U.S. Agency for International Development (USAID)
and
The American Council on Education (ACE)
Office of Higher Education for Development (HED)

Virginia Polytechnic & State University and University of Juba/Catholic University of South Sudan Partnership

"*Rebuilding higher education in agriculture to support food security, economic growth and peace efforts in South Sudan*"

February 07, 2011 – August 31, 2014

FINAL ASSOCIATE AWARD REPORT
December 2014

USAID/South Sudan Associate Award
Cooperative Agreement No. 650-A-00-11-00303-00
Under
Leadership with Associates Award Cooperative Agreement No. AEG-A-00-05-00007-0

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PARTNERSHIP INFORMATION

Lead Partner Institutions: Virginia Polytechnic & State University and University of Juba/Catholic University of South Sudan
Secondary Partner Institutions: Virginia State University
Region, Country: Sub-Saharan Africa, South Sudan
Performance Period: *February 07, 2011 – August 31, 2014*
Funding Level: Associate Award: $3,186,422 and Subaward: $2,800,892
Cost Share: $505,069

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List of Acronyms

ACE	American Council on Education
AGRA	Alliance for the Green Revolution in Africa
ARDC	Agricultural Research and Development Center
B.Sc	Bachelor of Sciences
CRG	Competitive Research Grants
CUoSS	Catholic University of South Sudan
FTF	Feed the Future
HED	Higher Education for Development
HICD	USAID's Human and Institutional Capacity Development
IFDC	International Fertilizer Development Institute
JG-MUST	John Garang Memorial University for Science and Technology (Juba, South Sudan)
MAF	Ministry of Agriculture, Irrigation and Forestry
M&E	Monitoring and Evaluation
MSc	Master of Science
NGO	Non-Governmental Organization
PhD	Doctorate Degree
PRIME	Partnership Results & Information Management Engine
RHEA	Rebuilding higher education in agriculture to support food security, economic growth and peace efforts in South Sudan
UoJ	University of Juba
USAID	United States Agency for International Development
USAID/AFR	United States Agency for International Development/Africa Bureau
USG	United States Government
VT	Virginia Polytechnic & State University

1. Executive Summary

This report is submitted for the Associate Award Agreement No. 650-A-00-11-00303-00 between USAID/South Sudan and the American Council on Education, Office of Higher Education for Development (ACE/HED), and a sub-cooperative agreement between Virginia Tech University and ACE/HED. USAID/South Sudan has obligated $3,186,422 for the Associate Award Agreement providing funding for a partnership between Virginia Polytechnic & State University (VT) and University of Juba/ Catholic University of South Sudan (UoJ/CUoSS) titled "*Rebuilding higher education in agriculture to support food security, economic growth and peace efforts in South Sudan (RHEA).*"

The continuing instability of the country posed numerous challenges in implementation of the partnership activities. When USAID suspended its operations in South Sudan in December, 2013, the AOR requested revised implementation plans, which were submitted in January, 2014. In February 2014, USAID modified the Associate Award to reduce the ceiling of the award from $10,544,527 to $8,348,477 and obligating a total of $3,315,700 for the award. This was in conjunction with the Missions request for immediate and early closeout of all partnership activities in South Sudan. The final six months of program implementation were limited to closeout activities, reporting and disposition of equipment. Furthermore, in June 2914, USAID modified the Associate Award one more time, this time reducing the ceiling from $8,348,477 to the total obligated amount of $3,186,422, and establishing August 31, 2014 as the closing date of the Associate Award.

Over the three years of project implementation, the VT and UoJ/CUoSS partnership planned and implemented numerous activities to develop the world's youngest nation's institutional and human capacity through research, infrastructure improvement, outreach and extension and trainings.

Partners delivered sixteen short-term trainings benefitting 304 individuals, contributing to developing capacity of South Sudanese individuals by improving their skills and hands-on experience in areas such as agribusiness, microenterprise, entrepreneurship, agricultural laboratory experimentation, accounting and financial reporting, curricula review and research proposal writing. The partnership also provided long-term training for nine South Sudanese in the areas of limnology/fisheries, animal breeding, food nutrition, wildlife conservation, forestry and mining engineering.

Supporting the academic programs of South Sudanese institutions, the partnership developed a three year diploma program in General Agriculture that contains104 course credits and provides a hands-on technical education in agriculture preparing graduates to be productive and adaptable agricultural leaders. It also supported libraries by providing 4,524 books and journals covering wide range of topics, including plant biology, agriculture and farming, natural resource management, environmental sciences, physics and chemical engineering. Partnership activities have strengthened the infrastructure of the CUoSS campus at Wau by purchasing and building a generator shed, two guard-houses, a borehole for a water supply system, new latrines, and renovated classroom space.

In its outreach programs, the partners have collaborated on Agricultural Trade Fairs, farmer trainings, and farmer surveys conducted by CUoSS students. In this project, undergraduate and graduate students conducted two farmer surveys in Wau and gathered information about vegetables grown and the challenges farmers face in production. Students used a structured questionnaire to collect data and then used their findings to select and train farmers on vegetable production technologies.

With the goal of improving skills of faculty and students, as well as generating new technologies and management practices, partners completed two joint research projects, six mini-grant research programs and several student thesis research projects. These research projects address Feed the Future priorities, such as staple food production, soil quality, the production practices of small- and mid-sized producers, and animal production.

Throughout the performance period, the partnership was affected by the political instability and ensuing conflict and closure of universities resulting in several suspensions of learning and implementation of partnership activities, and ultimately an early closeout of the partnership award.

Finding well prepared candidates for graduate programs in the U.S. was difficult and limited the number of potential beneficiaries of long-term training goals of the partnership. Due to the successive reductions in USAID funding over the performance period, partnership targets and activities had to be reduced significantly, affecting the implementation plan and deliverables particularly the last two years of the partnership program. VT and UoJ/CUoSS partners had not put in place an effective communication strategy and plan, resulting in difficulties in adjusting implementation plans and M&E targets in response to rapidly changing conditions on the ground. Partners were also unable to submit required reports in a timely manner. This resulted in partners providing HED with inconsistent accomplishment data, narratives and supporting documentation. Partners were challenged in addressing data quality issues identified by HED including reporting accurate data, supporting data with documents, and linking reported accomplishments to implementation plans and targets approved by USAID. Partners were unable to submit success stories for each reporting period demonstrating impact of the implementation of project activities.

2. Partnership Overview

Background

The collaboration between Virginia Polytechnic Institute and State University (VT) and University of Juba (UoJ)/ Catholic University of Sudan (CUoSS) was designed to implement a comprehensive plan to restore higher education curriculum and research capacity in South Sudan, in partnership with stakeholders, national research institutions, and NGOs.

The partnership has set out an ambitious agenda to develop a premier and innovative agronomy and crop production degree program and establish an Agricultural Research and Development Center (ARDC) based at UoJ/CUoSS, South Sudan. The Center is hoped to positively impact

agricultural higher education in South Sudan and throughout the Sahel. Graduates from the program will be trained to meet the ecological and agricultural challenges of this fragile, semi-arid environment and provide the human capacity to serve the emerging food export industry.

Partners planned to build agricultural capacity that responds to the extraordinary food security and human capacity development needs of the newly-established nation of South Sudan. The collective vision of the partnership was to adopt a "land-grant university" approach in Southern Sudan through tertiary education, research, and outreach missions.

The partners collaborated and promoted synergies with USG initiatives in Southern Sudan, including Feed the Future (FTF) and Education Development. It also aligned with the USAID Mission's overall Human and Institutional Capacity Development (HICD) strategies and Agricultural Development programs. In particular, they sought to collaborate closely with the newly initiated FARM project to increase smallholder agricultural productivity and food security. The partnership objectives strongly supported the Government of Southern Sudan's strategy of Accelerated Sustainable Development and Eradication of Poverty.

HED/ACE worked closely with VT and UoJ/CUoSS partners toward quality and timely submission of quarterly financial expenditure reports and implementation progress reports. HED has established a monthly conference call involving VT, UoJ, CUoSS, and USAID/South Sudan. Continuous engagement and communication between HED and partners, as well as USAID/South Sudan has provided guidance on issues such as developing monitoring and evaluation plans, budget utilization and realignment, faculty/staff travel, etc.

Goals and Vision

The goal of the partnership was to produce quality agriculturalists to contribute to food security in South Sudan toward creating long-term professional capacity to solve agricultural management challenges in the fragile South Sudan and Sahelian ecosystems.

Partnership Objectives

A shortage of trained agriculturalists at all levels of the food chain system was the major constraint addressed by the Rebuilding Higher Education in Agriculture (RHEA) project. To assist in the assessment of the initial needs, the United States Agency for International Development (USAID/South Sudan) funded a needs assessment through an associate award given to SANREM CRSP, managed by the Office of International Research and Education (OIRED) at Virginia Tech. A key informant survey targeting the public and private sectors in three of the ten states of South Sudan was also conducted.

With the needs assessment as a background and with resources made available by USAID through Higher Education for Development (HED), a strategic planning exercise was held in 2009 to increase capacity in higher education in agriculture and natural resource management in response to the extraordinary short-and long term challenges faced by post-conflict South Sudan.

The strategic objectives of the partnership as identified by the partners were:

1. Enhance agricultural Research, Education and Training
2. Improve delivery of agriculture and natural resources academic offerings in South Sudan
3. Generate knowledge through relevant and quality research
4. Create a quality natural-resources management outreach program that addresses the unique food security and long -term agricultural and natural resource management needs of the South Sudan.

The strategic plan developed in 2009 identified a number of potential collaborating stakeholders, some of which became important partners in the implementation of this partnership:

NGOs:

International Fertilizer Development Center

The IFDC work with the partnership on student demonstrations on university farms, student internships, assisted with the organization of the field days. IFDC provided the students with valuable input and training for the university farm demonstrations.

Dorcas Aid International

Dorcas Aid International provides development assistance and relief aid through sustainable projects. The CUoSS students were attached to the Food Security Thematic Project funded by the EU. The objective of the project is to improve food security through development of sustainable livelihoods for the poor and marginalized households in Western Bahr Ghazal State.

Alliance for a Green Revaluation in Africa (AGRA)

The African Green Revolution (AGRA) with funding from Bill Gates and Warren Buffet partnered with the Ministry of Agriculture at the National level to support research activities. CUoSS students were attached to the Ministry's research stations in Yei, Palotaka and Halima which are funded by AGRA.

Agrolife

Incorporated in 2010 just before the birth of the newly independent South Sudan, Agrolife Ltd is South Sudan's first Agricultural inputs company. Sourcing its quality agro- inputs from some of the world's leaders in the areas of seeds, agro-chemicals, fertilizers, and all farming technologies, Agrolife has been appointed as the agent in South Sudan of Amiran Kenya Ltd., one of East Africa's leading Agribusiness entities in the areas of greenhouses, drip irrigation, agro-chemicals, fertilizers, seeds, and more. In partnership with the RHEA project, AgroLife provided internships to UoJ undergraduates and providing greenhouses, agrochemicals, seeds, and training to UoJ and CUoSS faculty and students. UJ students were attached to the company's stand at the Agricultural Trade Fair and were responsible for demonstrating the technologies to the public.

Government:

U.S. Department of Agriculture

USDA, supported by USAID, offered drip irrigation training to students, faculty, and staff at CUoSS, Wau in March 2012.

USAID Food, Agribusiness and Rural Markets (FARM) Project

The USAID funded the Food, Agribusiness and Rural Markets (FARM) project provides support to Farmer Organizations and Agro- Dealers. The CUoSS students are attached to field offices and are engages in Market research surveys, data collection, extension messaging, farm training and the management the demo plots. The RHEA project personnel met with USAID FARM project personnel regularly. The project's key FARM contact was David Hughes, Chief of Party, FARM Project, Abt Associates. The FARM project provided agricultural inputs (seed and fertilizer) to both South Sudanese partner institutions and in collaboration with AGRA/MAF and IFDC, a 10-week summer internship program for RHEA program undergraduates from CUoSS was offered in Wau.

Ministry of Agriculture, Irrigation and Forestry, Western Bahr, Ghazal State

Various representatives of the Ministry of Agriculture, Irrigation and Forestry (MAF) were consulted and kept up to date on RHEA project activities via visits to their offices and invitations to participate in partnership planning activities. Key representatives include: Loro George Leju Lugor, Director General of Research, Training, and Extension and Timothy Thwol Onak Yor, Director General of Forestry, Ministry of Agriculture and Forestry. MAF at both the state and federal levels have loaned farm equipment (tractors and plows) to UoJ and CUoSS for the development of the experiential learning and research farms. In addition, in partnership with AGRA, MAF hosted undergraduate interns from the CUoSS, Wau during the summer of 2012 for 10 weeks.

Universities:

Virginia State University

Virginia State University (VSU) was a U.S. partner of VT on the RHEA project. VSU does not have graduate programs but has substantial international experience in small ruminants, pond aquaculture, specialty crops, and invasive weed control in Africa. VSU cooperated in programming and implementation and a faculty member from VSU participated in trips to South Sudan in the first two years of implementation. The key partnership members are: Wondimagegnehu Mersie, Associate Dean and Director of Research and Laban Rutto, Assistant Professor of Agronomy, School of Agriculture.

3. Partnership Results and Performance

This section presents results and performance against the partnership's FY 2011-2014 targets. Structured around the partnership's M&E plan, this section outlines the partnership's achievements and progress in relation to the objectives, outcomes and outputs. The partnership's M&E plan and reporting in FY 2011 was not systematized as well as the later years of the program, affecting the quality of data and reports. Furthermore, reporting by subawardees provided little substantiation of reported data and no articulation of some of the accomplishments reported.

3.1 Achievements and Implementation Progress

Objective 1: Enhance Agricultural Research Education and Training (Feed the Future Development Objective)

Outcome 1.1: Ability of the tertiary educational institution to offer relevant and high quality technical education increased

The partnership's effort towards enhancing agricultural research, education, and training were directed towards: i) development of human and institutional capacity for increased sustainable agriculture sector productivity, and ii) increase in technologies or management practices that are made available for transfer as a result of USG support. To reach these outcomes, the partners implemented a combination of activities including short-term training to improve teaching, research skills and long-term training to improve staff capabilities and collaborative research programs.

Short-term training program to improve teaching and research skills

The partnership completed a total of 16 short-term trainings in FY 2012 and FY 2013, which included workshops on proposal writing, research methodology, food technology, and curriculum design and review, and student internships. The data collection methods evolved over the course of this partnership and consequently there are slight variations in the reporting of data on short-term trainings. Unfortunately, the partnership did not report any short-term training during FY 2014 due to the civil and political unrest (Table 1).

Table 1: Short-Term Trainings (FY12 to FY14)

			Number of People		
FY	**Name**	**Duration**	**Male**	**Female**	**Total**
FY12	Accounting and Project Reporting Procedure	One Week or Less	3	0	3
	Employment Preparation: Resumes, Job Search Strategies, and Interview Preparation	One Week or Less	N/A	N/A	20
	Food Processing, Quality Control & Rheology Training Session (2)	One Week or Less	N/A	N/A	30
	USDA Drip Irrigation Training	One Week or Less			5

	Student Internships	Greater Than One Week and Less than Six Months	14	6	20
	Experimental Field Trials	One Week or Less	42	10	52
	Accounting and Project Reporting Procedure	One Week or Less	12	2	14
Total FY12 Trainings					8
FY12 Total Individuals					124
	Food Processing Workshop	One Week or Less	38	8	46
	Curriculum Review	One Week or Less	11	1	12
	Research Proposal Writing Workshop	One Week or Less	54	2	56
FY13	Student Attachment to Agrolife	Greater Than One Week and Less than Six Months	9	6	15
	U.S. Study Tour	One Week or Less	9	1	10
	Kampala Workshop	One Week or Less	5	1	6
	CUoSS Student Attachment	Greater Than One Week and Less than Six Months	30	4	34
	Innovate Conference	One Week or Less	1	0	1
Total FY13 Trainings					8
Total FY13 Individuals					180
TOTAL Number of Trainings					**16**
TOTAL Individuals					**304**

These short-term training programs contributed to developing capacity of South Sudanese individuals by improving their skills and hands-on experience in areas such as agribusiness, microenterprise, entrepreneurship, agricultural laboratory experimentation, accounting and financial reporting, curricula review and research proposal writing. Representatives from UJ faculty, finance, and administration staff who traveled to the U.S. on a study tour were each attached to corresponding departments, faculty, and staff to learn about U.S. university procedures and establish linkages with their hosts while touring teaching and research facilities.

Student Internships

Thirty-four (30 male and 4 female) CUoSS students completed ten-week internships at the following placements:

- USAID FARM project
- the Ministry of Agriculture, Rural Development, Animal Resources, and Forestry/AGRA sponsored Research Stations
- the Ministry of Agriculture, Irrigation, and Forestry, Western Bahr Ghazal State

- Dorcas Aid International and Agrolife

These internships exposed students to a range of practical and theoretical aspects of crop cultivation and management, such as crossing techniques, tractor operation, aspects of seed quality control, farm and seed production field visits, data collection, design and management of experimental field layout, and vegetable production. Additionally, the students were exposed to practical skills in crop production, plant breeding, and data management and were able to relate these skills back to theories they learned in the classroom. Following these ten-week internships, students demonstrated their practical skills by returning to school and preparing their own plots and planting their crops of choice. They submitted weekly reports, interacted and learned from the staff at their posts, learning from their experiences both administration and field-based skills.

Faculty Study Tour to the U.S.

In FY 2013, a group of eight faculty members and finance and administration staff from the UoJ traveled to the U.S. on a study tour of VT and VSU from April 30th through May 10, 2013. The participants included:

1. Dr. Denis Duku Kenyi Odubasa, Department Head, Fisheries
2. Dr. Melton Melingasuk Lado Mogga, Department Head, Animal Production
3. Dr. Pasquale Tiberio Droko Moilinga, Dean, College of Natural Resources and Environmental Studies (Wildlife Scientist)
4. Dr. Augustino Lokule Bongo, Department Head, Forestry
5. Charles Mahmoud Sebit Manya, Department Head, Environmental Studies
6. John Light Abel Gumbe, RHEA Accountant at U of Juba
7. Margaret Wani Sadia Andrea, President's Administrative Assistant
8. Dr. Peter Batali Samuel Gama, Department Head, Agricultural Sciences

This experience enhanced the participants' institutions by helping them to improve teaching and learning methodologies, improve research and outreach activities, strengthen public private partnerships and improve administrative functions of the host country institutions. The team visited the Embassy of South Sudan in Washington, D.C., the Association of Public Land Grant Offices, USAID headquarters, and met with Congressman Frank Wolf. The group also toured several college facilities at VSU and VT, including, the Crop and Soil, Animal Science, Fisheries, Wildlife and Environmental Studies. Each participant was connected with their corresponding departments, faculty, and staff to learn about U.S. university procedures and activities. (See Appendix B.1)

Long-term training programs to improve staff capabilities

In the original plan, partners had anticipated about 25 South Sudanese receiving MSc and PhD level graduate training in various fields of agriculture and natural resource management. With the reduced funding and performance period, the partnership supported and enrolled nine individuals (2 female and 7 male) in long-term training at Stellenbosch University in South Africa, University of Pretoria in South Africa, and Virginia Tech in Blacksburg, VA (Table 2).

