addition to stakeholder interviews, the capstone team conducted literature reviews to examine issues pertaining to the agricultural sector in Uganda and potential business plan models. We also developed case studies of specific models that have been successful in Africa.

Infrastructure

For sustainable development of the agriculture sector and further economic prosperity in Uganda, infrastructure is one of the key determinants. Even if well-educated and trained workers are available as a consequence of the success of vocational training, poor productivity and small markets would place serious constraints on the future of FCS farmers. To commercialize and modernize agriculture, new technologies and machines are necessary. To expand the agriculture market, domestically and internationally, networks connecting suppliers and consumers must be established. As a precondition for those breakthroughs, more resources need to be funneled into public projects of transport, electricity, and irrigation to prepare social and economic environments.

Recent academic findings support this view on Uganda's economy. Pontius, Rogers, and Bishop (2011) found the significant correlation between supply side constraints and performance of exportable products in Uganda. Their paper identified problems in many areas such as transport, information technology, storage capacity, and power generation. They argue that if the government is able to induce more foreign direct investment, it might improve the infrastructure level of the country. In addition, they pointed out that insufficient number of skilled workers should be taken care of at the same time.

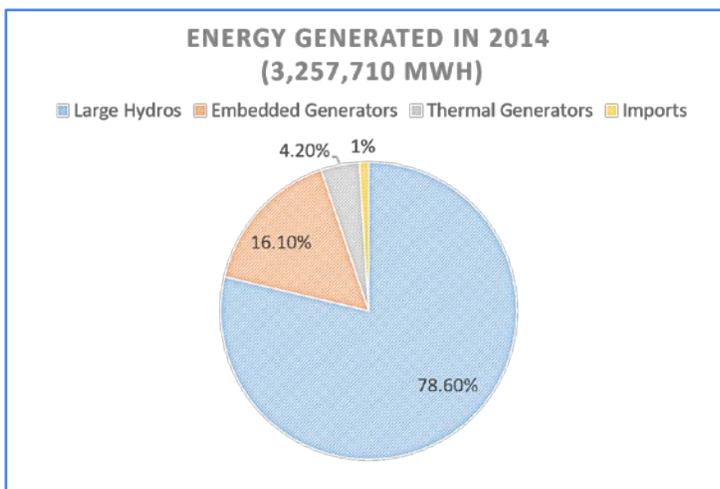
Among others, transport and electricity are top priorities which warrant strong initiatives. Dorosha and Thurlowb (2011) reviewed the two possible economic development solutions, namely agriculture-led strategy and urban industry-led development. The former emphasizes the potential of agriculture in rural areas in terms of growth and income raising effect. The latter sees concentrated population and economic activities in urban cities as a booster which can stimulate rural living standards. As an attempt to apply these two theories to Uganda, the two researchers discussed the importance of transportation infrastructure connecting the poor regions in northern Uganda to the developing regions in southern Uganda and the need for raising agricultural productivity. This two factors are inseparable because even if Ugandan farmers learn to produce crops more efficiently, mass production can simply lead to lower prices and lower revenues. When outputs can be delivered to broader areas including global markets and urban cities, suppliers should be able to generate greater profits due to reduced supply costs in addition to enhanced farming technologies, they concluded.

When it comes to electricity, many would agree that it significantly contributes to innovating farming in Uganda. Elias and Bower (2015) examined how Uganda can provide hydroelectricity to rural areas so that residents there can utilize electricity in updating their farming methods. Specifically, powered machines and equipment can play a primary role in modernizing agriculture. Their article states that traditional agriculture practices are the cause of low crop prices and accordingly, rural poverty. Traditional agricultural methods employ an inefficient process which leads to these low-quality products. Currently, simple and cheap electric machines are available to rural farmers but electricity is not. That is why Elais and Bower took stock of Uganda’s geographical location. Since there are massive resources for hydroelectric power generation especially along mountains, the authors recommend using hydroelectric power for agriculture. If electricity was available, irrigation would have high rates of return on investment because irrigation development would decrease reliance on rainy seasons, expand cultivated acreage, and diversify crops. This research also presented a case study of Kapchowa in Uganda as a possible scenario for the rest of rural Uganda. That study found that mechanized irrigation systems, which can be achieved by hydropower generation, would result in an approximately 50% increase in agricultural revenues annually in the region.

FIGURE 1: BREAKDOWN OF POWER GENERATION IN UGANDA

(SOURCE: Sectoral Planning and Policy Analysis Department, Ministry of Energy and Mineral

Development. (2015). *2014 Statistical Abstract*. Kampala.)



As indicated in the graph, most of the electricity consumed in Uganda is supplied by hydroelectric power generators. The national government has paid attention to hydroelectricity, which has an estimated potential of over 4,500MW, much more than other sources such as biomass co-generation (1,650MW), geothermal generation (450MW), and peat power (800MW).