Table 2: Long-Term Training Enrolled (FY12 to FY14)

Degree Program	Female	Male	Total
Bachelor	1	0	1
Master's	0	4	4
Doctorate	1	3	4
TOTAL	**2**	**7**	**9**

When the six University of Juba faculty members who were selected to pursue their graduate studies at Virginia Tech took the GRE, they all scored below 140, which typically means the applicant ranks in the lowest 10% of test-takers. In order to meet VT's requirements for enrollment in graduate programs, they were enrolled in an intensive English language course for four months to address the gap in their language skills. They also took a few courses to help adjust to the rigors of the new academic setting and were later admitted to their respective departments. The participants were assigned to departments most fitting for their thesis topics and paired with advisors that were interested in helping them build their capacity as researchers and students. All of the Virginia Tech professors involved spent time with the participants and advised them on their course work. One of the faculty members met with the scholars on a regular basis to check-in on their social and academic acclimation to the new environment. In addition to these regular check-ins, the partnership held a number of briefing sessions to help the participants better adapt to the different stages of their study and lifestyle. The participants faced many challenges due to the timing of enrollment and the competitive nature of the graduate school at Virginia Tech.

The other three faculty identified for long-term training were unable enroll in programs at Virginia Tech because of delays in visas processing and the RHEA staff in Juba were able to find suitable alternative at Stellenbosch University and the University of Pretoria. These three are pursuing their Masters degrees in South Africa under the support of the project (Table 3).

Table 3: Long-Term Training Participants (FY12 to FY14)

Participant	University	Degree Program	Sex
Mr. Raphael F. Talamuk	Stellenbosch University, South Africa	MSc, Limnology/Fisheries	Male
Mr. Samuel Abin	Stellenbosch University, South Africa	MSc, Animal Breeding/Production	Male
Ms. Sandra Balel	University of Pretoria, South Africa	MSc, Food Nutrition/Agriculture	Female
Mr. Martin Baru Serbit	Virginia Tech, USA	PhD Animal Science	Male
Mr. Majengo Jambo Ganja Wura	Virginia Tech, USA	PhD, Wildlife/Conservation	Male
Mr. C. Ruba Bilal	Virginia Tech, USA	PhD, Forestry	Male
Ms. Flora Eyola Severino Lado	Virginia Tech, USA	PhD, Mining Engineering	Female
Mr. John Kutosi Bartholomew	Virginia Tech, USA	MSc, Fisheries	Male
Mr. Emmanuel Musa Atiba	Virginia Tech, USA	MSc, Animal Science/Poultry	Male

A major challenge faced by the RHEA project was finding candidates that had the potential to do well in selective universities abroad. Continuing to improve the screening process of

candidates should be followed in the future. In order to decide which courses are most beneficial for future participants, and to assess the impact of training on work performance and on the pursuit of project goals, a more rigorous form of on-going evaluation is needed.

One lesson from the RHEA project is the need for the implementation of "bridge courses" for all students from South Sudan studying abroad. Such courses should be considered for all participants from conflict environments to supplement their education and ensure that they are ready for the level of difficulty of US courses. This should be in addition to the GRE prep and language courses that most South Sudanese students take before entering their full-time MSc or PhD programs. Moreover, it is critical to institute a training follow-up and evaluation system involving assessments and interviews when participants are studying in the U.S. and also after their return home.

On a related note, a lack of qualified agricultural specialists and professors was a major challenge faced by the South Sudanese Universities, particularly the CUoSS. The partnership program was able to hire a number of faculty members that contributed toward enhanced quality of teaching, research and outreach programs. As a result of these hires, seven new courses were introduced in the CUoSS curriculum, which included classes in horticulture, plant breeding, plant pathology, plant entomology, soil and nutrition management, and soil microbiology.

Outcome 1.2: Technologies or management practices made available for transfer as a result of USG support

Collaborative Research Programs

The partnership reported **two** joint research projects, **six** mini-grant research programs and **twenty** senior students' theses research over the course of the RHEA project.

Joint Research Studies
The partnership conducted two joint research studies during the project implementation period; one on gender studies and the second on higher education in agriculture and natural resources.

1. **Gender Study**

Virginia Tech and University of Juba faculty members developed methodological instruments for a gender assessment in the Universities of Juba, John Garang Memorial University of Science and Technology (JG-MUST), and Catholic University of South Sudan. The Virginia Tech Institutional Review Board authorized their methodologies to protect human research subjects a methodology that includes training and a coding sheet to maintain anonymity. Data was gathered from five focus group discussions and eight key informant interviews, in addition to gray literature on national and university policies regarding gender and education.

The research suggests that early marriages and dowries play a key role in limiting women's participation in higher education. One man responded that sending girls to school is just like putting valuable money in a bad investment. Several women expressed concern that the duration of time required to get an agricultural degree threatens their marriageability. The lack of on-campus accommodations further inhibits women's participation and leaves them vulnerable to

sexual harassment and assault. Finally, many women drop out due to language difficulties; having been schooled largely in Arabic, while the two intensive English courses offered at the university are not sufficient to remedy their limited language skills.

Cultural biases govern perceptions of women's roles in education and agriculture. Many men view women as physically incapable of completing the manual labor and some traditions posit that land worked by a woman loses its fertility and becomes less productive. The absence of women in higher education is viewed by some as reflecting a lack of desire or effort. Overemphasizing women's agency and opportunities muddles cause and effect and leads to the incorrect assumption that women don't participate in agricultural education because they do not want to. Once her degree is obtained, a woman must face the obstacle of finding employment. While men and women both reference governmental cronyism as an impediment to securing state jobs, women face the added resistance of men not wanting to work under them. One woman, while submitting her application for a posting at the Ministry of Agriculture, overheard a man asking, "How can a woman be my boss?"

2. Higher Education in Agriculture and Natural Resources Needs Assessment study

The needs assessment study was jointly funded by Virginia Tech and the Norman Borlaug Institute for International Agriculture - Texas A&M. The purpose of the needs assessment was to identify planning and programming priorities for South Sudanese higher education in agriculture, natural resources, and environmental sciences. The assessment included teaching, research, and extension functions. The needs of the institutions, their curriculums, students, and stakeholders were examined with regard to institutional elements, beneficiaries, and consensus.

Seventy-eight participants recognized the importance of the 14 attributes and the need to sequence the development of higher education in agriculture, natural resources, and environmental sciences. The composite of participants ranked improving instructional technology and library resources first in the sequence of 14 attributes for development.

Improving technological infrastructure & facilities ranked second in the sequence by the composite of participants. Improving outreach, community development & extension was ranked third by the composite group.

Mini-Grant Research Programs

Partners developed clear procedures for applying for Competitive Research Grants (CRG) the Mini-Grants concept were introduced with training researchers and faculty members on how to write proposals. Seven proposals were received from teams consisting of the UoJ (six proposals) and CUoSS (one proposal). These proposals were reviewed by a selection committee that consisted of the deans of the College of Medicine, the Library, and the College Natural Resources and Environmental Committee as well as the Virginia Tech Representative in South Sudan. Six out of seven submitted proposals were selected and were awarded their research grants. The six selected mini-grants demonstrated how technology could improve agricultural processes with the goal of taking the results to market. These research studies unfortunately had to be discontinued because of the conflict in-country.

The titles of the six mini-grant research programs:

1. The Cassava Project: Introduction of well-adapted, high-yielding and early maturing varieties. The Cassava Project was launched by collecting ten different cassava cultivars from the Yei Research Station, women's development groups, and farmers from Wau and Tombora.
2. The Striga Project: Sorghum yield and striga infestation study. The project tested an indigenous species, Hyptisspicigera that shows great potential as an agent of biological control (a trap crop) of Striga.
3. The Cowpea Project. The cowpea research project was looking at four cowpea landraces and one exotic line from the International Institute of Tropical Agriculture.
4. The distribution patters, community structure and habitat use of small mammals in South Sudan.
5. Assessment of the contribution of indigenous fruit trees and their integration into farming systems of Central Equatorial State for sustainable livelihoods and improved food security.
6. Assessing the determinants of maize productivity in South Sudan.

Student Research

In an effort to improve the curriculum and research capacity at CUoSS, the RHEA project asked students in their final year of school to conduct research projects to support their knowledge of the agricultural field. Twenty fifth year students conducted research for their senior theses that included a written proposal addressing the problem they wished to investigate. The topics of these senior theses included, animal husbandry, the environment, vegetable and field crops, field experiments that evaluated different varieties of maize and sorghum and their response to fertilizer, and a survey on the status of agricultural extension services in rural areas.

These final year student research projects were very successful but the RHEA project team noted that helping the students design quality research projects was a challenge. In order to keep these successful programs going, the project recommended holding annual in-house reviews of research programs at both UoJ and CUoSS to provide quality assurance for the research proposals. The in-house review should focus on several questions, including the relevance of specific research to increased food security, target groups and areas, collaborative efforts with other institutions such as AGRA, FAO, SPARK, the Ministries of Agriculture, Forestry and Rural Development and Environment, extension systems, and other universities with agriculture programs.

Objective 2: Improved delivery of agriculture and natural resources academic programs (Higher Ed Objective)

Outcome 2.1: Improved infrastructure and human resources required for quality teaching programs

The partnership's effort towards improving the delivery of agriculture and natural resources academic offerings at CUSS and UoJ focused on: i) improving infrastructure and human resources required for quality teaching programs, and ii) developing a new certificate and

diploma programs in agricultural production, and iii) increasing tertiary education access to underserved and/or disadvantaged.

Infrastructure Development
Through the RHEA project and the generous support of USAID/South Sudan, the partners completed a total of $750,200 worth of small infrastructure development activities, mainly at the CUoSS campus at Wau. The partners utilized these funds to renovate existing classrooms and construct a four bedroom guesthouse with sewage and draining, a generator shed, a four-door pit latrine, a two-door pit latrine, two guardhouses with gates, and fences on campus. The RHEA project also built a farm drilling borehole that created a water supply system with overhead water tanks and a 40-feet steel container. (See Appendix B.2)

Books and Journals
Increasing the library holdings, the partnership collected and shipped a container of 4,289 donated books and journals to both UoJ (1,858 books and journals) and CUoSS (2,431 books and journals). In addition, 12 computer monitors with keyboards and one back-up power supply were donated to UoJ and CUoSS The donations were a result of a campaign launched by VT to collect materials to improve the quality of teaching, research and student learning at their South Sudanese partner institutions. The transport of the container was paid for by the RHEA project and the total estimate of the container's contents is $82,267.

The books and journals donated and purchased by the RHEA project covered a wide range of topics including, Physics, Chemical Engineering, Plant Biology, Agriculture and Farming, Natural Resources Management, and Environmental Sciences.
The RHEA project purchased 25 computers (20 desk tops and 5 laptops) for CUoSS. The laptops are being used by the faculty and the students for research work while the desktops were installed in the computer lab which was being renovated with USAID assistance.

Outcome 2.2: Restructured tertiary level programs and curricula

Develop new certificate and diploma programs in agricultural fields

Over the course of the project, the partners worked to develop and improve the curriculum of both UoJ and CUoSS. CUoSS leaders and VT faculty members developed a diploma program in General Agriculture. . The goal of this three year diploma program that contains104 course credits was to provide a hands-on technical education in agriculture that would better prepare graduates to be productive and adaptable agricultural leaders. The curriculum would be broad based and have courses in Animal production, Crop production, Agribusiness, Applied Agricultural Math, Computer Applications, and Communication Skills. The curriculum was expected to begin in the 2014 academic year. However due to the university closures and major civil conflict in South Sudan, this curriculum has yet to be implemented. The curriculum also contains an additional track of a five year BS degree that encompasses 170 course credits.

Prior to the early closure of the RHEA project, CUoSS set-up an agreement with the University of Nairobi to have all degree programs reviewed by the university for affiliation with

CUoSS/FAES. This review process was also scheduled to take place in FY14 but did not occur due to civil unrest and the early close-out of the partnership.

Outcome 2.3: Improved quality of teaching and student-learning

Increase tertiary education access to underserved and/or disadvantaged

The partnership defined all South Sudanese students as underserved or disadvantaged groups. Therefore, all individuals who were offered admission to certificate or degree programs were considered as underserved or disadvantaged. The majority of students from disadvantaged and underserved groups accessed undergraduate program at these institutions. There was a significant lack of balance in gender ratio. The trend of disproportionate numbers of males accessing higher education is present across all educational levels.

Over the course of the RHEA project, the partners recognized that one of the major barriers to access for underserved and disadvantaged groups are institutional policies and admission procedures. To increase access to underserved and/or disadvantaged students, CUoSS created remedial programs and courses for their applicants who scored below a passing level on the entrance exam. Rather than be denied admissions, these applicants were required to attend a four-week intensive course in English and/or Mathematics. The partners noted that the performance of the UoJ faculty in foreign graduate programs highlighted the importance of undergraduate preparation of South Sudanese citizens. The nine faculty selected for long-term trainings were not considered disadvantaged by South Sudanese standards but their low performance on the GRE and entrance exams demonstrated the educational disadvantages of being training in South Sudan and reaffirmed the expectation that 100% of the students at UoJ and CUoSS are considered disadvantaged. This provides an additional imperative for a concentrated effort towards improving the human and institutional capacity of CUoSS and UoJ.

Objective 3: Generate knowledge through relevant and quality research (Higher Ed Objective)

Outcome 3.1: Collaborative research programs established

Under this objective, the partnership focused on establishing collaborative research through implementing on-farm research programs and establishing experimental field stations in South Sudan. Progress towards this objective was measured with the two higher education indicators presented in Table 4 below:

Table 4: Objective 3 Indicator Results

Indicator Name	FY12	FY13	FY14	Project Total
Percent of Academic certificate and/or degree programs supported through the partnership that include new and/or enhanced experiential and/or applied learning opportunities*	0%	0%	0	0

Number of U.S.-host country institution joint development research projects	1	1	0	2
Number of new research collaborations established between USG-supported beneficiaries and other collaborators	0	3	0	3

*Although the diploma program developed by partners includes experiential learning, it has not been implemented and is not reported here.

Objective 4: Create a quality natural-resources management outreach program that addresses the unique food security and long-term agricultural and natural resource management needs of the South Sudan (Higher Ed Objective)

Outcome 4.1: Increased outreach activities

The partnership worked towards an outcome of increased capacity of tertiary educational institutions to deliver outreach programs by seeking to secure resources required for outreach programs, establishing outreach coordination groups and disseminating university-based research results.

Outreach/Extension Activities

Overall during implementation, the partnership conducted 11 major outreach activities (Table 5). These activities included extension field visits, farmer trainings, and agricultural trade fairs in Wau and Juba.

Table 5: Outreach/Extension Activities (FY12 to FY14)

FY	Reporting Period	Type of Activity	Duration	Number of People Reached/In Attendance
	Q3Q4	Training - land preparation	More than 1 Week	7
	Q3Q4	Training - planting	2 Days to 1 Week	7
FY12	Q3Q4	Training - weeding	More than 1 Week	7
	Q3Q4	Training - pest control	More than 1 Week	7
	Q3Q4	Training - harvesting and threshing and storage	More than 1 Week	14
FY13	Q1Q2	Students Farmer Survey	N/A	N/A

Q3Q4	Agricultural Trade Fair	2 Days to 1 Week	135
Q3Q4	Agricultural Trade Fair	2 Days to 1 Week	380
Q3Q4	Farmer Training	More than 1 Week	7
Q3Q4	Students Farmer Survey	More than 1 Week	15
TOTAL			**579**

Agricultural Trade Fairs in Wau and Juba

The University of Juba and Catholic University of South Sudan, jointly with JG-MUST, participated in the second Agricultural Trade Fair organized by the Ministry of Agriculture. Over 1,200 leaflets were distributed to advertise the quality of agricultural training offered at the two universities. Each university had their own booth at the fair. The booths were visited by about 380 people, including youth, officials of the Ministry of Agriculture, including the Hon. Michael Roberto Kenyi Legge of the Ministry of Agriculture, Central Equatorial State. CUoSS participated in a similar Agricultural Trade Fair at the State (Western Bahr el Ghazal level held in Wau. About 135 people visited the booth. Thirty five CUoSS students participated, among whom six were female students. The visitors enjoyed training conducted by the students on production of major crops in South Sudan and the display of farm produce from the university farm.

Farmer Trainings

Farmers were provided with an opportunity to learn and practically experience production of major field crops grown in South Sudan namely sorghum, maize, ground nut and cowpea. Farmers were trained on how to establish these crops by land preparation and row planting with the correct plant spacing. They were also trained on crop husbandry that is how to control diseases and pest on these crops and also harvesting of the crop at maturity. The trainings were done by Samuel Wanjohi of CUoSS around Wau in August 2013.

Farmer Surveys conducted by students

15 CUoSS students conducted a survey on farmer activities in Wau County. The students gathered information about the vegetables grown and the challenges farmers face in production. A structured questionnaire was developed and used by the students to collect data. Locations surveyed were Mboro, Hai Janine, Ngomini and Masna in Wau County. A total of 136 females and 130 males were interviewed on the type of vegetable they grow and the challenges encountered in their production. Preliminary analysis shows that 98% of the farmers produce vegetables. The vegetables produced near Wau are okra, tomato, kudra, eggplant, rigla, butternut squash, and pumpkins. Okra is the vegetable most frequently grown by farmers followed by tomato and kudra. The majority of the farmers reported that seeds and water are available, but agrochemicals (synthetic fertilizer and pesticides) are not accessible. About 74% of the farmers rely on entirely rain-fed agricultural systems. This information and other information from the survey will be used to select and train farmers on vegetable production technologies.

3.2 Challenges

Conflict and political instability. The conflict which started in mid-December and the subsequent political instability have created tension and suspension of learning and implementation of partnership activities. Partners had to evacuate all U.S. and third country nationals out of South Sudan and stopped all project implementation activities in South Sudan. Partners had difficulty implementing student training activities and short-term faculty development programs, developing the experiential learning farm and recruiting faculty members for graduate studies. Political instability has also affected availability of materials and supplies for renovation works.

University Closures. The University of Juba was closed to students for first 10 months of the RHEA project. It opened Dec 5, 2011 and it closed again on March 28, 2012 due to student fighting between tribal groups. The University was again closed immediately following the December 2013 civil unrest that most students failed to report back to school once things started showing semblance of normalcy missing a semester.

Student preparation for graduate programs and difficulty in Obtaining Visas. A major challenge faced by the RHEA project was finding candidates that had the potential to do well in selective universities abroad. Students had challenges of passing GRE tests and following courses in English. A continuous support provided by partner institutions coupled with a more rigorous form of on-going evaluation contributed to the success of these students continuing their studies. Graduate training and faculty study tours in the US have been delayed because of the inability to obtain US visas because few South Sudanese had South Sudan passports and because their Sudan passports were no longer valid. The US Embassy does not issue visas in the South Sudan. South Sudanese must travel to other countries to obtain a US visa, and trainees had to travel to Nairobi to obtain US visas. To address these challenges, VT supported participants in obtaining passports, completing exchange visitor required forms, online visa application and visa scheduling and facilitated with pre-departure preparations.

Financial Reporting, Invoicing & Reimbursement. At the start of the partnership program, partners faced a challenge in finding a bank that could open an interest bearing account for UoJ. This resulted in delayed transfer of funds from VT to UoJ. Later in the project, invoice processing delays experienced by both UoJ and CUoSS affected timely financial expenditure reporting and overall project implementation. Partners trained staff from UoJ and CUoSS in accounting, basic computer skills and introduction to the VT invoicing system. Staff from South Sudan also participated in the FY 2013 study tour to the U.S. to provide greater familiarity with university systems in the U.S. The development of an invoice log to track the processing of RHEA invoices and periodic telephone conversation to discuss financial and other implementation issues helped improve the situation.

Reporting & Data Limitation. Due to the reduction of the award amount in the course of initial implementation, partnership targets and activities were reduced significantly, affecting the implementation plan and deliverables particularly the last two years of the partnership program. Throughout implementation the partners provided HED with inconsistent accomplishment data, narratives and supporting documentation with little elaboration on

accomplished activities. Partners were challenged in addressing data quality issues including reporting accurate data, supporting data with documents, and tying reported accomplishments with agreed implementation plans and targets. Partners were unable to submit success stories for each reporting period demonstrating impact of the implementation of project activities.

Communication Challenges. VT and UoJ/CUoSS partners were unable to provide information and reports in a timely manner. Although the hiring of a Chief of Party based in Juba by VT and establishment of a staffed program office there, was helpful in bridging the gap, timely submission of quality and comprehensive programmatic and financial reports and substantiation of data continued to be challenging throughout the life of the project. Challenges of phone and internet connectivity in South Sudan also affected ability of partners to communicate effectively.

3.3 Lessons Learned

Enormity of the capacity challenges in South Sudan. While there was never any doubt that there were endless needs in terms of physical and technical capacity at UoJ and CUoSS, this project has brought to light the degree of limitations in human capacity at these institutions. Implementing research and teaching programs is particularly difficult when the students, faculty, and staff have all been isolated from current international practices by long-term civil conflict. Truly sustainable human and institutional capacity improvements are beyond the scope of a five year partnership project. For a project in this environment to be genuinely successful, all stakeholders will have to provide great efforts, especially the faculty and staff at the South Sudanese institutions.

Project Administration. In the initial stages of project planning, the U.S. partners greatly overestimated the capacity of the South Sudanese partners to manage budgets, implement programs, and undertake education abroad. The lack of strong synergy between program and financial units of the U.S. institutional partner also affected processes such as budget realignment, understanding differing system (such as encumbered funding and advances), aligning activities with budget and timely reporting. It is essential to have clearly agreed upon guidelines and procedures in place as early as possible. A dedicated administration at all sites is essential to maintain oversight of all project activities and facilitate communication on contractual and administrative matters between institutions. For a project in this environment to be genuinely successful, great efforts will need to be made on all sides of the table, especially by the assigned project managers, financial and grant managers and overall leaders of such projects.

HED/ACE Programmatic Support. HED/ACE's programmatic support to partners attempted to ensure effective implementation of partnership activities and provide essential technical assistance to partners in the areas of developing and periodically revising clear results framework (RF), partnership monitoring plan (PMP) and partnership implementation plans (PIP), as well as reporting in PRIME. HED established a monthly conference call involving VT, UoJ, CUoSS and USAID/South Sudan. Despite phone connection problems between the U.S.

and South Sudan, the calls enabled HED and partners to troubleshoot challenges and support of successes in implementation, as well as creating common understanding on challenges and issues related to implementation. USAID/South Sudan provided guidance on issues such as developing monitoring and evaluation plans, procurement of goods, faculty/staff travel, etc. Annual monitoring visits to the field has provided opportunities for all parties to meet face-to-face and provide technical assistance and troubleshooting.

4. Success Stories

Experience Beyond the Classroom: Intern Success Stories

The following intern success stories feature Catholic University students who participated in the Rebuilding Higher Education in Agriculture (RHEA) project's internship program.
The fifty-four students who undertook internships are enrolled in the General Agriculture undergraduate degree program at CUoSS. Each spent ten weeks on site at placements ranging from for-profit companies, non-profit organizations, and government ministries.

Students were asked to respond to the question, "What did you learn from the attachment/ internship?"
Agnes Angua. "I have gains skills and knowledge, during my internship .The experience has influenced me both, politically, socially .economically, morally and practically, because of interaction with people of different backgrounds in and outside the work place. The experience exposed me in the field of agriculture and agro business". I was not convinced of my career path before this internship, she confesses. The most valuable part was the experience learning about the path I want to take for my professional career and the type of organization that fits my career goals.

Moses Jenty. "What I like most is the practical approach to learning that I have experienced during the internship program, the application of fertilizer (topdressing) and planting of crops, thinning and weeding," Thanks to the Catholic University for providing this opportunity. I developed skills which cannot be taught in the classroom and skills that I can use for the rest of my life.

John Chuol Kuol. We have learned about planting techniques, especially crop spacing, planting of crop with calculated fertilizer (DAP) and also application of urea when it reaches the knee height. We learned how to weed, thinning and crop management system. I am excited about my involvement in the internship because I have known the different types of seeds, crops and crop infestation pests and diseases. I was able to properly plant and apply fertilizer while working under my supervisor. Just knowing I was able to accomplish something like that was a very good feeling.

Moses Gum Degur. I like the several trainings I have been attending, especially the business management training organized by IFDC/AGMARK which introduced me to basic business terms, like stockiest, markup, turnover, fast lines and pricing. We also learned about how to start a business and run it have learnt about unique environmental conditions associated with particular level of the government, such as national, state, county and even at grass root level and the nonprofit sector. The exposure has provided me with academic demonstrated competence and a hands-on experience in either public or nonprofit sector. This internship provided me with the opportunity to explore my options. I have a much better understanding of the direction I want to pursue, and that is agribusiness.

Regina Tito Mabior. In my internship, I was able to work on a variety of activities from on-station research to on-farm research on famers' fields, small, medium and large scale farmers. As part of our internship, we were to help with the training of farmers. The most important things I learned were to be confident and to be able to adapt to any situation.

Majok Ignatius Matou. The attachment provided real practical world experience in the agriculture field. With my interest to become a research scientist, the internship experience has extremely been beneficial. Working with five interns we successfully managed five trials on maize, rice, cowpea, groundnuts and sorghum. The most valuable part was the experience in how to keep time in doing research.

Majok Deng Majok Bak. I gained enough practical knowledge from the extension workers that will help me when I join the field in the future. I have been able to work with experienced extension workers and learned how to work as a team to achieve results. It was the day –to day hands –on experience that I have valued most from my internship.

Deng Madut Deng. He was assigned to intern at the Yei Research Station, one of the key research centers in South Sudan. Deng values his internship as truly great. The most valuable part of his internship was the real application of the courses taught in the classroom. He explains that internship provided him the opportunities to not only apply the concepts he learned in the classroom but also gained knowledge from his supervisors and colleagues. He commented that Yei Research Station is a great place to learn how to do research.

Justin Charles Mbarote. From the first day of my internship, I was expected to follow the schedule, keep time and participate in all the aspect of the office work. This internship experience has been great, and I think it is one of the most valuable things I have done at the Catholic University. I highly recommend it to all the students and I ask the Vice Chancellor and Virginia Tech to improve it every year.

Agnes Davis Modi. During my internship, I was involved in visiting farmer groups and helping to organize training workshops. I also helped to carry out farmer's survey. My internship convinced me that I was studying the right field.

5. Appendices

Appendix A: Publications & Joint Research Projects

Please see page 33 of the VT Final Report.

Appendix B: Other Research Grants and Activities

B.1 Infrastructure Improvements

Renovation of Existing Classroom Space, CUoSS, Wau (2013)

New borehole and water supply system, CUoSS, Wau (2013)

New Two-Door Latrine, CUoSS, Wau (2013)

Installation of New Fence, CUoSS, Wau (2013)

B.2 In-Kind Donated Textbooks and Journals

RHEA Staff unloading shipping container of books in Juba (2012)

New CUoSS Library (2012)

Appendix C: Virginia Tech Final Report

See separate pdf file titled, "Appendix C_Virginia Tech Final Report."

2014

Higher Education for Development and Virginia Tech

FINAL PARTNERSHIP REPORT

WITH CONTRUBTIONS FROM: DR. KURT RICHTER, DR. MARIA MULLEI, DR. KHALED HASSOUNA, AND ANTHONY LIZAN

JUNE 30, 2014

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Introduction & Partnership Overview

After almost fifty years of civil war, the higher education system in Southern Sudan was left in a state of crisis as it attempted to deal with the immense challenges of post-conflict reconstruction and development. The Comprehensive Peace Agreement (CPA) and later independence in 2011 offered an opportunity to begin the long process of rebuilding the human capacity necessary to promote economic growth, increase food security, and maintain the peace. Higher education in agriculture, the source of livelihood for the vast majority of the population, together with sustainable management of the rich natural resource base of the region was seen as offering the best opportunity for near and intermediate-term impact.

In this context, that the establishment of a technically qualified, professional agricultural extension cadre with a production and practical orientation may hold the key to South Sudan's future. It was this need that the Rebuilding of Higher Education in Agriculture was designed to address.

Partnership Objectives

A shortage of trained agriculturalists at all levels of the food chain system was the major constraint addressed by the Rebuilding Higher Education in Agriculture (RHEA) project. To assist in the assessment of the initial needs, the United States Agency for International Development (USAID/South Sudan) funded a needs assessment through an associate award given to SANREM CRSP, managed by the Office of International Research and Education (OIRED) at Virginia Tech. A key informant survey targeting the public and private sectors in three of the ten states of South Sudan was also conducted.

With the needs assessment as a background and with resources made available through Higher Education for Development (HED), a strategic planning exercise was held in 2009 to increase capacity in higher education in agriculture and natural resource management in response to the extraordinary short-and long term challenges faced by post-conflict South Sudan.

The strategic planning workshop came up with the following major objectives:

- **Enhance** university level teaching, research, and outreach programs in agriculture and natural resources management.
- **Train** university students, faculty, and staff in South Sudan through teaching, research, and outreach collaboration between South Sudanese and U.S. university faculty.
- **Support** graduate studies for South Sudanese faculty members in U.S. and African universities, who will then return to South Sudan to teach at their home universities.

In March of 2011, the RHEA project formally commenced with initial funding of $9.47 million. The project was originally slated to last five years and was a partnership between USAID, Higher Education for Development, Virginia Tech, Virginia State University, the Catholic University of South Sudan (CUoSS) and the University of Juba (UoJ). However, due to the ongoing conflict plaguing South Sudan, the project ended in the summer of 2014.

Summary of Activities and Key Achievements

The following section outlines RHEA's main activities. Brief summaries of each activity as well as their impacts are included. More detailed descriptions are included in the "Partnership Results" section.

1. Teaching program

Four new Agricultural lecturers were provided for the Faculty in of CUoSS at Wau and seven new courses were introduced in the curriculum, which included topics such as: horticulture, plant breeding, plant pathology, plant entomology, soil and nutrition management, and soil microbiology.

2. Curriculum review and revision

A Diploma program in General Agriculture at CUoSS was developed with help of Dr. Pavli Mykerezi and Dr. Jim McKenna from Virginia Tech. A curriculum was prepared and shared with all faculty members in January of 2013. The curriculum contains 104 credits, and will begin to supplement the inadequate agricultural training that currently exists.

3. Research Program

The Research Program for both partner universities was restructured with the advent of the "Mini-Grants" concept, which gave faculty members the opportunity to receive competitively awarded funding based on the strength of their research proposals. Seven grants were received in total: 1) six grants for UoJ faculty members and 2) 1 grant for a CUoSS faculty member. Six out of the seven were awarded.

4. Students Research

Fifth year students at CUoSS carried out research for their final senior theses. A total of 20 students investigated topics such as: 1) maize & sorghum 2) local agricultural extension programs 3) vegetable and field crops 4) environmental issues, and 5) animal husbandry.

5. Joint Research Program

Two joint-research projects were conducted by faculty from Virginia Tech, UoJ, and Texas A&M. The first study was a gender assessment of CUoSS and UoJ conducted by Dr. Maria Elisa Christie and Laura Zseleczky of Virginia Tech and Dr. Asha Rahim of UoJ. Dr. Glen Shinn of Global Consulting Solutions and Texas A&M conducted a needs assessment study regarding agriculture and natural resource management. Please refer to Appendix VII and Appendix VIII respectively for full research results.

6. Students' attachment

The students' attachment consisted of ten-week internships with the USAID-FARM project , the Ministry of Agriculture, Rural Development, Animal Resources & Forestry/AGRA sponsored

research stations, the Ministry of Agriculture, Irrigation & Forestry of the Western Bahr Ghazal State, Dorcas Aid International and Agrolife (a private sector company). A total of 49 students, 34 from CUoSS and 15 from UoJ, completed these internships and gained valuable practical skills, which they demonstrated when they returned to school.

7. Short-Term Training

Short-term trainings at the UoJ included seminars and workshops on proposal writing, research methodology, food technology, and curriculum design and review. For FY 2013, there was a total of 8 short-term training events that served 144 individuals.

8. Long-term Training

USAID-RHEA has supported 12 MSc or PhD students in agriculture or natural resource management fields at various renowned universities in the US and Africa. Six students are currently studying in the US; four at Virginia Tech and two at Virginia State University. The six remaining students are attending or are planning to attend the University of Pretoria (three students), Stellenbosch University (one student), and the University of Nairobi-Kenya (two students).

9. Study Tour

In May of 2013, a mixed group consisting of faculty members and finance and administration staff from the University of Juba attended a short study tour in the United States. They were hosted by Virginia Tech and learned about ways that to improve teaching and learning methodologies, research and outreach activities, public/private partnerships and administrative processes within their home institution.

10. Infrastructure Improvement

The RHEA project invested a total of $750,200 to support the Catholic University of South Sudan's campus in Wau with needed infrastructure improvements. Most of the money was allocated to improve the physical campus, increase security, and develop better learning environments for the students.

11. Outreach Activities

Several extension and outreach activities were initiated during the project period. These included farmers' field days, agricultural trade fairs in Wau and Juba, farmer trainings and we also conducted 266 farmer surveys.

Summary of Impacts:

Over the past three years, the RHEA project has made valuable and sustainable impacts on the development of South Sudan. Because of the project:

- The CUoSS campus at Wau has improved facilities that include: a generator shed, two guard-houses with gates, a borehole to install a water supply system, 40ft steel container, new four-door and two-door latrines, and renovated classroom space
- CUoSS also has a new agricultural curriculum and diploma program that includes seven new classes
- 900+ individuals have been reached or received training in a myriad of useful subjects, including:
    - 6 scholars from UoJ and CUoSS were successfully trained in proposal writing and research project development for the Mini-Grant project
    - 12 full- time students are on their way to receiving graduate degrees at top universities
    - 250 members of the local community have been reach through the Farmer field days
    - 280(50 female and 230 male) people at the Juba trade fairs
    - 135 (90 male and 45 female) people attended our trade fair in Wau
    - Valuable data has been gathered from 266 farmers (130 male and 136 female) through our farmers survey program

Training people with the requisite skills to improve their livelihoods, institutions, and ultimately South Sudan as a whole has been our key strength as a project.

Partnership Results

Key Achievements

Over the past three years, the RHEA project has implemented numerous activities to assist the fledgling country in its post-war development. The strengths of the RHEA project can be divided into four distinct categories:

1) Human and Institutional Capacity Development
2) Research Activities
3) Infrastructure Improvement
4) Outreach and Extension

The following lists RHEA's achievements. Each activity and key achievement can be classified into one or more of the above categories, and each section outlines how the achievement was implemented, the major challenges of implementation, and recommendations on how to overcome these challenges.

Human and Institutional Capacity Development

1. ***Teaching program***

A lack of qualified agricultural specialists and professors was a major challenge faced by the Catholic University of South Sudan. Without a substantive faculty, CUoSS would be unable to adequately educate its students.

To mitigate this problem and enhance the quality of teaching, research and outreach programs, the RHEA project found five new agricultural lecturers and hired them onto the CUoSS faculty at Wau. The lecturers include:

1) Mr. Samuel Wanjohi—MSc in Crop Science and plant research
2) Dr. Poi Kwor Ding—PhD in Soil Sciences
3) Mr. Joseph Mebarahitu—MSc in Horticulture
4) Mr. Aduol Malwa—BSc in Plant Pathology and Entomology
5) Clarice Gombe—MSc in Soil and Nutrition Management

As a result of the new hires, seven new courses were introduced in the CUoSS curriculum, which included classes in: horticulture, plant breeding, plant pathology, plant entomology, soil and nutrition management, and soil microbiology.

2. New Curriculum Development

To complement the new lecturers at the CUoSS, RHEA leaders saw a need to help them build a curriculum to train the next cohort of students. To do this, the project enlisted the help of Dr. Pavli Mykerezi and Dr. Jim McKenna in 2012.

Dr. Mykerezi is the Director of Agricultural Technology Program at Virginia Tech. He has extensive experience in curriculum development and teaches courses in Applied Agriculture, Mathematics, Agribusiness and Information Systems, Automated Accounting for Agriculture, Application of Computers, and Contemporary Agricultural Issues.

Dr. McKenna is a Professor Emeritus of Agronomy in Virginia Tech's Agricultural Technology program. He is also the former Interim Department Head of Virginia Tech's Crop, Soil, and Environmental Sciences Department. He has taught courses in Agronomic Crops, World Crops and Systems, Advanced Cropping Systems, and many other courses.