Nevertheless, northern Uganda has been

facing the imbalance of power generator location. The map below depicts where electricity is generated and supplied in Uganda. Although Lira has a relatively strong transmission line connected with developed south region, it does not reach rural areas. Fortunately, however, one large hydroelectric power generator, whose capacity would be 600MW, is under construction at the Karuma Falls on the Victoria Nile. This location is nearly 80 km west to Lira. According to Uganda Electricity Generation Company Limited (2017), this Karuma Hydropower Project started on December 2013 to be completed in five years. Its cost is estimated to be US \$1.7

billion, 85% of which is funded by Export-Import Bank of China and 15% of which by the Ugandan Government. This would be the largest dam in northern Uganda once constructed.

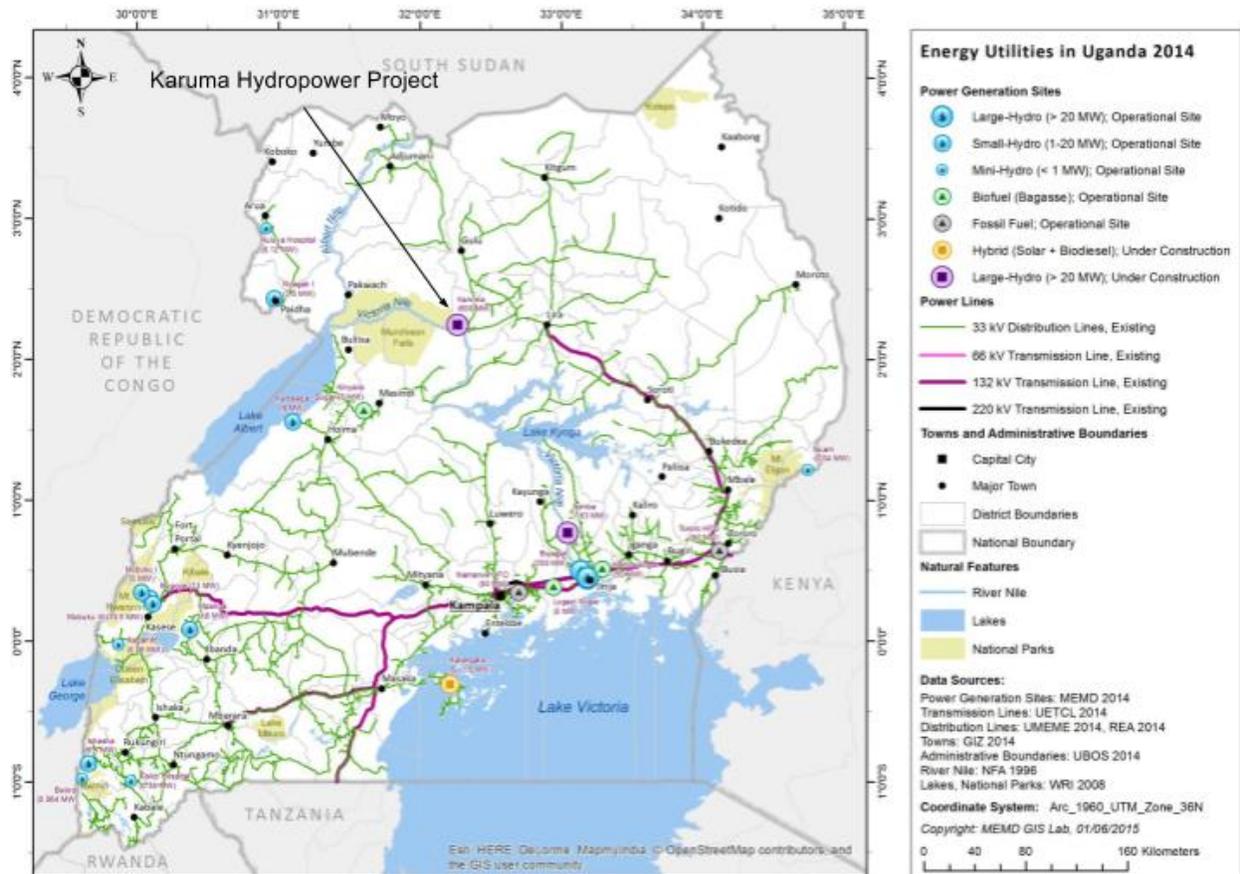


FIGURE 2: MAP OF ENERGY UTILITIES IN UGANDA (2014)
 (SOURCE: Sectoral Planning and Policy Analysis Department, Ministry of Energy and Mineral Development. (2015). *2014 Statistical Abstract*. Kampala.)

In contrast to this expensive and large-scale electrification, Buchholz, T. & Silva (2010) discuss the solution of small-scale wood-based bio-power generation, which extend to populations far from major towns. They argue that hydropower alone cannot provide enough energy because of growing demand, time constraints, and unstable water resources. They also stress the lack of political momentum for installing power generation facilities in rural areas. Instead, their focus is on bioenergy, which make use of biomass residue and woody crops. They continue that Uganda has the strong potential of biofuels and thus, modern technology and well-managed power generation and distribution system should boost rural electrification at low cost. In addition, the authors mention that this technology may improve the soil used for food production through better nutrient cycling and decreasing erosion.