With the help of CUoSS leaders, Drs. Mykerezi and McKenna developed a program in General Agriculture. The curriculum was prepared and shared with all CUoSS faculty members in January of 2013 and was expected to begin in the 2014 academic year. The first graduates were expected to complete the program in 2017. The curriculum contains two tracks: a 5 year BS degree that encompasses 170 course credits and a 3 year diploma program that contains104 course credits. Please see Appendix I for a breakdown of the academic structure. The diploma program, once started, would begin to supplement the inadequate training that currently exists in agriculture.

The goals of the diploma program would be to provide a hands-on technical education in agriculture and related areas and prepare graduates to be productive agricultural leaders with the ability to adapt to an ever-changing agricultural sector.

The curriculum would be broad based and have courses in:

- Animal production
- Crop production

- Agribusiness
- Applied Agricultural Math
- Computer Applications
- Communication Skills

Unfortunately, the curriculum has yet to be implemented because of the major conflict occurring throughout South Sudan.

Our recommendation is to have the curriculum fully implemented as soon as the violence subsides and the student body returns to full capacity at CUoSS.

3. Students' Attachment

Thirty-four (30 male and 4 female) CUoSS students and fifteen (13 male and 2 female) University of Juba students completed ten-week internships with the USAID FARM project, the Ministry of Agriculture, Rural Development, Animal Resources & Forestry/AGRA sponsored Research Stations, Ministry of Agriculture, Irrigation & Forestry, Western Bahr Ghazal State and Dorcas Aid International and Agrolife, a private sector company. The students were exposed to a range of both practical and theoretical aspects of crop cultivation and management, such as crossing techniques, tractor operation, aspects of seed quality control, farm and seed production field visits, data collection, design and management of experimental field layout, and vegetable production. Additionally, the students were exposed to practical skills in crop production, plant breeding, and data management and were able to relate these skills with the theory they learned in the classroom.

Furthermore, the students were able to demonstrate practical skills by returning to school and preparing their own plots and planting their crops of choice. They submitted weekly reports, interacted and learned from the staff at their posts—learning from their experiences, both administration and field-based skills.

Attachments/internships offer students a period of practical experience in the industry relating to their field of study. This experience is valuable to students as a means of demonstrating how their studies are applied in the "real world." Moreover, the work experience is highly attractive to potential employers. Future student internships are strongly encouraged

4. Short-Term Training

Short-term trainings for students and faculty at both universities increased during the course of the project. Seminar and workshop series included presentations by Virginia Tech visiting exchange faculty, administration and TA team members on such subjects as: research proposal writing, research methodology, food technology, and curriculum review.

Of the 18 activities that benefited over 900 individuals, 144 people were reached through the short-term training program. These included seminars and workshops, both in-country and in the region, that included adjunct and exchange faculty as instructors. Figure 1 below outlines eight short-term activities and the number of people reached.

Figure 1. Short-Term Training Results

Training Event or Workshop	Number of Participants Reached
Food Processing Workshop	46
Proposal Writing Workshop	56
Curriculum Review Workshop	12
IFDC Regional Workshop in Tanzania	1
Kampala Workshop	6
Joint InnovATE Workshop in Fairfax, VA	1
CUoSS Student Farmers Survey	15
CUoSS Farmer Training	7
Total:	**144**

These workshops together with frequent college and departmental meetings have greatly facilitated communication among the departments and among faculty.

5. Long-term Training

Under the degree training component, 25 South Sudanese were to receive graduate training in various fields of agriculture and natural resource management. The training was primarily limited to MSc and PhD level programs. Although the sub award specified post-BSc participant training, feedback from US and regional universities recognized that some participants may require one or more extra years to complete MSc training. Moreover, the extra time may take place in the region or in the US depending upon field of study and the available budget.

To date six participants have been sent for training to Virginia Tech, two of which transferred to Virginia State University. One student was sent to the University of Pretoria and two to Stellenbosch University in South Africa. Of the first group of the six students, all are making satisfactory progress, though the six US participants underwent necessary language training for six weeks. One in South Africa terminated after year at the University of Pretoria.

Of the second group to attend regional universities only one joined the University of Pretoria in January 2014. The three participants will join regional universities in August, bringing the total to 12(excluding the one who was terminated). Virginia Tech believes that all twelve will complete their degree programs with USAID-BHEARD funding. (Please refer to Appendix II for a full list of students, their disciplines and academic statuses.)

The general procedure for selecting and placing training participants follows:

University of Juba

1) Department heads nominate the candidates and identify the field area of study.
2) A committee composed of department heads, chaired by the Dean of the College of Natural Resources and Environmental Sciences, and RHEA representatives reviews the list.

3) The Candidates are then submitted to the Vice Chancellor for final approval.
4) The list is forwarded to Virginia Tech, the Implementing Agency for placement to US and regional universities.
5) When candidates have been admitted to universities in the US, required documents are presented to USAID for review and security clearance. USAID needs approximately six months lead-time to appropriately review, do security clearance, apply for visa etc.

Catholic University

1) Candidates are identified at a Faculty departmental meeting.
2) The names are then forwarded to the Vice Chancellor for approval.

The process of nominating and approving candidates for both universities usually includes a review of the following factors:

- Length of service
- Overall training needs of the department
- Job performance
- Interest in the training
- Prior training opportunities
- Whether he/she can be spared from job responsibilities
- Type of job candidate presently performing
- Gender

A major challenge faced by the RHEA project was finding candidates that had the potential to do well in selective universities abroad. However, the selection of participants has improved since 2013, attributable in part to the conscientious efforts of Virginia Tech and USAID Participant Training Officer. Continuing to improve the screening process of candidates should be followed in the future. In order to decide which courses are most beneficial for future participants, and to assess the impact of training on work performance and on the pursuit of project goals, a more rigorous form of on-going evaluation is needed.

The RHEA project recommends the implementation of "bridge courses" for all students studying abroad. These courses should be offered to participants from conflict environments to supplement their education and ensure that they are ready for the level of difficulty of US courses. These bridge courses can be offered either in South Sudan or in the U.S. as part of the overall long-term training program. This should be in addition to the GRE prep and language courses that most South Sudanese students take before entering their full-time MSc or PhD programs. Moreover, USAID should institute a training follow-up and evaluation system involving assessments and interviews when participants return home.

Research Activities

6. Joint Research Studies

Two following joint research studies were conducted during the project implementation period.

Gender Assessment in Agricultural Universities

The study assessed gender issues in the colleges/faculties of agriculture and natural resource management at the three universities in South Sudan: University of Juba, Dr. John Garang Memorial University of Science & Technology (JG-MUST) and Catholic University –Wau.

The study was carried out by Dr. Maria Elisa Christie and Ms. Laura Zseleczky of Virginia Tech and Dr. Asha Abdel Rahim of the University of Juba. A thorough literature review on gender inequality at different agricultural education institutions in South Sudan was done to inform the gender analysis. In order to assess agricultural education within the three universities, the study selected key indicators including:

1) the number of men and women per faculty, broken down into the number of administrators and students
2) the quality of the infrastructure and facilities, including adequate residence halls and health and sanitation facilities
3) the attitude towards women in agriculture, including whether or not they feel respected and safe,
4) the funding and scholarship opportunities available to encourage women studying the agricultural sciences,
5) gender-based violence and harassment of students
6) the lack of female role models or mentors for female students in agriculture
7) the lack of gender issues in the agricultural curriculum

The analysis is also based on interviews and Focus Group Discussions (FGD) with male and female students, staff, and administrators in the three universities.

Published data indicates that there is a high level of gender inequality subsiding at all levels of education in South Sudan. The gender gaps are expanding at the higher education level. A low level of enrollment in higher education indicates that opportunities for women's capacity development at the academic institutions level are subsiding and their chances to participate in leadership positions and employment will be diminished.

Based on this observation the study will draw attention to challenges facing women in higher education, particularly in the discipline of agriculture. The study will also make recommendations for future developments to increase gender equality and suggest best practices to enhance the role of women in agriculture sector activities in South Sudan. (Please refer to Appendix VII for further details)

Higher Education in Agriculture and Natural Resources Needs Assessment Study

Dr. Glen Shinn, Global Consulting Solutions, conducted a study to identify planning and programming priorities for South Sudan higher education in agriculture, natural resources, and environmental sciences. The assessment included teaching, research, and community outreach functions. Needs of the institution, curriculum, subject matter, students, and stakeholders were examined with regard to institutional elements, beneficiaries, and consensus.

The population included the University of Juba (n=21), Catholic University-Wau (n=24), and John Garang Memorial University of Science and Technology (n=23). Ten participants stood as a national cohort who works across several states in South Sudan. Seventy-eight participants represent six peer groups—administrators (n=13), professors (n=21), students (n=17), stakeholders (n=17), donors and contractors (n=5), and NGOs (n=5).

A pre-critical path method (PCPM©) deployed three tools by which to understand priorities, sequence, agreements, and relationships. Q-methodology rank-ordered the development sequence of 14 attributes associated with high performing universities. A seven-point Likert-type scale classified 50 associated items according to agreement and contribution to the development path. A semi-structured qualitative interview examined influences of four crosscutting constructs—cooperation, future view, receptivity to change, and sustainability.

Seventy –eight participants recognized the importance the importance of the 14 attributes and the need to sequence the development of higher education in agriculture, natural resources, and environmental sciences.

However, participants concurred that in any sequence, a sub-set of four well-ordered attributes began the development path. The composite participants ranked improving instructional technology, library resources first in the sequence of 14 attributes for development. There was minimum divergence from one to 5 in the rank-order. The group of administrators and professors, and donors and NGOs ranked this attribute first while vice chancellors ranked the attribute fifth.

Improving technological infrastructure and facilities ranked second in the sequence by the composite of participants. There was minimum divergence from one to 5 in the rank order. The groups of administrators and faculty, and students ranked this attribute first while stakeholders ranked the attribute fifth. Improving outreach, community development and extension was ranked third by the composite group. Vice chancellors and faculty ranked this attribute first while donors and NGOs ranked the attribute sixth. The composite of participants ranked improving administrative services fourth in the sequence. Donors and NGOs ranked this attribute third while vice chancellors, administrators, and faculty ranked the attribute sixth.

The needs assessment study was jointly funded by Virginia Tech and the Norman Borlaug Institute for International Agriculture - Texas A&M. (Please refer to Appendix VIII for a more detailed overview of the research project.)

7. Mini-Grant Research Program

In 2013, there was a major restructuring and rejuvenation of the RHEA research program. The procedures for applying for the Competitive Research Grants (CRG) were clarified and with the introduction of the Mini-Grants concept, researchers were trained on how to write proposals.

Seven proposals were received from teams consisting of the University of Juba (six proposals) and Catholic University (one proposal). Preparation of these proposals involved collaboration with several faculty members from each partner institution. These proposals were first reviewed

by RHEA South Sudan's Virginia Tech collaborators. The selection committee consisted of the deans of the College of Medicine, the Library, and the College Natural Resources and Environmental Committee as well as the Virginia Tech Representative in South Sudan. This group rated the proposals, with six out of seven submitted proposals deemed ready for funding.

The approved researchers were awarded their research grants, while the remaining research proposal needed further revision for submission during the second round of the proposals.

For brevity, we outline three proposals to provide examples of some of the great work being conducted by UoJ and CUoSS scholars. These proposals initiated research activities on: 1) sorghum yields and striga infestation levels, 2) evaluation and introduction of improved varieties of cowpeas, and 3) the introduction of well adapted, high yielding, and early maturing cassava varieties. These grants demonstrated how technology could improve agricultural processes. As a result, these technologies could have been taken to the market but were discontinued because of the recent conflict in South Sudan.

The cassava project was launched by collecting cassava germplasm in South Sudan. Ten different cultivars of cassava were obtained from the Yei Research Station, women's development groups, and farmers from Wau and Tombora. These cuttings were planted and are being evaluated. Preliminary observation shows that cassava mosaic virus is a limiting disease to most cassava cultivars in Wau. A survey has been designed to determine the production potential and constraints farmers face in production of cassava. With the help of Dr. Wade Thomason from Virginia Tech, a questionnaire was developed and a survey was to be conducted.

The Striga project has tested an indigenous species, Hyptisspicigera that shows great potential as an agent of biological control of Striga. This work is testing the efficacy of Hyptisspicigera as a trap crop for reducing the Striga infestation in sorghum fields. Further work was to continue on development of agronomic practices of Hyptis-derived Striga-control products.

The cowpea research project is looking at four cowpea landraces and one exotic line from the International Institute of Tropical Agriculture. The researcher is using the Randomized Complete Block Design with three replications, collecting and recording qualitative and quantitative traits of the nutritious legume. These grants were the first of a yearly research development process that was to lead to the creation of new technologies.

The other research proposals included topics on: 1) "The distribution patterns, community structure, and habitat use of small mammals in South Sudan" 2) Assessment of the contribution of indigenous fruit trees and their integration into farming systems of Central Equatoria State for sustainable livelihoods and improved food security" and 3) Assessing the Determinants of Maize Productivity in South Sudan."

8. Student Research

To improve upon the curriculums and educational offerings of CUoSS, the RHEA project suggested that students in their final years conduct research projects to bolster their knowledge of the agricultural field.

As a result, twenty fifth year students carried out research for their senior theses. Each student was expected to write a proposal addressing the problem he or she would like to investigate. Three of the students conducted field experiments that evaluated different varieties of maize and sorghum and their response to fertilizer. One student carried out a survey on the status of agricultural extension services in rural areas. Seven students conducted survey research on vegetable crops and field crops. Another group of five students researched issues related to the environment and the rest conducted research on animal husbandry.

The students have finished conducting their survey and field experiments, have analyzed their data and are working closely with their supervisors to complete their dissertation from their research findings. This had added great value to their educations.

Helping the students design quality research projects was a challenge that RHEA personnel faced. We recommend annual in-house reviews of the research programs of both universities. This would involve presentations by research faculty on their research projects, discussions with colleagues, and invitations to external reviewers from such agencies as the FAO, Ministry of Agriculture, Forestry and Rural Development, Ministry of Higher Education, Alliance for Green revolution (AGRA), USAID Implementing Partners in Agriculture, private sector and NGOs etc. to provide quality assurance for the research proposals.

The in-house review might focus on several questions including the relevance of specific research to increased food security, target group (s) and area(s), collaborative efforts with other institutions such as AGRA, FAO, SPARK, the Ministries of Agriculture, Forestry and Rural Development and Environment, extension systems, and other universities with agriculture programs.

Extension /Outreach Activities

9. Farmer Field Days and Agricultural Trade Fairs

Several extension and outreach activities were initiated during the project period. These included:

- Numerous farmers' field days (250 members of the community reached)
- 2 agricultural trade fairs in Juba and Wau that reached at total of 415 people at the national and state level
    - 280(50 female and 230 male) people in Juba
    - 135(90 male and 45 female)
- farmers surveys that reached 266 (130 male and 136 female)people
- farmer trainings that reached 7 (2 male and 5 female) people

(Students at the 2012 RHEA Sponsored Agricultural Trade Fair)

(RHEA COP, Maria Mullei, at the 2012 Agricultural Trade Fair)

10. Study Tour

A group of eight faculty members and finance and administration staff from the University of Juba were hosted on a short-term tour to the US from April 30 through May 10, 2013, in order to receive specific experience or exposure. This experience enhanced the participants' institutions by helping them to improve teaching and learning methodologies, improve research and outreach activities, strengthen public private partnerships and improve administrative functions of the host country institutions.

The team visited the Embassy of South Sudan in Washington, D.C, the Association of Public Land Grant Offices, USAID headquarters, and met with Congressman Frank Wolf. The group also toured several college facilities. At Virginia State University and Virginia Tech, they visited academic departments that included Crop and Soil, Animal Science, Fisheries, Wildlife, and Environmental Studies. Please see Appendix I. for a detailed list of participants and their fields of study, and Appendix II for a detailed itinerary.

(Study Tour Participants, Washington DC, 2013)

Infrastructure Improvement

11. CUoSS Building Construction and Renovations

A total of $750,200 for small infrastructure support at the Catholic University in Wau was provided by USAID's South Sudan mission. The infrastructure improvement included the following:

- Renovation and expansion of an existing classroom
- Construction of a four bedroom guesthouse with associated sewerage & drainage
- Construction of one generator shed
- Construction of a 4-door pit latrine and a 2-door pit latrine
- Construction of two guardhouses with gates
- Construction of fences on campus

- Drilling of one borehole and the creation of a water supply system with overhead water tanks
- Supply and installation of a 40-foot steel container

(Renovation of Existing Classroom Space-CUoSS-Wau, 2013)

(New Two Door Latrines-CUoSS-Wau)

(Installation of New Fence-CUoSS, Wau)

(New borehole and water supply system, CUoSS-Wau)

12. In-Kind Donated Textbooks and Journals

In November of 2012, a container of over 4,289 donated books and journals was shipped to South Sudan for distribution to both the University of Juba and the Catholic University of South Sudan. The donations were the result of a campaign launched by Virginia Tech to collect the materials in order to improve the quality of teaching, research, and student learning at our South Sudanese partner universities. The transport of the container was paid by the Rebuilding Higher Education in Agriculture project. The total estimated value of the container and its contents is $82,267.

(RHEA Staff Unloading Container of Books in Juba, 2012)

(USAID Rep unloads the first book, Juba, 2012)

The books now populate the libraries of both universities. The books covered a wide range of topics, including: Physics, Chemical Engineering, Plant Biology, Agriculture and Farming, Natural Resources Management, and Environmental Science. The distribution of books and journal articles is as follows:

- 1461 Books donated to UoJ
- 397 Journal Articles to UoJ
- 2307 Books sent to CUoSS
- 124 Journal Articles to CUoSS

(Left: Dr. Kurt Richter in the new CUoSS Library)

Please see Appendix VI for a table summary of our key results.

Conclusion

Overall, the HED/Virginia Tech partnership has made significant impacts on us as an institution and our host country partners as well. As demonstrated in the previous section, we've made great strides in improving the personal and institutional capacities of our partners. We hope that both CUoSS and UoJ continue to implement the training they have received to further improve their institutions as a whole. For us, the opportunity to work with the youngest country in the world has changed the way we think and operate in countries that are still unstable in regards to politics and security. Moreover, the pre-mature ending of the project has made us think more creatively in terms of budgets and funding. Though we've accomplished a lot, our work for the past three years has not been without challenges. (Please refer to Appendix IV for a summary of our key

challenges as a project) However, we have learned much, and the following section outlines the key lessons we've received over the course of the project.

Key Lessons Learned

After a slow and difficult start, most components of the project are now on schedule and within budget projection. A continuing degree of ambiguity is apparent, and project partners have high expectations, but much progress has been made. For several components, the actual intent of the project designers was not adequately reflected in the sub award documents.

The USAID Economic Growth Office and Program's Office (Participant's Training Coordinator) are to be commended, given project start-up circumstances. The start-up phase of the project was challenging, but now most components are into "operations" or institutionalization" phase.

Support for PhDs level training for South Sudanese should be confined to a small number of students and only where a compelling case can be made for a PhD. This would yield more value for the project and its partners. As a high priority, participants should receive adequate third country or in-country training before embarking to the US.

Future focus of the research support should be shifted towards meeting the needs of smallholder farmers. Increased contact with community groups through off-station work should be encouraged.

While there was never any doubt that there would be endless needs in terms of physical and technical capacity at UJ and CUoSS, further work on this project has brought to light the degree of limitations in human capacity at these institutions. For instance, the implementation of research and teaching programs was a difficult process because the students, faculty, and staff have all been isolated as a result of the long-term conflict. Making truly sustainable human and institutional development improvements will take more than the three years the project has been operational.

For a project in this environment to be genuinely successful, great efforts will need to be made on all sides of the table, especially by the faculty and staff at the South Sudanese institutions. For example, the capacity of the partners to manage budgets, implementation programs, and administer the foreign education of was greatly overestimated in the initial stages of this project. More extensive training for the faculty and staff at each university in basic program management and administration is highly necessary.

To make the kinds of strides initially proposed by the project would take many years of effort past the currently reduced three year term or planned five year term of the project. It has been demonstrated in similar USAID –funded projects that institutional development will require at least 15-20 years continued support for the institutions to mature to a sustainable level.

The HED and Virginia Tech Partnership

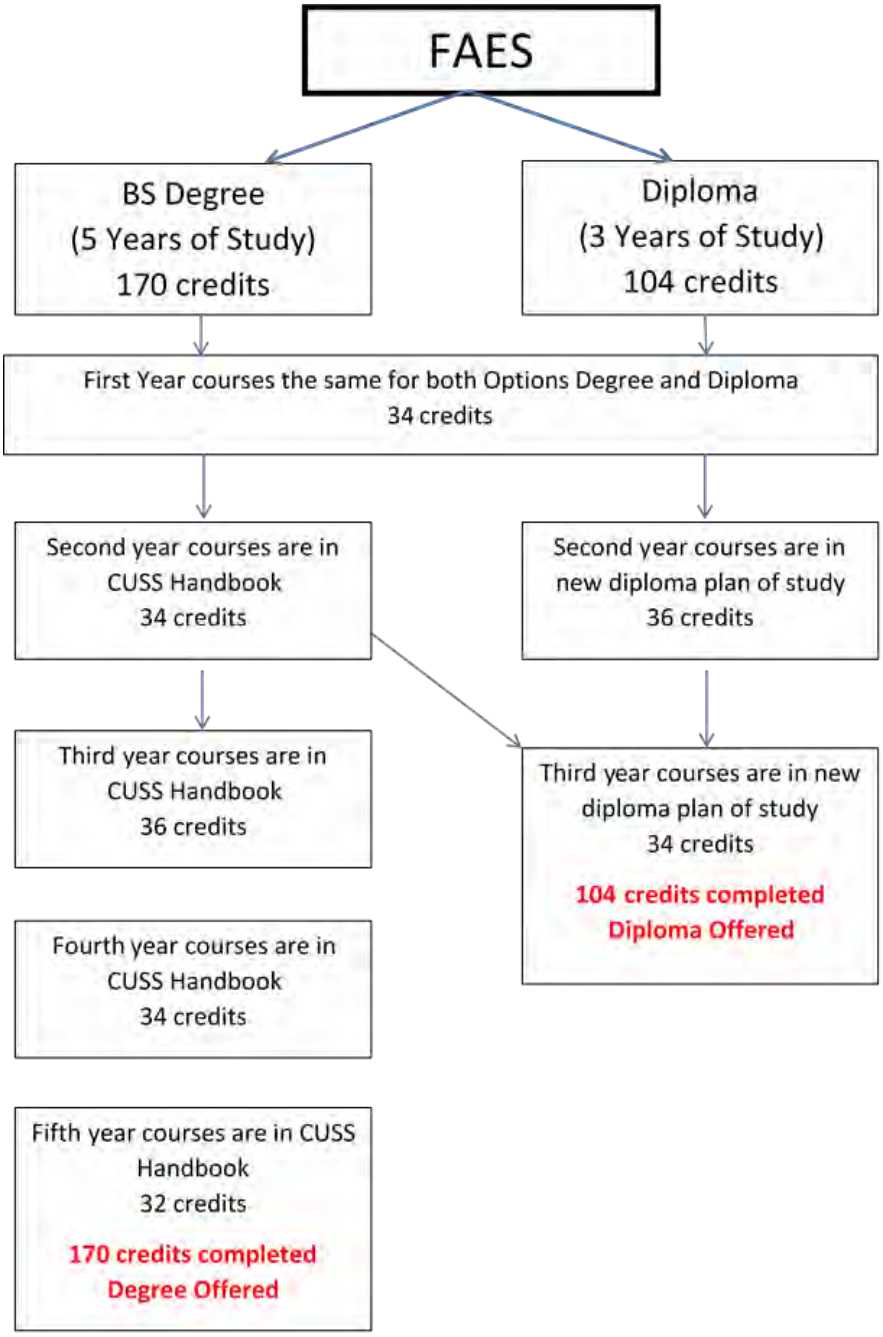
All international development projects at this level of complexity involve the collaboration of multiple stakeholders. The HED partnership allowed us to better understand the importance of communication and coordination between different partners. We have learned much from our partnership with HED and we hope to further improve our communication and coordination skills in the future.

Future Collaborations

Unfortunately, the ongoing conflict in the country has hampered further development efforts. When peace returns to South Sudan, we do hope to be able to restart our partnerships with the universities in the country. When the security situation improves, we hope further funding opportunities present themselves so that we can return and help the fledgling nation recover.

Appendices

Appendix I. CUoSS Faculty of Agricultural and Environmental Sciences New Agricultural Diploma Program Structure



Appendix II. Long-Term Study Participants

The following table describes the disciplines, training locations, and the academic statuses of the students in the training program:

Name of Prospective students	***Degree***	***Academic Field of Study***	***Name of the University***	***Planned Start Date***	***Need Additional Training Yes or No***	***Status***
AduolAthuann	MSc	Soil Science	University of Nairobi-Kenya	August 2014	No	Application completed being reviewed for admission
Saman Nicola	MSc	Farm Irrigation	University of Nairobi-Kenya	August 2014	No	Application completed being reviewed for admission
Dominic Lado Mariomo	MSc	Animal physiology	University of Pretoria, South Africa	February 2014	No	In Training
Thomas Willoba Amos Aromye	MSc	Wood Science and Forest Products	University of Pretoria, South Africa	August 2014	No	Application completed being reviewed for admission
Samuel AtanasioMustafa Abin	MSc	Animal Breeding	Stellenbosch University, South Africa	February 2012	No	In Training
Raphael Filberto Talamuk	MSc	Fisheries	University of Pretoria, South Africa	February 2012	No	In Training
Martin Baru Sebit	PhD	Animal Sciences	Virginia Tech, US	August 2013	Yes	In Training
Majango Jambo Ganja Wura	PhD	Wildlife	Virginia Tech	August 2013	Yes	In Training
Ruba Bilal	PhD	Forestry	Virginia Tech	August 2013	Yes	In Training
Flora Eyola Severino Lado	PhD	Mining Engineering	Virginia Tech	August 2013	Yes	In Training
John Kutosi Bartholomew Alosias	MSc	Fisheries	Virginia State University	August 2013	Yes	In Training
Emmanuel Musa Atiba	MSc	Animal Science/ Poultry	Virginia State University	August 2013	Yes	In Training

Appendix III. Partnership Results Summary

The following are the major substantive achievements as measured by the various indicators included in the Project Results Framework and the Project Implementation Plan (PIP):

Activity	**Indicator**	**Impact/Results**
Graduate Training	# of individuals who have received USG supported LT training	Twelve LT participants are in Training and four will be enrolled in August 2014
Overall Training, including short-term & long-term training	# of individuals who have received USG ST	911 individuals benefitted from short-term trainings.
Experiential/Applied Learning	% of education programs that include enhanced experiential applied learning opportunities	34 CUoSS and 15 UoJ students completed ten week internships to public, NGO and private sector collaborators
New Program	# of new academic certificate/Diploma/degree program	A Diploma in General Agriculture at CUoSS
Research-Applied, Replicated, Taken to Market	% of research initiatives whose findings have been applied, replicated or taken to market	Two research initiatives are under research and have the potential for replication and be taken to market
Joint Research	# of US-host country institution joint development research projects	Two major joint research between University of Juba and VT in gender study and second higher education needs assessment between Taxes A&M, Virginia Tech and Partners.
Custom Indicator-Increased library holdings	# of books and journals delivered to partner universities	Donated books, journals, computers valued $84,000
Secure external funding /in-kind donations	Amount of funding/in-kind donations	Leveraged $750,200 for infrastructure improvement at CUoSS
Additional Questions	Other Collaborating Stakeholders	Partnership collaboration with Public sector(Ministries of Agriculture at national and State level, NGO- Dorcas AID International and AGRA, FARM project and private sector Agrolife

Appendix IV. Summary of Implementation Challenges:

Description	***Impact***	***Action Taken***
The L.T. participants to the US were not well screened, possibly reflecting both a shortage of suitable candidates –the participants did not have basic technical and biological sciences foundation to fit in US universities	Increased the cost per participant by about 20% since additional year was required to complete language courses and bridging courses to retake the GRE	Virginia Tech arranged for language courses and bridging courses
Insufficient and uncertain electricity supply	These situations stand in the way of carrying out any sort of research	Virginia Tech had planned to procure solar panels but this did not happen due to early close out of the project
Lack of basic skills to carry out scientific research	Risking jeopardizing the effectiveness of research program. Paying additional amounts required for purchasing solar and generators.	Virginia Tech carried training to provide experience in basic research skills
Early phase of the sub award was accompanied by numerous administrative difficulties	Considerable effort and time was spent on dealing with a variety of communications, personnel, and financial issues(e.g invoicing)	Virginia Tech, trained partners on financial accounting/invoicing, hired an Accountant. Developed mechanism to improve communications (e.g. Monthly tel. conference with US and field)

Appendix V. Study Tour Participants

Name	**Discipline**	**Degree program**
Dennis Duku Kenyi Odubasa	Fisheries	PhD
Melton Melingasuk Lado Mogga	Animal Science	PhD
Pasquale Tiberio Droko Moilinga	Wildlife	PhD
Augustino Lokule Bongo	Forestry	PhD
Charles Mahmoud Sebit Manya	Environmental Studies	PhD
Peter Batali Samuel Gama	Agricultural Sciences	PhD
John Light Abel Gumbe	Accounting	Certificate
Margaret Wani Sadia Andrea	Administration/Office Management	Diploma

Appendix VI. Study Tour Itinerary

RHEA Study Tour – Draft Itinerary (revised 5/2/2013 7:56am)
May 1-10, 2013

Day	Date	Location	Activities
1	Tues, Apr 30	Nairobi	Depart Nairobi on DL 9496 at 10:25pm
2	Wed, May 1	Washington DC	Arrive Dulles on DL 9384 at 3:30 pm Evening cultural activities as desired Lodging at Holiday Inn Express Washington, DC SW - Springfield, 6401 Brandon Ave Springfield, VA 22150 (703) 644-5555
3	Thurs, May 2	Washington, DC, Petersburg, VA	Morning: 10:30 Embassy of the Republic of the South Sudan, 1233 20th St NW # 602 # 602 Washington, DC 20036; (202) 293-7940 (DuPont Circle area) Afternoon: 1:00 Congressman Frank Wolf and/or Elyse Anderson, Foreign Policy Director for Congressman Wolf, 233 Cannon House Office Building, Independence Ave and 1st Street, SE; 202-225-5136 2:30-3:30 pm Association of Public and Land-grant Universities, Drs. Peter McPherson and Montague Demment; 1307 New York Avenue, NW, Suite 400, Washington, DC 20005-4722; (202) 478-6040 3:45-4:45 pm USAID Sudan/South Sudan Bureau, Reagan Bldg Lodging at Hilton Garden Inn Richmond South/Southpark – 800 Southpark Blvd Colonial Heights, VA, 23834 United States, 1-866-538-0251
4	Fri, May 3	VSU, Petersburg, VA	8:15 am Depart Hotel AM 3:30 Virginia State University, Dr. Wondi Mersie, Associate Dean, Research Director School of Agriculture, M.T. Carter Building, Room 106 9:00 Welcome, W. Weldon Hill, Ph.D., Provost/Vice President of Academic Affairs 9:10 Virginia State University – an 1890 Land Grant University, Jewel E. Hairston, Ph.D., Dean School of Agriculture 9:20 Agriculture Research and International Outreach, Dr. Wondi Mersie, 9:35 Curriculum and Advising in the School of Agriculture, Oluwarotimi Odeh, Chair Department of Agriculture 9:50 Academic Technology, Arthur J. Fridrich, Director Distance Education 10:00 Comments by Keith T. Miller, Ph.D., President Virginia State University

			10:10Comments by the Office for International Education, Maxine Sample, Ph.D., Director Dr. George H. Bennett Office for International Education 10:20 Agriculture and Environmental Sciences at the University of Juba, Dr. Pasquale Tiberio Droko Moilinga, Dean, College of Natural Resources and Environmental Studies 10:40 Campus Tour MT Carter Laboratory Facilities E-Portfolio Writing Center, Freddy Thomas, Ph.D., Director Reginald F. Lewis School of Business, Mirta M. Martin, Ph.D., Dean University Libraries, Elsie Weatherington, Ph.D., Dean Moore Residence Hall, LaVerne J. Briggs, Ph.D., Director of Residence Life 12:00 Lunch, 1st Floor Gateway Dining Hall – Student Dining Hall 1:30 Aquaculture – Pond Management , Brian Nerrie, Ph.D., Cooperative Extension 2:00 Aquaculture – Fish Processing, Albert Reid, Cooperative Extension 2:30 Horticulture, Reza Rafie, Ph.D., Cooperative Extension 3:00 Field and Specialty Crops, Laban Rutto, Ph.D., Agricultural Research 3:30 Alternative Crops, Harbans Bhardwaj, Ph.D., Agricultural Research 4:00 Meat Goats, Adnan Yousuf, Ph.D., Agricultural Research 4:30 Return to hotel Lodging at Hilton Garden Inn Richmond South/Southpark
5	Sat, May 4	Petersburg, to Blacksburg	8:00 Depart hotel 9:00 Southern Piedmont Agricultural Research and Extension Center, Dr. Carol Wilkinson, Director (2375 Darvills Road, Blackstone, VA 23824 (need Carol's cell #) 10:30 Leave for Reuben Blanton's Farm (tentative) 11:00 R. L. Blanton and Son Farm, Cartersville 12:00 Leave Reuben Blanton's Farm for Charlottesville 2:30 Arrive Vanguard Ranch Ltd, Gordonsville (goats, vegetables, herbs) 8:00 Arrive Blacksburg Lodging: Inn at Virginia Tech
6	Sun, May 5	Blacksburg	Morning: Rest and cultural activities Afternoon: Cultural activities 4:00 pm Barbeque at Theo Dillaha's home Lodging: Inn at Virginia Tech

7	Mon, May 6	Blacksburg	8:00 Pick-up at hotel and pick up checks at Bursar's Office 8:30 Welcome and Introductions, Dr. Mike Bertelsen, Interim Director, OIRED, OIRED Conference Room A 9:00 University of Juba and College of Natural Resources and Environmental Studies (CNRES) Overview, Dr. Pasquale Moilinga, Dean CNRES, University of Juba 9:30 Overview of VT College of Natural Resources and Environment (CNRE), Dean Winistorfer 9:45 Virginia Tech Overview, Dr. Mike Bertelsen 10:00 Virginia Tech College of Agriculture and Life Sciences Overview (CALS), Dr. Alan Grant, Dean of CALS 10:15 Coffee break 10:45 Rebuilding Higher Education in Agriculture in the South Sudan Project Overview, Dr. Kurt Richter, Meet faculty and staff from peer departments/units 11:15 Discussion of goals and objectives of study tours and special requests of study tour participants for individualized activities on Wednesday and Thursday 12:00 Lunch, Turner Place at Lavery Hall 1-3 pm Campus tour by Alumni Center, Laura Wedin, Student Programs Director, Meet in Front of Turner place at Lavery Hall 3:00 Virginia Tech Colleges, Departments, and Faculty: How They Work Together, location TBD • Roles of college administration, Alan Grant, Dean CALS • Saied Mostaghimi, Director Virginia Agricultural Experiment Station and Associate Dean for Research and Graduate Studies. • Roles of departments and faculty, Dr. Mary Leigh Wolfe, Biological Systems Engineering Department Head • Questions and answers 6-9pm OIRED/LCI Senegal and South Sudan Projects Reception, Faculty Club Lodging: Inn at Virginia Tech
8	Tues, May 7	Blacksburg	Group tour of CALS research and learning farms 8:00 Dairy Center, Shane Brannock (540-552-3767), meet at milking parlor 9:00 Swine, Beef and Sheep Centers (David Linker, 230-4106) 9:45 Depart for Kentland 10:00 Kentland Farm, Dwight Paulette 12:00 Lunch 1:00 CNRE Departmental overviews , 136B Cheatham Hall, CNRE department heads Eric Hallerman, Bill Carstensen, Janaki Alavalapati, Steve McMullin, Audrey Zink Sharp 2:00 Tour of CNRE facilities in Cheatham and Lantham Halls with Eric Hallerman, Bill Carstensen, Janaki Alavalapati,