The key determinant of electricity provision lies not only in generation but in distribution. An ambitious initiative called Rural Electricity Access project is under way throughout the nation (African Development Bank, 2015). It aims to construct 1,147 km of medium voltage and 808 km of low-voltage distribution networks across Uganda, which will connect 58,206 rural households, 5,320 business centers and 1,474 public institutions to the energy grids. It is scheduled to complete in February 2019. The expenditure of US\$ 121 million is funded by principally the African Development Bank and European Union's funds. When this network is fully functional, numerous local farmers will have reliable access to electricity.

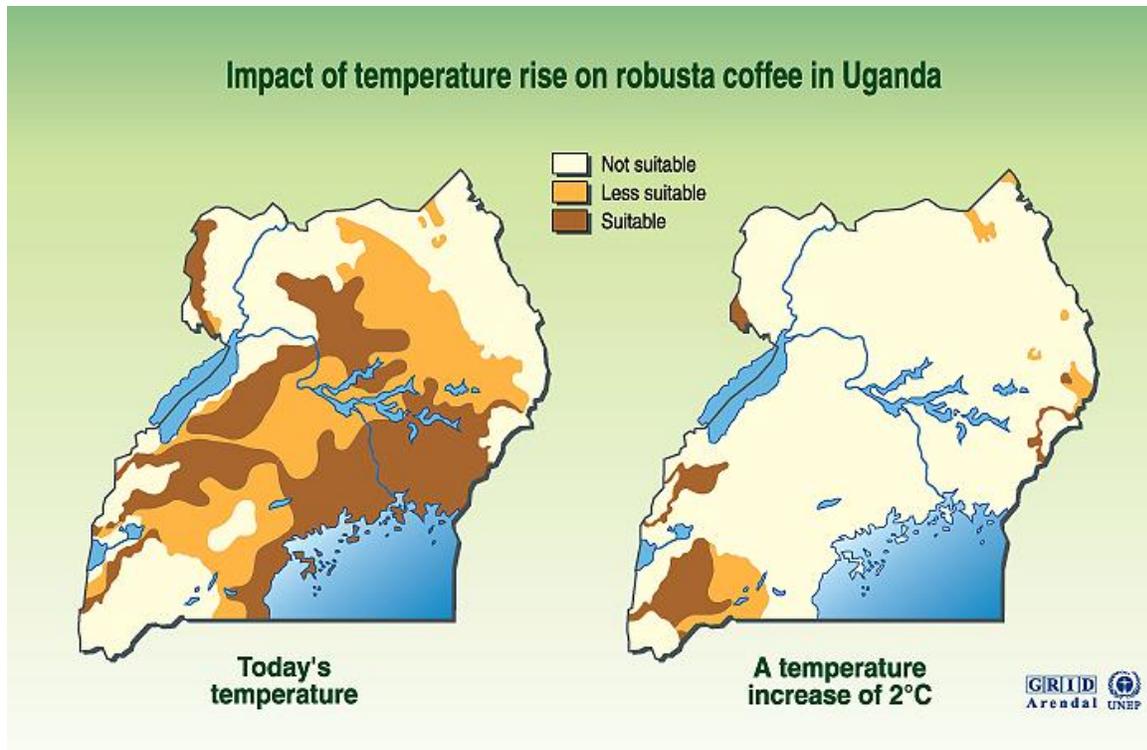
These findings have a strong implication that, in the near future, residents in Lira and surrounding areas will benefit from hydropower utilities and distribution grids, so that they can innovate their ways of farming. Even if not all farmers can get access to energy, small-scale bio-power generation will be a contingency plan to fill the gap. Therefore, modernization and commercialization of agriculture is highly likely to take place, which will lead to further economic growth and poverty reduction.

Climate Change

Since the 1980s, climate change has created less predictable growing seasons in sub-Saharan Africa (UNEP, 2009; USGS, 2012). Temperature trends for Uganda indicate that the mean annual temperature has increased by a total of 1.3°C since 1960 (UNEP, 2009). This temperature increase has subsequently reduced the amount of rain during the spring and summer rainy seasons (USGS, 2012). In addition to the reduced total rainfall, the bouts of rain themselves have become more volatile; the duration and intensity of storms are also unpredictable, which can affect impact on crops (Jost, 2016). These unpredictable changes in weather have resulted in an increase in unpredictable flooding, drought, and landslides (Johnson, 2013).

This change in temperature and rainfall will have a large impact on Uganda's agricultural sector as is very susceptible to water resource crisis due to its reliance on rain water. The majority of crop irrigation in Uganda is rain-fed, not diverted from existing bodies of water such as rivers or lakes (UNEP, 2009). Changing temperatures can also affect which crops survive in the climate. As the average temperature increases, traditional crops in the region, such as coffee, may be adversely affected (USGS, 2012). Scarce water sources will have to be rationed accordingly, and crop production may fall if these changes continue.