			Steve McMullin, Audrey Zink Sharp 3:30 Tour of CNRE Brooks Forest Products Lab, Tom Hammett 5:00 Return to hotel Lodging: Inn at Virginia Tech
9	Wed, May 8	Blacksburg	8 to 10am Agricultural Technology Program, Dr. Pavli Mykerezi, Department Head, 1240 Litton Reeves 4:00 Virginia Tech Language and Culture institute, Amanda Johnson <u>Dr. Denis Duku Kenyi Odubasa, UofJ Fisheries Department Head</u> 10 to 1pm: CNRE Fisheries programs, Dr. Eric Hallerman, Head and Professor of Fish and Wildlife Conservation, 136 B Cheatham Tour of aquaculture center and bear pens <u>Dr. Augustino Lokule Bongo, UofJ Forestry Department Head</u> 1:00 Tour to forestry harvesting operation, Dr. Chad Bolding, Associate Professor of Forest Resources and Environmental Conservation 3:30 CNRE Forestry, Representatives of Department of Forest Resources and Environmental Conservation, 136B Cheatham <u>Charles Mahmoud Sebit Manya, Dept. Head of Environmental Studies</u> 1 to 5 pm Environmental Science Program, Dr. Matt Eick, Professor of Crop and Soil Environmental Sciences, 236 Smyth Hall <u>Dr. Peter Batali Samuel Gama, Dept. Head of Agricultural Sciences</u> 10 to ? pm Crop and Soil Environmental Sciences, Dr. Wade Thomason, Associate Professor of Crop and Soil Environmental Sciences, 422 Smyth <u>Dr. Melton Melingasuk Lado Mogga, Dept. Head of Animal Production</u> 10 to ? pm Animal Sciences and Dairy Sciences <u>Dr. Pasquale Tiberio Droko Moilinga, Dean, College of Natural Resources and Environmental Studies, UofJ</u> ? CALS Dean's Office <u>John Light Abel Gumbe, RHEA Accountant, UofJ</u>

			10 to 5 pm: Individualized training program in OIRED, OSP, etc. for accounting and fiscal management training, Christina Brannan, OIRED <u>Margaret Wani Sadia Andrea, UofJ President's Administrative Assistant</u> 10:00 Office of Guru Ghosh, Vice President, Outreach and International Affairs. Meetings with Kim Rhodes and Holly Carroll, Administrative Assistants, 319 Burruss Hall 1:00 Office of the Dean of CALS, Sheila Norman, Administrative Assistant to The Dean, 104 Hutcheson Hall 4:00 VTLCI meeting with Don Beck and Amanda Johnson, VTLCI Office Lodging at Inn at Virginia Tech
10	Thurs, May 9	Blacksburg	8:30 Laboratory for Interdisciplinary Statistical Analysis Tour, Eric Vance, LISA Director, 212 Hutcheson Hall 10:00 Use of geographic Information Systems in Teaching, Research, and Extension, Dr. John McGee, Geospatial Extension Specialist, Forest Resources and Environmental Conservation, location?315 Cheatham Hall 11:00 Undergraduate advising in CNRE, Maureen Deisinger, Geography Undergraduate Advisor and Stephanie Lang, CNRE Academic Advising Coordinator, 315 Cheatham Hall 1:00 Wildlife faculty (Dean Moilinga?) – meet with Sarah Karpanty, CNRE 1:00 Tour of Virginia Tech Library, Margaret Merrill, College Librarian, Agriculture & Life Sciences 2:00 RHEA project planning, OIRED 5:00 Return to hotel Lodging at Inn at Virginia Tech
11	Fri, May 10	Dulles, VA	7:00 am Depart Blacksburg 9:00 am Shenandoah Valley AREC and Cyrus McCormick Museum, 128 McCormick Farm Circle, Raphine, VA 24472 (David Fske, 11:00 Virginia Poultry Growers Cooperative, Hinton Processing Plant, Manager Mickey Baugher, 540-867-4203, 6349 Rawley Pike, Hinton, VA 22831 (Tour requirements: closed toe shoes, no photography, must sign confidentiality agreement, no jewelry other than wedding band) 1:00 pm Depart for Washington Dulles International Airport Arrive Dulles by 3:30 pm; DL 9385 departs 5:55 pm
12	Sat, May 11	Travel to Nairobi	Arrive Nairobi 8:10pm Lodging in Nairobi

13	Sun., May 11	Juba	Depart Nairobi 12:50pm Arrive Juba 2:35 pm

Study Tour Participants:

1. Dr. Denis Duku Kenyi Odubasa, Department Head, Fisheries
2. Dr. Melton Melingasuk Lado Mogga, Department Head, Animal Production
3. Dr. Pasquale Tiberio Droko Moilinga, Dean, College of Natural Resources and Environmental Studies (Wildlife Scientist)
4. Dr. Augustino Lokule Bongo, Department Head, Forestry
5. Charles Mahmoud Sebit Manya, Department Head, Environmental Studies
6. John Light Abel Gumbe, RHEA Accountant at U of Juba
7. Margaret Wani Sadia Andrea, President's Administrative Assistant
8. Dr. Peter Batali Samuel Gama, Department Head, Agricultural Sciences
9. Dr. Maria Mullei, OIRED, Virginia Tech
10. Kurt Richter, OIRED, Virginia Tech
11. Emma Flemmig, Virginia Tech (DC, VSU portion of study tour)

Appendix VII. Gender Assessment Final Report

Final Report

Gender Assessment Study in Agriculture Colleges in the Three South Sudanese Universities: University of Juba, Dr. John Garang Memorial University of Science & Technology, and Catholic University of South Sudan-Wau

JUBA, South Sudan, April 2014
Dr. Asha A Rahim

Abbreviations

CAIS: College of Applied Industrial Sciences
CAH: College of Arts and Humanities
CAMD: College of Arts Music and Drama
CCSRD: College of Community Studies and Rural Development
CCSIT: College of Computer Science and Information Technology
CE: College of Education
CE: College of Engineering
CL: College of Law
CM: College of Medicine
CNRES: College of Natural Resources and Environmental Studies
CSES: College of Social and Economic Studies
SMS: School of Management Sciences
CDE: Center for Distance Education
CHRDCE: Center for Human Resources Development and Continual Education
CLT: Center for Languages and Translation
CPD: Centre for Peace and Development
IRB: Institute Review Board

1. Background

In general gender equality in education can be considered from a number of perspectives. According to the World Bank Report (WB, 2112), there are three essential dimensions: the accumulation of endowments, the use of education in areas of economic opportunity to generate income, and finally the application of endowments to take up action on activities affecting the wellbeing of individuals and households. This paper will assess the colleges/faculties of agriculture and natural resource management in the three universities in South Sudan, namely: University of Juba, JG-MUST and Catholic University –Wau as regards gender issues.
A thorough literature review on gender inequality at different agricultural education was done to inform gender assessment analysis. In order to assess agricultural education within the three universities, the study selected key indicators including: the number of men and women per faculty, broken down into the number of administrators and students; the quality of the infrastructure and facilities, including adequate halls of residence and health and sanitation facilities; the attitude towards women in agriculture, including whether or not they feel respected and safe, the funding and scholarship opportunities available to encourage women studying the agricultural sciences, gender-based violence and harassment of students, the lack of female role models or mentors for female students in agriculture and the lack of gender issues in the agricultural curriculum.

Objectives of the study

The gender assessment study sought to:

1. Review and analyze South Sudan's policies on gender and education, as well as university policies on gender issues.

2. Analyze the barriers preventing the progress of women and men in this field in South Sudan and identify key gender concerns.

3. Propose concrete recommendations and strategies for gender mainstreaming studies at the university level.

2. Problem statement

Published data indicates that there is a high level of gender inequality in favor of males at all levels of education in South Sudan. The gender gaps are expanding at the higher education level. A Low level of enrolment in higher education indicates that opportunities for capacity development of women at the academic institutions level are subsided, and their chances to participate in leadership positions and employment will be minor as a result. Based on this observation the study will draw attention to challenges facing women in higher education and in particular in the agriculture field. The paper will also make recommendations for future developments to eliminate causes and suggest best practices to enhance the role of women in agriculture sector activities in South Sudan.

Research methodology

The idea to conduct gender assessment research was first introduced by Dr. Maria Mullei. As a result, Dr. Maria Elisa Christie, Director of Women and Gender in International Development Office of International Research, Education and Development (OIRED), Virginia Tech and Ms.

Laura Jacqueline Zseleczky of Virginia Tech worked with Dr. Asha Abdel Rahim, Head Economics Department-University of Juba to develop methodological instruments to conduct a gender assessment at the universities of Juba, JG-MUST, and Catholic University, beginning in June of 2013. An IRB at Virginia Tech was obtained to protect human research subjects, with an accompanying training and coding sheet to maintain anonymity. Through to the end of the fiscal year, Dr. Rahim has gathered data from focus group discussions as the following 21 individual focus groups in Bor, 2 focus groups in 3 focus groups. Interviews were carried out with key subjects include teaching and administrative staff (6 in Bor 4 in Wau and 5 in Juba). She has collected gray literature on national and university policies regarding gender and education. The data has been cleaned and organized in Excel. Drs. Rahim and Christie were slated to present initial findings at the higher education conference, but due to political instability the conference has been postponed.

Mixed Focus Group Discussion and individual interviews

The Catholic University of South Sudan in Wau, Dr. John Garang Memorial University of Science & Technology (JG-MUST) in Bor the "focus group discussion method was applied by the consultant and mainly with students. The consultant organized two meetings with target group: a general meeting with students where the purpose of the study was explained and informed students that their names will be kept anonymous. Then we started group discussion with the 23 male's student plus one female student. However, and due to the insufficient speed to capture all details and writing, the consultant distributed questionnaires to each individual student to get in-depth answers for all questionnaires. Besides, some students kept silent through the verbal discussion, or felt shy to answer or express themselves during group discussion.

Literature review

Women play a crucial role in agricultural production in South Sudan where subsistence farming is prevalent and shifting cultivation remains essential (Ministry of Agriculture, 2012). Women perform almost all activities related to subsistence food production. Women undertake most of the agricultural work, including the burning and clearing of bushes and trees, planting, weeding, harvesting and the preparation of crops for storage or consumption, however, most, if not all of the tasks are performed using primitive tools. This is labor-intensive work, requiring a lot of time and energy, which compromises the women's ability to produce enough food to feed their families. It is clear from the nature of the work and the amount of responsibilities and tasks performed that women work longer hours than their male counterparts. Since women produce a large share of agriculture produce as well as supply a larger share of labor over time, successful agricultural reform would require raising women's productivity and ensuring that gender–specific policies are at the core of rural development strategies. Gender disparity and ownership of assets are significant. Where social custom deter women's mobility's to participate in decision making and limit their involvement in production activities (Ministry of Agriculture, 2012, MDTF 2011).

Major obstacles to general education system in South Sudan:

According to the recent publication on education in the National Baseline Household Survey Report for 2011 (2011 NBHS), young South Sudanese females receive a lower level of education than their male counterparts. Literacy rates for males and females population 15-24 years old were 55% and 28% respectively. Majority of literate persons reside in urban areas and belong to the wealthiest 20% of the population. A large majority of illiterate people and those who have

been unable to attend school in South Sudan are female. It should be kept in mind that the target for Millennium Development Goal number three ("promote gender equality and empower women") is to eliminate the gender disparity in primary and secondary education. The gross attendance rate in primary school is 65% while attendance rate is only 40%, which means that South Sudan still lags behind the MDG of all children being enrolled in primary education. On the other hand gross rate of attendance secondary school in South Sudan is 22%. Very limited numbers are of the correct age (14-19). Again the 60% of them from urban population, compared to 26% of rural population. Gender disparity at the secondary education is 44 % of the males have attended school compared to 20% of the females.

Table 5.1: Number and % of primary school, by gender in South Sudan, 2010-2012

Year	Total	%Male	%Female
2012	1,365,757	60.8	39.2
2011	1,391,704	61.2	38.8
2010	1,401,874	62.8	37,2

Table 5.2: Number and % of Secondary school, by gender in South Sudan, 2010-2012

Year	Total	%Male	%Female
2012	56,827	70.5	29.5
2011	44,084	69.8	30.2
2010	34,471	71.0	29,0

Source: SSCSE 2012

Table 5.1, 5.2 shows the gender inequality at the primary and secondary levels of education in South Sudan. This demonstrates the general trend that there are ever fewer female participants as the level of education becomes higher. However, gender inequality at the level of secondary education was worsened in 2012, while gender disparity at primary level education was slightly narrowed in 2012. According to a report published by (WB 2012) this is due to some changes in attitudes toward girls' school participation.

Reasons for dropouts in secondary education

Literature (Ministry of education 2012) findings show that reasons for school dropout by gender at the level of secondary education and alternative education could be summarized as the following:

A lack of school fees accounts for the majority of the dropouts for both girls and boys in secondary schools. This is followed by lack of interest in education especially for boys. The effect of conflicts and instability in some areas of South Sudan were indicates causes for over 11% of the dropout rate. Final reason was the search for employment opportunities account for 6% of the total dropout rate, it mainly affects boys (9%) compared to girls (3%).

Reasons for dropping out of alternative education

Unlike in secondary education, where a lack of school fees accounts for the majority of the dropout rate, in alternative education the major obstacles (Multi-donor Trust Funds, 2012, Ministry of Education 2012) is connected with the desire to begin a family that is associated with pregnancies, marriage and family responsibilities. Pregnancies account for 50% of those dropping out of alternative education, affecting both females and males. These factors affect girl's participation in schools at all levels of education, not merely primary and secondary but also extending to higher education. Other factors include budget constraints, whereby public expenditure has declined in real terms since 2008. The education sector received 5-8% of total governmental spending in South Sudan. Additionally, the austerity measures imposed as a result of the shutting down of oil production - transported through Sudan from March 2012 until August 2013 - has resulted in lower levels of government expenditure on education.

Reasons for not enrolling into the education system

Literature reviewed indicates that the long distances to schools is a major hindrance to school enrolment in South Sudan. It affects both boys and girls, in particular the young ones. Owing to long distances to the nearest school, parents and caretakers prefer to keep their children at home. Available data indicates that most states have an inadequate number of schools. A sizeable proportion of people cannot afford to pay for education; this equally affects both girls and boys. Although the Interim South Sudan Constitution provides for the right to free and compulsory education in South Sudan, the costs associated with education continue to deny a sizeable section of children this important right and wellbeing, since those who cannot pay drop out or never enroll in the education system to begin with.

Parents also regard their children as a source of labor for farming, caring for cattle and household chores; 19% of girls and 13% of the boys are kept at home so that they can assist their parents with domestic work. This affects girls more, compared to boys. On the other hand some guardians do not send children to school, due to a lack of awareness of the importance of education as a key factor in development and poverty alleviation. A sizeable number of parents believe that schools impose aspirations on girls and boys, which oppose local customs. For example, it is believed that education takes girls away from household activities. All these factors continue to deny children the right to education.

High dropout levels at schools are also related to the change from Arabic to English language as the language of instruction at all levels of education in 2011 after the Referendum. During the time of the civil war, different curriculums were in place, varying based on region. For example, in areas formerly controlled by the SPLM, Ugandan and Kenyan school curricula were enforced, with English as the main language of instruction. Areas controlled by the Northern Government on the other hand, employed the northern Sudanese curricula, with Arabic constituting the language of instruction. The positive impact of this change to the education system is the use of English as the main teaching language for students in both primary and secondary schooling levels.

Having explored general education condition as background information which could be used to explain further issues related to girls enrollments in higher education in particular agricultural studies.

Opportunities

The following opportunities could be utilized to eliminate some of the major obstacles towards girls' education in primary and secondary schools in South Sudan (Multi Donor Trust Fund and, Government of South 2012):

- Offering equal opportunity to girls by banning early marriage and sexual harassment in schools and communities, introducing of feeding programs in school. (Ministry of Gender and Child Social Welfare, Ministry of Education, NGOs local and Foreign),

- Motivate and encourage parents take their children to school, and penalizing those who keep them away of school (local community leaders and local authority), International NGOs)

- Opening schools for girls alone, subsidize girl's schools by building additional girls' school in the rural areas previously disadvantaged (increase budget allocation for education, donor, local/International NGOs).

- Increasing number of girls enrolling in primary and secondary school through reducing distance to the nearest school. Because distance to school is the greater determent to girl's education than to boys (private sector investment, community, local authority).

- Building/hiring well-managed and secured school's dormitories for girls and organized schools busses for girls living far away from the schools (Ministry of Education, private investors).

- Encourage guardians to give girls less work in the community, through Invest more in appropriate technology in order to reduce household/domestic work (introduce best ways towards using clean friendly energy, improve access to water services, kinder gardens-private investment initiatives) .

- Sensitize the females on the importance of education (civil societies, women organizations etc.),

- Subsidized girls education as a measure to encourage girls to remain in school (Government),

- Improve hygiene and sanitation in girls' school not only in schools but also in the communities (Ministry of Health, NGOs Local/International),

- Training and employment of females teachers (Ministry of Education, Universities)

- Supplying school learners with suitable quantities of textbooks, blackboards, chalk and writing materials.

- Facilitating boarding and school feeding systems to help encourage the enrolment of girls.

- Promoting the concept of equal education for boy and girls among the community
- Enhance the level of teaching English language as the medium of instruction at all levels of school education.
- Unified school's curricula in South Sudan in areas still applying Ugandan, Kenyan and Sudanese school curriculums.

Enrollment in South Sudanese universities

When it comes to the agricultural education there are five public universities in South Sudan, 2 of them offer agricultural training namely Universities of Juba and UJG, with very limited services. There is some other training centers offer short-term training. With regard to gender disparity, 80% of women employees with the Ministry of Agricultural and Fisheries are unskilled with low level of education. This compromised their work efficiency as extension officers in particular in the rural areas. This reflects serious gaps of a well-trained women and man in agricultural field (MDTF 2011, and ASPFA 2012). At the level of higher education, women make up a small minority of the total number of university students in South Sudan. School completion rates in South Sudan have become a clear indication of gender inequality, in particular in the rural areas. Table 5.1 shows male/female gender disparity in each discipline and degree in 2012 at university level. Only two disciplines enrolled high number of females, namely Social Welfare and Social Administration 40.4%, Nursing/Midwifery 39.9% and English 37% respectively.

Agriculture and Environmental Studies enrolled 14.8% and 0% respectively.

Table 5.1: Number of university students by discipline and gender, 2012

Discipline	% of male student	% of female students
Agriculture	85.2%	14,6%
Business/public administration	71.5%	28,5%
Economics	91.3%	8,7%
Education	88.7%	11,3%
English	63.0%	37,0%
Environmental studies	100.0%	0
Information and computer science	72%	27,6%
Law	96%	4,0%
Nursing/Midwife	60%	40,0%
Philosophy	100.0	0,0%
Procurement/Logistics	89%	11,0%
Science and Technology	75%	25,0%
Social Welfare& social Administration	60%	40,0%
Theology	100.0	0

Source: Ministry of Education, 2012

Major obstacles

From the previous listed constraints in terms of access to primary and secondary education is gender insensitive owing to mentioned problems. Problems preventing women participating in higher education are mainly due to either lack of funds, early marriages or school dropouts. On the other hand, the ability to study mathematics and science have limited girls chances of being admitted to colleges of agriculture, science and technology, girls remain only with admission to colleges nursing/midwife, social, welfare and administration.