FIGURE 3: COMPARISON OF COFFEE GROWING REGIONS IN 1989 AND PROJECTED ARABLE



Source: Otto Simonett, Potential impacts of global warming, GRID-Geneva, case studies on climatic change, Geneva, 1989.

REGIONS IF THE TEMPERATURE RAISES BY 2°C

(SOURCE: Simonett, O. (1989). Potential Impacts of Global Warming. GRID-Geneva, Case Studies on Climatic Change. Geneva.)

These changes, when combined with other changing demographic factors in Uganda such as the exponential growth in population in the past two decades could also strain the agricultural resources.

Case Studies

Community Markets for Conservation (COMACO)

COMACO is a non-profit company that “targets food insecure households and individuals involved in environmentally destructive livelihoods...and supports them to improve their food and income security in exchange for their commitment to conserve the Luangwa Valley ecosystem” (Fanta-Project, 2015, p. 1). The organization launched its operations in Zambia in 2003, and has since helped thousands of farmers engage in sustainable agricultural practices and connected them to high-value markets.

The company’s overarching goal is to “reduce hunger and poverty and conserve ecosystems and wildlife” by improving farmer skills, market access, income stability, and reducing the risk of natural resource degradation (Fanta-Project, 2015, p. 1). In addition, COMACO has made a concerted effort to promote family planning activities. Several factors in the region guided their

holistic approach including growing family size which threatened food security, limited family planning resources and education, and poor geographical access to health clinics. Major funders for the program include the Royal Norwegian Embassy, CARE International, and the World Bank, which suggests that there is financial interest in these types of initiatives across both public and private sectors. Family planning activities have been funded by sources such as the USAID BALANCED Project Seed Grant and the Flexible Fund Grant (Fanta-Project, 2015).

COMACO was able to take advantage of the existing producer group structure in Zambia's Luangwa Valley. The community-based model is led by extension officers and volunteer lead farmers, who play key roles in leading both family planning and conservation initiatives. A paid extension officer with agricultural expertise oversees two or three producer groups, which consist of 10-20 farmers each. Volunteer lead farmers are responsible for ensuring that farmers abide by COMACO's sustainable agricultural practices and report to the extension officers (Fanta-Project, 2015). The organization's success in promoting family planning in addition to agricultural development demonstrates the capacity of such organizations to improve community well-being outside of the agricultural realm, which could include areas such as mental health and education programs.

Extension officers make monthly or quarterly field visits to monitor producer groups and discuss agricultural and health topics. Lead farmers hold meetings more frequently, sometimes on a weekly basis, to ensure that conservation standards are being upheld. They also receive resources from COMACO to maintain demonstration farms, at which they exhibit best practices to their respective producer groups (Fanta-Project, 2015). These practices include soil management and beekeeping, but likely could be tailored to the needs of different communities if similar business models were applied elsewhere.

Produce is handled by a centralized local depot that exports goods to regional trading centers. At these centers, goods are processed, packaged, and marketed as environmentally friendly products. Profits are then shipped back to farmers, who are financially incentivized to remain in producer groups and adhere to COMACO's conservation standards as a result (Fanta-Project, 2015).

Survey research conducted in 2006 found that "household adoption of conservation farming techniques [were] having a positive impact on food security in the valley community" (Ecoagricultural Partners, n.d.). According to results from the survey, 84.6% of households that adopted COMACO's conservation standards achieved food security in the nine-month target, while only 70.1% of non-practicing farmers did so. There were notable ecosystem improvements as well, including the stabilization of wildlife populations that were previously vulnerable to poaching as a source of alternative income (Ecoagricultural Partners, n.d.).

More recently, COMACO reported that 80% of its participant households were food secure, compared to 43% when the organization began its efforts in 2003. Average annual family income increased from \$79 in 2003 to \$348 in 2015. Meanwhile, farmers have diversified their sources of income and food, consequently reducing the negative consequences of climate extremes on community well-being and malnutrition. As of most recently, there are a reported 164,300 farmers registered with COMACO and 52% of them are women (It's Wild, 2017).

Kilimanjaro Native Co-Operative Union (KNCU). The KNCU is a cooperative union of coffee farmers based in Tanzania. Originally founded in 1933, the union's mission is to "provide efficient services to its primary cooperative society members in production, collection, processing and marketing of coffee." In order to accomplish these goals, the organization outlines a list of its key functions:

- Provide crop finance to member primary cooperative societies.
- Provide market information on coffee prices to member primary cooperative societies and help them to secure optimal prices.
- Collect, transport, grade, process, package and market members' coffee.
- Provide information on input prices and seek the minimal prices for the best quality inputs.
- Supply farm equipment and inputs (seedlings, fertilizers and chemicals) to member primary cooperative societies.
- Provide cooperative education and extension services to member primary cooperative societies (KNCU, 2014).

KNCU's many functions demonstrate the potential of farmer groups to foster not only agricultural development, but also improve access to other crucial functions such as health care and education.

The organization provides benefits and services to its members in return for their contributions, the most important of which may be the union's Community Health Insurance Scheme. Citing their acknowledgement of the World Health Organization's concept of health and the operational benefits of having healthy farming communities, the union operates an insurance scheme in collaboration with nonprofit partners the PharmAccess Foundation and Hivos. Through this plan, members have access to affordable primary care services. The union also uses funds from fair trade premiums to help improve the livelihood of its members. Projects stemming from these premiums include an educational scholarship fund, organic coffee farming, a coffee quality improvement program, and improved coffee seedlings supply. Lastly, the KNCU is engaged in the Fair Tourism Project, commonly referred to as "Kahawa Shamba," to develop sustainable tourism and help diversify the incomes of coffee farmers, which can serve to protect them from fluctuating coffee prices (KNCU 2014).

Conclusion

The capstone team explored issues related to infrastructure and climate change in order to highlight some of the major issues facing Northern Uganda. Poor infrastructure negatively impacts the development of the agricultural sector in the region and increasingly severe climate factors make the adoption of resource conservation practices imperative. Meanwhile, the team chose to highlight COMACO and KNCU because each program has unique aspects that could be relevant to a community-based farmer group and vocational program in Lira. Information on these topics will be expanded on in the following section and used to formulate recommendations for GLI moving forward.

Analysis

Infrastructure

As a precondition for economic growth, infrastructure is an indispensable part of development strategy. If FCS successfully acquired agriculture skills and secured a job in this sector, their future would still be largely dependent on external conditions such as transportation and electricity access. Both are necessary for expanded access to markets and enhanced productivity in the long term.

On a positive note, IMF research indicates that the government of Uganda plans to spend \$11 billion on infrastructure upgrades in the next ten years (Coronel, 2015). Transport and power generation are seen as top priorities of this project. IMF analyzes that this will have a tremendous impact on agriculture, manufacturing, and trade. Ugandan Finance Minister Matia Kasaijja's remarks at the National Budget Speech, which took place June 8, 2016, concurred with this view. He noted that 32.8 % of the total government expenditures would be used for infrastructure every year, and additionally, his government was carrying out projects influencing agribusiness, transport, and telecommunication (Pettersen, 2016). Still, several problems remain. The IMF article, for the sake of further infrastructure development, urged the government to work toward seamless policy implementation, careful project management, and hospitable business environment (Coronel, 2015).

Findings in this paper suggest residents in Lira need to make efforts on two fronts for their community's prosperity. First, they should not put too many expectations on public projects' spillover on their region. Even though the government is trying to achieve better infrastructure throughout the country, it will not occur immediately and may affect communities unevenly. There is considerable risk of disruption of their work due to poor management. At the grass root level, local people, NGOs, and private actors should continue their own approach toward reintegration, community development, and economic activities.

Second, although the government decides its overarching priorities and strategy for infrastructure upgrading, local actors can affect the allocation of resources. When formulating a policy, budget limitations require the government to choose what projects to build and where to locate them. During the selection process, they consider multiple factors from various stakeholders, which include economic impact, feasibility, and politics. If local farmers or community leaders in Lira and Gulu ask local and national authorities for public investment in a strong and consistent manner, and if the governments take note of it, their request would be high on the policy agenda.

Thus, local people must work to influence government officials through appropriate means to attract investment in their region as well as keep seeking more innovative and efficient way of

farming. While Ugandan municipalities experience challenges in balancing traditional leadership and local governance, embracing the democratic process, and allocating resources fairly, it is ultimately collective action which can change the status quo. GLI's vocational training program needs to recognize these realities, listen to local residents' opinions, and design its framework accordingly.

Climate Change

Climate change will very likely have a large effect on the Lira region and the Ugandan agriculture sector as a whole. Therefore, it is necessary to prioritize the following:

It is important to ensure that farms in the Lira region have reliable irrigation systems that provide consistent access to crop water. This could involve creating man-made reservoirs or wells to catch and retain rainfall.

Intercropping, or planting different crops in close proximity to one another, is an important agricultural method that can adapt crop fields to changing climates. A case study in South and Southwest Uganda demonstrated that growing coffee and bananas together can generate a larger crop yield (and therefore a larger income) than planting the two separately. This is because the taller banana trees will shade the coffee plants from the sun, reducing the temperature of the coffee fields. Banana trees also can mitigate climate change by capturing more carbon dioxide and producing more oxygen. Utilizing different farming adaptations such as intercropping could protect the longevity of plants and also increase plant yields (CGIAR, 2013).

Finally, while traditional crops (i.e. coffee) can still survive with adaptations such as intercropping, it is also important to examine possible new crops to determine whether or not they would be better suited for Uganda's changing climate.

The effects of climate change on agriculture are predicted to have differing impacts on certain populations; women and children, for example, are expected to be disproportionately affected by the increasing number of droughts and floods in the region. Women are less likely to be able to access different intervention methods that could increase crop production and market sales such as building irrigation systems or traveling to farther marketplaces to sell harvested crops (Jost, 2016). Children are especially vulnerable to food shortages and water-borne diseases that arise as water sources are altered (Johnson, 2013).