Gender and the empowerment of women through education in South Sudan

Education has been regarded as a cornerstone of sustainable socio-economic development and is emphasized in the Dakar and Beijing Platforms for Action as key to the empowerment of women and men. Experience has shown that educating women brings about an improved quality of life for whole communities, including improved food security, health and nutrition and enables families to better benefit from development interventions. As a result of decades of insecurity and under-development, huge disparities exist in access to education and in capacity to fully participate in national life between women and men, and boys and girls. This study assessing agricultural colleges in three South Sudanese universities highlights the need to correct these gaps focusing especially on addressing the low levels of enrollment in agriculture colleges, and improving accessibility of agriculture education facilities to increase the enrolment of girls. The following strategy seeks to address gender issues with regard to the promotion of gender equality in the education sector through two pillars (Ministry of Gender, National Gender Policy, and Juba South Sudan 2012):

Pillar 1:

- Support research and introduce policies and legislation to eliminate negative traditional and other practices, which undermine girls' education, such as child marriage.
- Strengthen the campaign for girl-child education as a strategy for rectifying all kinds of biases, which are the result of attitudes, customs and traditions.
- Integrate human rights, gender equality, reproductive health and the right for life skills as mandatory courses in the national education curriculum at all levels.
- Provide separate sanitation facilities in schools, as well as sanitary wear for adolescent girls.
- Sensitize communities, on the rights and benefits of education for all children, especially those with disabilities and special needs.
- Collaborate with the Ministry of Education to undertake emergency national functional literacy programs with the target of reducing illiteracy among women by at least 60% by 2030.
- Institute affirmative action intervention in vocational and technical training programs to reduce imbalances and increase women's skills and employment opportunities.

- Incorporate gender equality and human rights in literacy programs to sensitize communities on the negative effects of gender-based discrimination.

Pillar 2:
Institutionalize appropriate responses and protection mechanisms against Sexual and Gender-Based Violence (SGBV) through the following:

- Engaging communities in research into alternatives to traditional and customary practices that increase the risk of GBV, including the high bride wealth, girl child compensation and early and forced marriages.

- Incorporate SGBV and human rights modules into the training curricula of the law enforcement and security sectors, tertiary institutions and the judiciary.

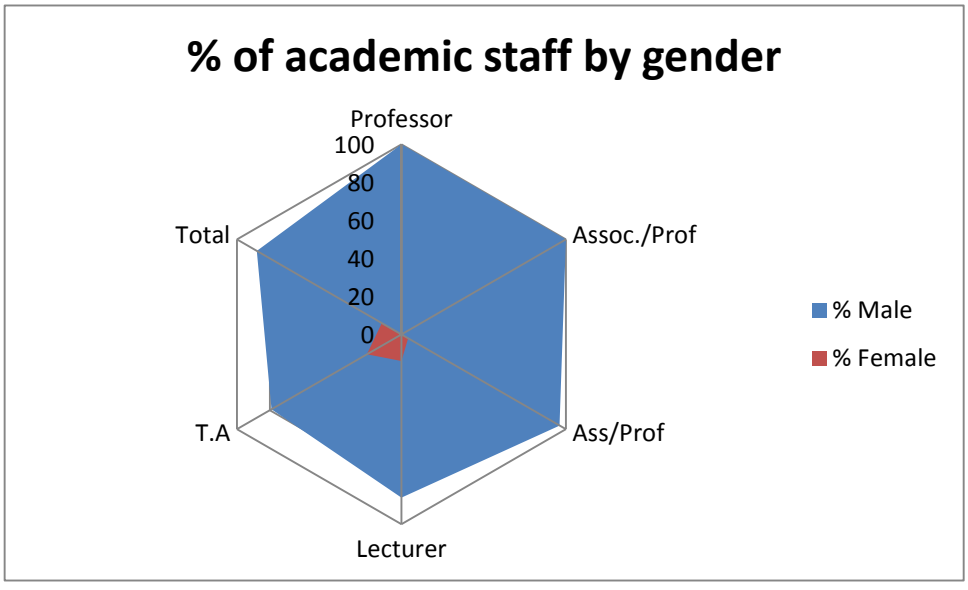
Empirical evidence proves that educational discrimination against women impedes economic development. Therefore closing the educational gap by expanding educational opportunities for women, a backbone of the MDGs is economically necessary for three reasons:

- The rate of return on women's education is higher than that of men, particularly in emerging countries,

- Enhancing women's education can result in lower fertility rates, greater improved child health and nutrition levels and increased productivity of women in the workplace.

- It can also result in a reduction of poverty and inequality.

Figure 5.1: % of Academic of Staff by gender in 2013



Source: Unpublished data, University of Juba 2013

Most of the public data on non-academic staff was found at the University of Juba, which was established in 1977. During the civil war in 1990s, the University of Juba was moved from Juba, now the capital of South Sudan to Khartoum, the capital of Sudan. After signing the CPA in 2005 the University of Juba was gradually moved out of Khartoum, and by the end of 2011 all colleges were back in Juba. The University of Juba is a public university, and historically the premier university in the South. It has produced only 237 crop sciences and 325 animal production graduates, of whom only 51 and 80, respectively, are from the South, very few of whom are females. This limited skill pool must serve an estimated population of 10-12 million. Nevertheless South Sudan must fulfil its major priority for higher education programs to enable the country to meet increasing demands for food through sustainable smallholder production of staple food crops and livestock by increasing general accessibility to improved technologies and practices. In this regard, Universities in South Sudan are expected to play an important role, in particular the colleges of agricultural studies. This assessment report is an attempt to evaluate the existing capacity of each university as well as the constraints and challenges faced with regard to gender equality in the agricultural colleges (rebuilding higher education in agriculture to support food security, economic growth, and peace efforts in post-conflict Southern Sudan strategic partnership plan for the
Africa-U.S. higher education initiative)

The other two universities; the Dr. John Garang Memorial University of Science & Technology and the Catholic University of South Sudan-Wau, have only existed since 2005, with a small capacity of academic staff and students, the former is a public university while the latter is a private American university.
Figure 5.1 demonstrates the gender inequality among academic and teaching staff at the University of Juba. The gender disparity can be observed at all college levels. The number of female teaching staff is 12%; they are mainly present on the lowest level of the hierarchy, occupying roles such as teaching assistants and lecturers. There are only three women with the title of 'assistant professor' in the college of Social and Economic Studies and two in the College of Medicine. At the College of Natural Resources and Environmental Studies (CNRES), the participation of women as teaching staff was 12% or 8 out of the total of 67. Five are working as Lecturers with Masters, and three are working as Teaching Assistant with BA–Honors degrees (all of them working for the Department of Agriculture). At the higher levels of. The College of Natural Resources and Environmental Studies (which Agriculture is a part of), contributes 23% of the University teaching and T.A. staff. In general the participation of women as academic and teaching staff was 12%. Interviews and observations reflect the following results: Chances to compete for scholarships in particular at the time when the University of Juba relocated to Khartoum were limited. Since 2005, and in particular since the University relocated to Juba, the staff has had some difficulties in proceeding with their applications due to age limitations. As a condition to join Masters or PhD programs, some universities have enforced age limitations of 30 years and below. In addition, female lectures must consolidate family and childcare commitments with academic commitments, which may prevent them from applying. However, recently and since the independence of South Sudan, several highly ranked academic institutions including Virginia Tech University, the German Academic Exchange Service (DAAD) and the African Economic Research Consortium (AERC) have offered equal opportunities to female and

male students pursuing Master and PhD studies abroad. It is expected that the gender disparity gap will be narrowed in the next five years. The newly appointed Minister of Education has promised to engender higher education by encouraging females to play a leading role in decision-making positions at the Universities of South Sudan. Dr. John Garang Memorial University of Science & Technology and Catholic University of South Sudan-Wau has worse track records than the University of Juba, where not a single teaching staff was female. There was only one newly appointed female technician. The reason for this is simply that the selection committee blocked the appointment of women because of their perceived family commitments. The selection committee believes that a successful female candidate might be prevented from accepting a teaching position by her husband, particularly in rural areas, or in areas far away of her family.

The University of Juba has 13 Colleges with 63 Departments and four Centers. There is only one female dean amongst 12 Colleges, and 5 female heads of Department amongst 64 Heads.

Classified and Unclassified university staff

Women contributed 42.4% and 38.1% respectively (see tables 6.1, 6.2) of the unclassified and classified staff compared to a 12 % of women as academic staff. Their numbers termed as 'unclassified' were slightly higher due to a lack of skills and training required to fulfill the tasks. Illiteracy and school dropout rates among women in particular have intensified gender inequality among university administrative staff. The majority of working women at the university occupy the role of cleaners, messengers, clerks, and secretaries due to limited education and illiteracy problems.

Table 5.2: Unclassified Staff, University of Juba 2013

S/N	Grade	M	F	Total
1	5	22	7	29
2	7	27	10	37
3	8	59	15	74
4	10	42	12	54
5	11	29	3	32
6	13	75	14	89
7	15	56	68	124
8	16	55	56	111
9	17	54	123	177
Total		**419**	**308**	**727**
In %		**57.6%**	**42.4%**	**100.0%**

Source: unpublished materials, University of Juba 2013

Table 5.3: Classified staff, University of Juba 2013

S/N	Grade	M	F	Total

1	3	41	24	65
2	5	12	9	21
3	7	12	11	23
4	8	36	19	55
5	9	34	21	55
6	10	12	5	17
7	12	49	24	73
8	14	17	18	35
Total		**213**	**131**	**344**
In %		**61.9**	**38.1%**	**100.0**

Source: unpublished materials, University of Juba, 2013

Having summarized the general situation of the Academic and teaching staff from the gender perspective allow me to analyze the finding of the fieldwork that used two methods of data collection namely focus groups discussions with students group as well as structured interviews with academic staff respectively.

Fieldwork findings

Table: 6. 1: Focus Group by gender, type of activities, and roles played by informants in three institutions

Female	Male	Gender (Female, Male, or Both)	Type of Activity FG= Focus Group IN=Interview	Role in institutions (Adm=admin; Col=college; Tea=teachers/instructor; Stu=student; Alumni=Alum)	Institution
1	23	B	FG	Stu	JG-MUST
6	14	B	FG	Stu	CU
8	0	F	FG	Stu	UoJ
0	9	M	FG	Stu	UoJ
3	8	B	FG	Stu	UoJ
18	**54**				

1.1. Focus group discussion

In Wau Catholic University the focus group discussion was successfully done, without individual distributions to each student. There were three focus group discussions: mixed, male and female groups (see table 6.1). The number of female group was 6 students, while male group was 14 students. It was also difficult because discussions group organized during the teaching-break. Some of the students were busy writing exams, or working in the college's farm. Nevertheless a large number of students attended. The discussion was lively, specifically amongst female students. The three difference discussion groups helped to cross-check answers.

Mixed focus group discussion and individual interviews

At the University Juba focus group discussions were done with mixed female and male students, and two other separate FGD female and male groups respectively with senior and junior students. The consultant met students and explained the purposes, conditions and important of the research. The first meeting held with mixed group (male and female). The second meeting held with male group and the last meeting held with female. The male focus group discussion was done through distribution of the questionnaire to individual males. Some of them have difficulties to understand English language (first year). The consultant translated the questionnaire from Arabic to English languages. Girl's group discussion was face to face discussion; they expressed themselves much better than when they were sharing the rooms with male.

Equality in agricultural activities in South Sudan:

The finding showed that most of students answer with regard to the above mentioned question as a uniform, and confirmed the reviewed literature. Students confirmed the existence of gender disparity whereby men and women are unequally treated in agricultural activities in South Sudan due to cultural beliefs, customs and illiteracy.

Women have no access to capital to pay for land, advanced technology, and tools to improve land productivity.

- At the university level female's students lack suitable and well managed accommodation arrangements, for example at JG-MUST, the Catholic University of South Sudan-Wau.
- Negative perceptions about females studying agriculture as professionals among the community. The agricultural profession is considered as a 'male job'.
- Insecurity, custom and belief, and lack of services such as health and education prevent female agricultural professionals from working in the rural areas among rural women.
- Delayed enrollments due to the war, as well as the long duration of agriculture studies (+/- 5-7 years) has negatively impacted the opportunity for both males and females to find spouses
- A difference in the curriculum and the language used as the medium of instruction (Arabic/English respectively) in the host community has a negative impact on the student's performance.
- Students' economic conditions are strongly influenced by the selection criteria of what to study

Opportunities:

The following are some of the opportunities that could be implemented to eliminating gender inequality in the three universities. Some of these opportunities were mentioned through National Gender Policy Report published in 2012 (Ministry of Gender, National Gender Policy, and Juba South Sudan 2012):

- Introduce and offer sponsorships for female students with excellent results so as to encourage them to continue with their studies/education.
- Enhance gender awareness among academic and non-academic university staff;
- Develop and apply research tools to situations of gender inequality at the college level;
- Intensify the campaign for girl-child education as a strategy for redressing discrimination created by attitudes, customs and traditions towards girl education.
- Reducing the duration of agriculture studies to 3-4 years as in other universities in the region to encourage girls to apply to study agriculture.
- Involve the private sector to finance the building of student hostels.
- Support and provide security and accommodation for females working in rural areas.

The role of women in agricultural activities in South Sudan

In general the responses of male and female students emphasize the issues of inequality between both sexes and attribute the unequal treatment in agricultural activities to the following reasons which were also reflected through the reviewed literature:

In some if not most South Sudanese cultures/beliefs, women are considered inferior, it is even said that when women cultivate land, the soil loses its fertility or quality easily, and becomes less fruitful. This can be attributed to a lack of knowledge about soils fertilizers, and advanced technology used to improve the land productivity on the part of women. All training is prepared by males and for males in a group, while women are excluded from participation in programs run by the extension offices in the rural areas. As part of the culture, women are primarily occupied with cocking for extended family and their own families, attending to young children, cleaning the house, fetching water and other domestic responsibilities.

Men and women have no equal opportunities in the agriculture sector because most women are illiterate due to the hardships they experienced during war-time. However, most women have the potential to carry out agricultural activities but are lacking the necessary requirements/facilities, which prevent them from doing so. Women have no capital to pay for land in case of land shortages. Land in most cases are male property, therefore women have no access to credit facilities. Despite all these hardships with regard to women's contribution to agricultural activities, the findings contradicted and confirmed that women actively participate in the subsistence sector; however, this contribution is yet to be monetized and included as part of the total GDP. The contribution of women to agriculture as a professional job hardly exists due to a lack of the necessary skills.

Women contribution in agricultural institutions

Unfortunately no serious effort has been made to encourage the presence of women in agricultural institutions: Although institution policy speaks of social justice and women empowerment, in reality the same institution has not created an appropriate environment for women to develop in this respect (see reviewed literate). For example, some universities (Catholic University –Wau) have failed to accommodate females in hostels due to other priority

and lack of funds. This has weakened the female position in respect of higher education, since South Sudanese culture prevents women from staying single due to the belief that a woman without a partner will 'spoil'. This is a common problem with regards to the three universities due to budget limitations rather than gender equality, because the government reduces public expenditure and devotes more funds towards insecurity problems in some part of the country. Therefore accommodation and food costs were dramatically reduced to zero.
Other reasons with regard to low participation levels of female students in the natural sciences and agricultural studies (see table 5.1) are due to the fact that education opportunities were given to boys, while girls were considered a source of dowries paid to the family of the bride by the husband as part of the wedding procedure. Boys are preferred and in general well taken care of and sent to university to pursue their higher education since they are considered the main breadwinners and thus will manage the household financially.

Gender disparity at the institutional level

In general student answers reflect many issues mentioned as part of the reviewed literature that have led to gender inequality, including, gender, and cultural and customary beliefs. Reasons behind inequality at the institutional level are related to the reality that so few girls have reached the college of agriculture. After girls complete primary education at the age of 14 years, they are either forced to marry early, or drop out of schools. The level of retaking years is higher amongst girls than boys. Most of those who managed to join secondary education and higher level of education are from urban areas. Poverty also plays a vital role in shaping women's education. Some of the girls who manage to complete their secondary and higher education are supported financially by their more wealthy relatives while others are forced to work and marry early including young girls and boys. Boys have the advantages and opportunities to work or move to the urban areas, where they will be better accommodated by their relatives in urban areas. The quality of education in the urban areas is also far better than in the rural areas in terms of teaching facilities. The lack of girls' hostels to accommodate those from rural areas moving to urban areas for education purposes is also problematic. This is a reason that young girls often find themselves falling behind in terms of education. Boys are given better opportunities because they are considered as the breadwinners of the family due to their better financial and educational position, girls by contrast are considered as sources of wealth, in particular the youngest aged between 12-14 years. Females are mainly employed as unclassified staff as already mentioned in the reviewed literature, and their contribution limited due to illiteracy. Educated women are not extensively represented, and their total number is less than that of males at both the academic and administrative levels.
Women are considered as not actively participating in office work. They have been mainly employed as unclassified staff. Women contribution is limited due to illiteracy. Educated women have not yet been represented. Their total number is smaller in our institution. They need to be encouraged to continue with their studies/education through offering them sponsorships.

Suitability of the professions within the agriculture field for males and females

There were differing opinions on this subject, but the answers were dominated by references to the difference in physical ability between men and women, some stated that agriculture is better suited to men (male FG), because practicing agricultural activities requires greater physical strength in terms of digging, cleaning the land and driving tractors. Agriculture should be considered suitable for both men and women so that the work could be shared. Women who are capable of working in the field of agriculture should be allowed to do so for equality reasons.

Women should be encouraged by offering them extension training to build up their capacity as agriculturists, skills which would be more easily transferred from women to women than from men to women due to gender sensitivity.
The students expressed their interest in studying agriculture from the professional point of view to achieve and master the following:

- To be knowledgeable about best practices in agriculture and educate their communities about advanced agricultural techniques,
- To take part in efforts made by the government to reduce food insecurity in South Sudan,
- To support on-going efforts to increase the production of livestock,
- To encourage people to engage in agricultural activities, in particular women,
- To learn more about food processing, because agricultural produce plays an important role in the food value chain industry in terms of vertical and horizontal linkages,
- Agriculture is one of the main sources of income worldwide, and thus also a source of foreign exchange through the export of agricultural products,
- It is a backbone of any country in the world, because it helps community to achieve self-reliance,
- Graduating with a degree in agriculture enhances the possibility of finding a job in an office, farming, fisheries or just being self-employed,
- Sources of revenue for the government in the form of fees collected using services such as veterinary, market, roads, electricity and so on,
- To improve the economy, and research in agriculture,
- To show people that agricultural activities are not only for peasants, the uneducated or the illiterate, but rather that they are important for everyone,

Agricultural activities are suitable for both males and females in the rural areas, with all members of the community participating in cultivation. Income generated from selling the produce is used for paying school fees and other costs for children. But in today's modern society some consider agriculture, fishery, and animal husbandry as primitive or lower level jobs. They would prefer that women select other fields such as economics, medicine, accounting and finance.
Students' responses were divided into two groups. The mixed group (of both males and females) stated that agriculture was not their first choice, but unfortunately exams results disqualified them from studying their first choices of engineering, medicine, veterinary studies or civil aviation. The second female group said that studying agriculture was their first choice, but that they would have preferred Wau to Juba. This is due to the difficulty of finding accommodation in Juba; many had relatives in Wau with whom they could stay. The cost of living is unaffordable for many in Juba, and the conditions are also undesirable.