Due to the complicated nature of the current agricultural industry in Uganda, GLI will need to implement a program that teaches FCS how to adapt to recent changes in climate.

Case Studies

Community Markets for Conservation (COMACO) in Zambia and the Kilimanjaro Native Co-Operative Union (KNCU) in Tanzania provide some insight on successful business models for farmer training and agricultural development. Most notably, the organizations aim to empower their members by uniting farmers and establishing community-based business models.

Consequently, they have been able to pool together financial and agricultural resources and utilize them in ways that improve production, well-being, and financial security.

Both organizations collect, process, package, transport, and market members' produce in preparation for trade. By consolidating these services, they are able to improve market access for their members. COMACO also increases the value of its products by marketing them as environmentally friendly, while KNCU actively provides information on coffee and input prices to maximize farmers' profits.

These organizations also find ways to incentivize their members to remain in their producer groups and unions. KNCU appears to be more active on this front. In addition to their efforts to improve market access, they coordinate activities and services such as health insurance, self-help initiatives, and tourism projects to help diversify income and improve their members' well-being. COMACO provides family planning services, training, and products to its members, but also gives lead farmers additional inputs so that they can demonstrate best practices to their respective producer groups. As evidenced by these two organizations, participation incentives for farmers can be tailored in each program based on problems that are most relevant to a respective community. Accounting for these factors in the conceptual phase of a program will be crucial for its long-term sustainability and self-sufficiency.

Ultimately, farmers are encouraged to remain with these organizations because of the benefits they receive. Some of these benefits are directly related to agriculture, such as improved market access and increased production and resources conservation. However, community-based models like COMACO and KNCU make concerted efforts to improve the livelihoods of their members with other types of resources and services. Such an approach could be applied to an agricultural vocational program for FCS, particularly with regards to health and educational services.

Business Plan

When brainstorming a business plan for a vocational program, the capstone team adopted components of existing community-based farmer group models. These elements were used to conceptualize a program that would be both financially sustainable and comprehensive with regards to reintegration. This section introduces potential components of a business plan that would promote GLI's efforts to improve the socioeconomic status of FCS while further integrating them into their communities.

Management Structure. Similar to COMACO, the management structure of an agricultural vocational program could be composed of extension officers, lead farmers, and producer groups. Extension officers would be paid experts who could survey Lira’s agricultural landscape, determine best practices to combat climate and infrastructure challenges, provide training on said practices to the community, and distribute farm inputs. Each officer would oversee several producer groups, conducting monthly site visits to ensure compliance with irrigation, water conservation, and soil rehabilitation practices. They would then report results to GLI administrative staff.

Lead farmers would consist of local leaders in the agricultural sector. Depending on the preference of GLI and partners, these individuals could either receive payment or extra tools and farm inputs. Lead farmers would be tasked with conducting weekly visits to producer groups, assisting in skills training, and reporting to extension officers. In addition, they would maintain demonstration farms, at which new members of the vocational program would be trained and best farming practices would be showcased.

Producer groups would form the base of the personnel structure, consisting of 10-30 members each (though this range can be subject to change). Producers would consist of FCS, but would also include community members interested in vocational training and joining the community-based farmer group. Prior to joining producer groups, members would be required to complete vocational training at demonstration farms, learning agricultural practices deemed relevant to the region by extension officers. Moving forward, they would be required to adhere to irrigation and conservation practices and standards to remain in their respective producer groups. Figure 4 provides a visual representation of the community-based farmer group management structure, ranging from extension officers to producer groups.

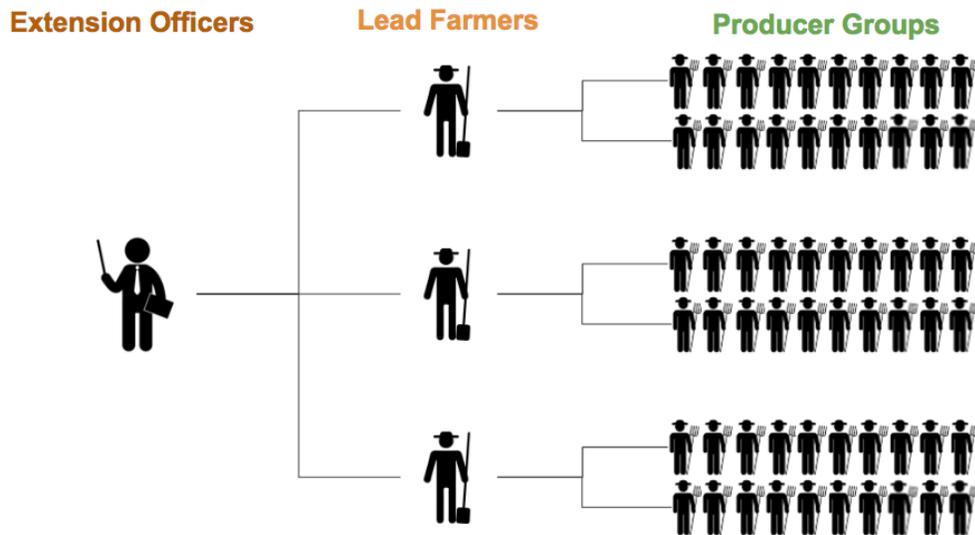


FIGURE 4: MANAGEMENT STRUCTURE OF A COMMUNITY-BASED FARMER GROUP

In addition to the aforementioned personnel, GLI and partners would be in charge of various other staff responsible for services that will be discussed below.

Services Provided. As the organization overseeing this business model, GLI would be responsible for providing a set of comprehensive services, as depicted in Figure 5. These services would provide the operational support to help enhance the socioeconomic well-being and stability of farmer group members, while increasing their market competitiveness.



FIGURE 5: SERVICES PROVIDED

First and foremost, GLI would provide vocational training to all members of the community-based farmer group. Such training would be vital for resource conservation, expanded production, quality of produce, and ultimately increased income security. Completion of the program would be required for membership. This would ideally promote the use of best farming practices and help integrate FCS into new social circles.

The second service GLI would provide is organizational management. Aside from previously outlined management structure, GLI would be responsible for staff related to administration, bookkeeping, market research, and produce transportation and processing, among others.

Third, GLI would help consolidate agricultural labor and resources in the region, establishing local depots at which produce would be collected, graded, processed, packaged, and marketed. The use of centralized facilities to gather resources and perform these functions is characteristic of existing organizations like COMACO and KNCU.

Lastly, GLI could leverage profits to establish a benefits system for producer groups. This system could be tailored to address the needs of member farmers, particularly among the FCS population. Benefits could include primary health care, mental health services, and educational opportunities and scholarships, among others.

Product Line. GLI has expressed interest in pursuing business opportunities related to sorghum,

which is a widely-produced crop in Northern Uganda. Other cash crops relevant to the region include maize, cassava, beans, and sweet potatoes (Dalipagic & Elepu, 2014). With the assistance of GLI, these are potential crops that farmers in Lira could sell competitively in regional and international markets.

Market Analysis (Sorghum). A large majority (75.7%) of Lira District residents engage in subsistence farming, suggesting that there is a wealth of potential for agricultural labor supply in the region (Lira District Local Government, 2009). As for demand, the largest global importers of grain sorghum are China, Japan, and Mexico, while the largest African importers are Ethiopia, Kenya, and Sudan (Observatory of Economic Complexity, 2015). These countries represent opportunities for Lira District farmers in the international market (particularly Kenya and Sudan, which directly border Uganda), though additional research on global and regional markets will need to be conducted.

Funding. Numerous organizations could provide initial funding for a GLI-sponsored community-based farmer group program. During the capstone team's interview with Jerry Amany, he mentioned the U.S. Embassy in Uganda and the Mastercard Foundation as potential investors. GLI could also attempt to leverage its connections with various levels of Ugandan government and NGOs in the region to acquire funding and form partnerships.

Additional outside sources include the World Bank and CARE International, which both provided funding for COMACO (Fanta-Project, 2015). The Atkinson Center for a Sustainable Future at Cornell University has also been involved with COMACO, and could provide valuable funding and academic research opportunities for extension officers.

Once the program is established, GLI could impose premiums on producer groups to financially sustain the program and invest in farm inputs, technologies, additional staff, etc. Additional research and analysis will be required to determine premium rates.

Recommendations

Infrastructure

To take advantage of the earnest attitude of the current government of Uganda toward infrastructure development, a systematic channel which can provide input from residents in Lira and Gulu to the government should be established. Through this communication, local people will be able to give their opinions and feedback to practitioners in the public sector so that their voices are heard when formulating a policy. For this purpose, organizing a farmers' group would be a plausible solution to mobilize community members and have an influence on decision makers. To move forward, GLI needs to know the perception of local communities through further research.

Climate Change

It is important to encompass climate change into any future planning for agricultural work in the Lira region. As discussed in the previous section, recent years demonstrate that weather and climate patterns are shifting. The lack of assured water sources could have devastating effects on farming in the region, and as such, the vocational training program in agriculture should encompass the following: (1) the importance of crop diversification and intercropping, (2) lessons in developing irrigation systems and improving farmland (explained in the following section) and (3) lessons in accessing and reading weather reports to predict impacts on crops.

Revitalization of Cropland

As discussed above, agriculture has high potential for growth and yet, faces challenging issues. To deal with the issues stemming from lack of infrastructure and climate change, GLI's program should help local farmers and FCS engage in land revitalization. Because of its significantly low cost, environmentally friendly means, and successful precedents in Africa, this approach will be the most feasible solution especially in the short term.

To carry this out, first and foremost, GLI needs to know the current situation of farmland in Lira and Gulu so that it can understand to what extent the soil is poor and how its initiative can improve cultivation practices. In the next phase, it should ask for input from experts and scholars of agriculture on specific methods to regenerate fertility in those lands. After that learning process, with the help of professionals, GLI has to find competent farmers who can take into practice this idea and also share his knowledge and skills with other workers and FCS students of the vocational program. Once instructors are available, FCS can acquire this expertise and implement it in their own farms. In terms of business plan, GLI should get inputs from farmers about their perception about the soil during this summer's focus group research. Then, in partnership with Children of Peach Uganda, GLI should seek connection with experts in this field so that they can obtain useful expertise.

Community-Based Farmer Group Structure

The CIPA capstone team recommends implementing a business plan that resembles other successful community-based farmer group models, such as COMACO in Zambia and KNCU in Tanzania. This plan should effectively provide vocational and skills training, organize regional produce management, and offer a system of benefits that addresses the needs of FCS and other members of the Lira community.

GLI and partners can establish centralized locations at which farmers' produce will be collected, processed, packaged. From these locations, goods can be transported to regional trading centers (or their equivalents), where they can be marketed and sold at competitive prices.

In terms of management structure, the capstone team strongly recommends hiring extension officers to provide agricultural skills training and high-level oversight of producer groups. Designated lead farmers can be tasked with weekly visits to producer to ensure that they are properly implementing required irrigation and climate change mitigation practices. Lead farmers will report to extension officers and can receive extra inputs or income from GLI and partners, enabling them to showcase best practices on demonstration farms. These farms can also serve as training grounds for other enrollees in the agricultural vocational program.

Profits from this model can be used to promote the socio-economics status of FCS and the general Lira community in various ways. While a portion will be needed to finance organizational staff and services, much of the profits can be distributed back to producer groups and used to create a system of benefits for member farmers. Benefits can address the health and educational needs of FCS, but can also the needs of the overall community.

In addition, based on the finding and recommendations contained in this report, the capstone team produced a set of recommended focus group questions for field work in Lira. These questions were constructed for engagement with various groups, include community members, community leaders, and organizations (nonprofit, private, etc.) in the region. Moving forward, the team's questions and recommendations can help guide summer research and additional capstone teams in future stages of this project.

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Appendix - Focus Group Questions for Summer 2017

Community Members

Perception of FCS

- What are your perceptions of FCS and their children?
- Would you be willing to work with FCS?
- Would you be willing to help train FCS?

Infrastructure

- What are your main infrastructure-related challenges (electricity, water, roads, etc.)?
 - How do these challenges impact the agricultural sector?
- Are you able to convey your community's needs regarding infrastructure and other public investments to the local government in a collective way?
 - If not, what obstacles do you face?

Benefits

- Do you have adequate access to health care services?
- Do you have adequate access to education services?
- What are your main sources of income?

Agriculture

- What types of crops do you grow?
- Do you grow crops for sustenance?
- Do you grow crops for profit?
 - Is this a significant source of income?
 - Where do sell your crops?
- What are the challenges facing the agricultural sector in the region (climate change, soil quality, infrastructure, etc.)
 - How do you handle these challenges?
 - Are your methods effective?
- What assets would help increase productivity (capital, machines, equipment, skills, knowledge, labor, etc.)?
- Would you be interested in agricultural skills training?
 - What kind of skills would you be interested in learning (irrigation, conservation, intercropping, upscaling)?
- Would you be willing to provide skills training to other farmers?
- Would you be interested in making farming your main source of income?
- Would you be interested in joining a community-based farmer group?

Community Leaders

Perception of FCS

- What is the community's perception of FCS and their children?
- Would the community would be willing to work with FCS?
- Would the community be willing to help train FCS?

Infrastructure

- What are the main infrastructure-related challenges in your region (electricity, water, roads, etc.)?
 - How do these challenges impact the agricultural sector?
- What infrastructure initiatives are taking place in the region?

Benefits

- Who are major providers of health care services in the region?
- Who are major providers of education services in the region?

Agriculture

- What are the main crops grown in the region?
- What are some of the more profitable crops in the region?
- What are the challenges facing the agricultural sector in the region (climate change, soil quality, infrastructure, etc.)?
- What assets would help increase productivity (capital, machines, equipment, skills, knowledge, labor, etc.)?
- Are there providers of agricultural skills training in the region?
- Would you be interested in joining a community-based farmer group?

Partnerships

- Are there vocational training institutions in the region?
 - Is there potential for partnerships with these institutions?
- Would local government be interested in supporting a community-based farmer group?

Business Plan

- Who are potential investors/co-sponsors for this program?
- What organizations could GLI partner with to provide benefits and training?
- How can GLI help connect Lira farmers to regional trade markets?
- Do you anticipate any major challenges related to forming producer groups?

Organizations

Perception of FCS

- What is the community's perception of FCS and their children?
- Would the community would be willing to work with FCS?
- Would the community be willing to help train FCS?

Benefits

- Who are major providers of health care services in the region?

- Who are major providers of education services in the region?

Business Plan

- How can GLI help connect Lira farmers to regional trade markets?
- Do you anticipate any major challenges related to forming a community-based farmer group?

Partnerships

- What kinds of services do your organizations engage in?
- Do your organizations engage in vocational skills training?
- Would your organizations be interested in an agricultural vocational training initiative?
- Would your organizations be interested sponsoring a community-based farmer group model?