Box 1:

Agriculture was my first choice (majority):

I joined the college of agriculture to learn about modern agriculture. In my village women used their hands to perform all agricultural tasks. At the end of each day, they had managed to cultivate just a small quantity, not enough to feed their hungry children. I would like to go back and help the people in my community adopt the best methods and tools that we are learning, to improve their productivity. Our land is fertile and we have water, so there is no reason to spend our hard currency on imported food from our neighbors, this is really shameful.

The effect of the economic situation on student's choices of field of study

The average age of students participating in the focus group was between 25-30+ years old. This is a result of different factors, for example:

- Effect of civil war on school age enrolment,
- Irregular school system in the refugee camps,
- Teachers received irregular payment of salaries,
- Transfer of the university from North Sudan to South Sudan delayed graduation process by more than 2 years
- Lack of labs, lack of a syllabus
- Language conflict (Arabic visa- via English problem)
- Lack of permanent teaching staff.

Box 2:

Effect of the economic situation:

I have to avoid selecting very expensive courses, and instead choose courses that require fewer years of studying. It is difficult to save enough money to pay the university fees annually, and the economic situation has resulted in my studies lasting 7 years instead of 5 years.

There is also now a reduced budget allocated to higher education in order to build: hostels for both girls and boys, to maintain farms for field studies, as well as labs. Teachers do not receive

salaries for long periods of time. The war has caused a lot of inconveniences, for example, no labs for practices, research centers, lack of a syllabus, and lack of some colleges at the university.

Box 3:

The early death of my father prevented me from studying medicine, which was my preferred choice. Limited financial resources and the fact that the Government of South Sudan abolished free education have meant that many students have been unable to apply for university education. Many students failed to pay the tuition fees.

Box 4:

(Answers by group of female students only)

This was my father's choice, my choice was to study business administration, and I am not interested in working in the fields, which I consider "dirty work". However we have not yet visited a real farm and have conducted no fieldwork yet. Now I enjoy studying agriculture, I have even planted some vegetables in our house. My grandmother appreciates the idea of producing our own vegetables and salad.

There was some hesitation with regard to reopening/rebuilding the student hostels unless the university administration shares the cost of running and maintaining the service delivery and security of the hostels with the government.

The effect of the war on field of study at university

The civil war had an impact on the fields of study chosen by students. In order to study, there needs to be a situation of peace and stability, during the war people were displaced and forced to move often, which prolonged the duration of their studies. It also often manipulated the field of study chosen. Some students became orphans and were forced to rely on government scholarships or part-time jobs.

Unemployment is high especially amongst those who graduated with agriculture degrees. Some students stated that the war had an impact on their choice of subject at university.

On the other hand, some were lucky enough to specialize in a wide range of subjects and institutions including JGU and University of Rumbek in Lack State. They study economics, accounting, business and public administration, law, education, engineering, petroleum, geology, mathematics, computer science, medicine and agriculture. However, many left school early because they could not afford to pay school fees; joined the labor market and have their own family and children.

Box 5

Few colleagues completed secondary school, started their university studies, but dropped out because for family reason, another became a priest. I am the only one of my colleagues who still pursues higher education. The reason for this is a lack of funds. Some friends from the Arabic-speaking group went to Khartoum or Upper Nile Universities, some of them have graduated already and are working for the Ministry of Agriculture.

Enrolment of family members in education system

From the discussion conducted with the students, it was discovered that many have young sisters still at school, or who have started their university education. There was only one case reported, where the father (a priest) had invested money in his sons' education, but did not want to do the same for his daughters'. In that case, the boys were fully support in terms of the payment of school fees, one of the elder girls, however, had failed to secure school fees, left school and become pregnant when she was in senior 2. She is now married with two children. The other sister failed school and remains at home. Some of the girls said that their mothers never encouraged them to pursue their studies, but instead expected them to do all the domestic work and help at home causing them to neglect their school work.

Gender equality and access to job markets in South Sudan

Obstacles to the labor market in South Sudan:

- Nepotism,
- A lack of vacancies in the public sector,
- Small private sector,
- Foreigners occupy jobs that could be given to local people

Gaining access to the job market in South Sudan is still difficult due to the prevalence of nepotism, with government jobs often given to relatives rather than distributed on the basis of qualifications. Therefore it is often necessary to have connections at the government level as this is amongst the most important factors to get a job. Unemployment is high among universities graduates, as many participating in this study had heard about that from their friends in Juba. On the other hand, vacancies in the public sector have become scarce while the private sector is still weak and unable to contribute in terms of job creation.

Box 6:

Story by male student

After I finished my secondary education I joined the college of Air Cargo Management in Uganda, I graduated after 2 years, and decided to apply for a job in Yambio, where my family comes from. The manager at the Airport told me they did not have any vacancies and asked where my family was from. He specifically did not ask about my family, but not about my

qualifications, nor did he interview me to determine whether what I had so far studied could be applied there. I spent 4 months looking in vain for a job in Wau and in Juba, then I applied to study at the Catholic University and I was accepted.

Box 7:

Story 2 by a female student:

It is not easy to find a job, I heard from a friend that an "X company" urgently needed an office assistant to work for them. So I went there to apply for the vacancy, but to my surprise, the guard prevented me from entering the building to submit my application personally. He kept telling me to return on the next day and that he would assist me to see the manager, but he never allowed me to enter. Finally, he asked me what gift he would receive in return if he allowed me to enter. So I left, and I have never returned to that place. After some time had passed, I heard from a friend of mine, that a girl who had agreed to leave a gift in exchange for the job had received it.

Females face many problems with their parents or guardians, if they decide to take on a part time job while studying, for example in restaurants or coffee shops.
Unemployment is high because our people have to compete with foreign labor, of which there is an influx in South Sudan, since there are no developed tools and mechanisms as in other countries to control and limit foreign labor. Foreign hotels, banks and companies offer job opportunities to imported foreign laborers at the expense of the South Sudanese labor force. They regard the South Sudanese as having few skills and a low level of education; some regard them as lazy. Another factor is related to the inappropriate school curricula and poor quality education that is largely irrelevant to the need of the labor market in South Sudan.

Expected job opportunities after graduation from the College of Agriculture Studies

(1) Agricultural officer,
(2) Food monitor,
(3) Extension officer,
(4) Trainers (farm trainer),
(5) Animal livestock officer,
(6) Researcher,
(7) Planner,

(7) Self-employed,

(8) Agriculture/NGOs

The male students said that they planned on teaching agriculture to school students or establishing their own agro-businesses to cultivate and rear animals. Some also hoped to farm their own land (in Leer, Upper Nile) to cultivate sorghum. By doing so, they would be able to

create jobs for many unemployed people in the area. Female students were interested in agribusiness aimed towards helping farmers in rural areas buy high quality of seeds. Most female students wanted to run their own shops, or for example to work as extension officers to help the local community in the rural areas. Female students are expected to work either with the Ministry of Agriculture or in the field of agro-business. Male students wished to engage in small-scale farming or as extension officer in farming, agribusiness, soil science, horticulture, and livestock-poultry, because agriculture required practicing the theories learned.
In general, female students prefer to work in offices, nurseries or engage with agro-business. Although some would prefer to work in laboratories, the field is still underdeveloped at the University of Juba and elsewhere in the county. Some female students expressed their interest in the field but felt unable to pursue this field because they were afraid their family might discourage or prevent them from doing so. Students with young children in particular wanted to remain close to their babies, who they felt needed to grow up with both parents present. However, some believe that while women enjoy the right to work in all fields, the level of family support available is an important factor, because someone needs to take care of the young children. Additionally, they need to resettle where services such as schools and health facilities are available. Sometimes women get support from the local communities, but this is still a new phenomenon in South Sudan.

Box 8:

"I can't leave my wife to work in the rural areas. There are many issues of concern: insecurity, lack of necessary services such as schools, health care, roads. Some men behave badly with single mothers, I don't want my wife to be exposed to or communicate with such people. My children might also be negatively influenced by such behavior.

Implication of family responsibilities on education for men and women

- Daily domestic work and child-care consume a lot of time at the expense of their education.
- Schoolgirls are often forced or feel obliged to leave school and remain at home to relieve their mothers of their heavy workload and responsibilities.
- Domestic work does prevent girls from regularly attending school and doing homework, in contrast to girls, boys are able to regularly attend school and have fewer responsibilities at home, allowing them to spare more time for studying.
- Forced and early marriages restrict girls from completing their school education and has increased the illiteracy level among girls,
- Family responsibility and family problems have affected both men and women and led to a high level of school dropouts,

- Poverty and the ability to pay school fee also affects both girls and boys,
- It has also been argued that there is no difference because women are free to schedule their domestic activities at specified times, when they are not doing school work,
- It was also said that men and women are equally busy at home, taking care of their kids and cattle in an equal division of labor,
- Home affairs engage both family members, they have no time to attend school

Box 9:

Married students:

It is hard to have a family and study at the same time; this has negatively affected my exams results. I have fewer hours to study compared with my male counterparts. I have to manage my family, bring my two children to kindergarten and back, clean the house, go shopping, and prepare food after returning from school. My husband cannot help me at home, because he is our breadwinner, he started working after he completed his secondary education. He failed to pursue his higher education due to financial constraints. I really appreciate his moral support and encouragement and he is actually the one who pays my school fees every year – this is my final year. I do not feel comfortable asking him to arrange for a housekeeper, because I knew he cannot afford to pay for one.

Box 10:

Told by male:

"It is important to divide responsibilities between men and women at home, but we can't ask a husband to bathe his baby, when his wife is present at home. Culturally this is the woman's job, not the man's; he can only do so in her absence. It is impossible to ask the father to remain home with babies; this is the mother's responsibility.

Gender as part of the curricula in agriculture courses

Gender as a subject was not addressed directly in agricultural courses. At the academic level gender as a subject has only been taught for one semester during the second and fifth academic years in rural community development and sociology and social anthropology respectively. Indirectly it has been taught as part of the principle and land use planning, rural society course, and extension in agriculture, and in economics of feasibility study.

Some of the biggest obstacles faced by women and girls involved in agriculture programs and agricultural professions are:

- Lack of good primary schools, high school drop-out rates due to poverty and early marriages, and an inadequate number of teaching staff at the university level,
- A lack of food programs in the universities, a sense of shyness, which prevents women from expressing their views, and the perception of some girls that the agriculture field is only for men because of the physical nature of digging land and driving tractors,
- A lack of elementary knowledge about agriculture foundation,
- Girls like to take comfortable offices' work,
- Many school girls do not work hard enough to pass exams in particular with regard to science and mathematics subjects,
- Accommodation for females, because while many students are willing to study agriculture, they have difficulties getting safe, low cost accommodation in the neighborhoods.

The number of girls who joined the college is smaller because families declined to let their daughters study far away from home or stay with relatives while they study. They are often afraid their daughters might be exposed to sexual harassment or other problems. Another challenge is with regard to early marriages, because families use dowries as a source of income.

Obstacles to becoming an agricultural professional based on gender

The lack of teaching staff in the university and an inability to pay tuition fees are not dependent on sex,

- Lack of farms to practice in, a lack of lab tools and equipment for applying and practicing agriculture subjects,
- We study general agriculture, we would like to study animal husbandry, soil management, crop production, and water management (Catholic and J. Garang Universities).
- Students are frightened of the long duration required to study agriculture (a minimum of five years). Females in particular complain about not being able to find a man to marry after graduation,
- Agriculture studies required a lot of studying and fieldwork during the study period, therefore women prefer to study other subjects.
- Lack of accommodation for both male and female respectively,

- Wrong perception assumes that the agriculture field is for men only.
- Language barriers: a number of students (girls) drop-out due to the difficulty of understanding and communicating in English. During school, they were mainly taught in Arabic, when they joined the University they were taught in English. Although they were offered two months intensive English courses, this was not enough to enable them to study in English, and understand it at an academic level.
- Instability of the University education, due to moving from Khartoum to Juba, lack of facilities (long duration of study)

Opportunities to increase female intake in agriculture programs

- Reducing duration of (Month and above) field work for agriculture's college may attract women to apply or choose agriculture courses,
- Launch an awareness campaign against early marriages.
- Teaching agriculture courses at the secondary school level,
- Advocating vigorously for girls education in South Sudan and encouraging girls to go school instead of keeping them at home as a source of income,
- Increasing the number of lecturers to avoid delays and time wasting and increasing the number of universities to encourage women to study agriculture,
- Introduction of human rights issues specifically as concern women's rights,
- Reducing the duration of the degree of agricultural science at the universities,
- Providing/provision of accommodation and food programs through the institutions,
- Creating employment opportunities in agricultural sectors for graduate and trained personnel.
- Encouraging women to join agricultural college,
- Formation of a women's agricultural center, and agricultural clubs for women,
- Launching a gender campaign to encourage female students to study agriculture,
- Organizing peaceful demonstrations to encourage education for girls and boys equally,
- Reviewing the curricula and integrating gender mainstreaming to be taught across the university colleges,
- Rationalizing the dowry, preventing by law early girls' marriages and encouraging girls' education – with specific attention to science and mathematics subjects

- Reducing the admission cost for bright girls from disadvantaged areas.

Job opportunities for female agricultural professionals

- Teaching positions in secondary education,
- Women and girls, have greater opportunities, because the government of South Sudan has passed into law a women's quota of 25% in decision making positions at all levels of government,
- Ministry of agriculture,
- Those who make it to the university level have the chance to represent women in various fields including agriculture extensions, field monitors-researcher, microfinance, Agricultural Bank, ministry of education and ministry of economics,
- Encourage girls to engage in agro-business, animal production, manage their own farms and work for NGOs

Way forward

- Involve female lecturers more to promote gender education programs at the secondary education level in both rural and urban areas. This is vital because some men and women do not understand the concept of gender in agriculture,
- Gender studies in the agriculture college should be integrated as part of curricula,
- Gender studies is vital because it promotes equality between men and women in the community,

Both men and women should be encouraged to put their culture beliefs aside, in order to achieve their goals,

- Traditionally gender equality has been practiced in subsistence farming, because both men and women worked together to produce food for their family,

- Some students stated that they believed all South Sudanese citizens would benefit from the study of agriculture as it would enable them to fight poverty and hunger in the local communities.

- All students, both female and male of the College of Agriculture should be given equal chances to participate in fieldtrips and practical exercises,

- Women should be given free education or half of their fee should be paid,

- Agriculture must be introduced in all areas of South Sudanese education because there are plenty of resources locally available, including water, land and soil, and enough rain to produce what is needed to reduce hunger and poverty among our communities

- Gender awareness campaigns need to be integrated in the curricula.

The following section summarized findings of interviews conducted with academic and technician staff within the three universities

6.2 Interview of the academic staff at the level three universities

Female	Male	Gender (Female, Male, or Both)	Type of Activity FG= Focus Group IN=Interview	Role in institutions (Adm=admin; Col=college; Tea=teachers/instructor; Stu=student; Alumni=Alum)	Institution
0	1	M	IN	Adm	CU
0	1	M	IN	Adm	CU
0	1	M	IN	Tea	CU
0	1	M	IN	Adm	UoJ
0	1	M	IN	Adm	UoJ
0	1	M	IN	Adm	UoJ
0	1	M	IN	Adm	UoJ
0	1	M	IN	Tea	UoJ
1		F	IN	Adm	UoJ
0	1	M	IN	Adm	UoJ
1	1	B	IN	Adm	JG-MUST
2	**10**				

Gender and equal opportunities among professionals in the agricultural sector

While men and women have equal opportunities within the agricultural field, female representation is lower in practice due to a lack of qualifications and their being few in the sector. Men and women enjoy equal opportunities at the three universities, for example when considering how the admissions process and the selection of the students are carried out. They are all given the same entrance exams and go through the procedures to be admitted, however, this equality is influenced by some social issues, such as parents discouraging their daughters in some communities, leading to low numbers of female students and staff in those institutions. Nevertheless over the last ten years the disparity between men and women has remained an issue and only minor improvements have been achieved. This may be because women often choose to study disciplines other than agriculture studies. Another reason could be attributed to the 25% quota of women in government bodies, which although a success in theory, the selection criteria considering the skills in question is simply a cosmetic action. This is because the women who are appointees are related to politicians/government offices, or selection based on tribal relations. Some positive changes have been achieved in terms of the number of female students, which has increased by almost 10%, an indication of a positive change in this area.

Gender disparity at the institutional level and changes over the last decade

Our findings reflect the gender disparity among administrative and academic staff within the three colleges of agriculture, natural resources and environmental studies. Almost 90% of the interviewed academic staff was male. However, there was small number of females among the technicians we interviewed. We observed differences in the answers which will be considered below.
Positive responses were observed amongst the interviewed staff, they agreed that both men and women are treated equally in terms of salary scales or bonus allowances, and timing. This can be observed through the presence of female and male staff - both the teaching and non-teaching staff members – with equal benefits with respect to their qualifications and performance. However, the number of male individuals is higher than the number of females in general but in reality the statistical data showed different picture.

Responses by female staff on the subject of gender activities were different because women were denied the right to equal access to the University staff accommodation and promotions. There was a small number of female staff at the administrative level; fewer than 10 heads of department were female. The gender disparity between men and women at the institution level is due to the lack of serious effort to encourage the presence of women in decision-making positions within the institutions. However there are some certain criteria and conditions requirements for promotions of the University staff.

Equal participation of males and females in decision-making positions of administration

Some assumed that, and as a professional job, agriculture mainly suits men because a degree is required, and women are often unable to complete one, but traditionally or formally women are the backbone of agriculture activities at home. Others assumed that agriculture is not limited to men, but is for women too. In South Sudan it is said that men are better suited to agriculture, but in reality there are more women than men in subsistence farming in rural areas.

There is also gender inequality because few women apply, women tend to avoid agricultural studies and opt instead for economics, secretarial studies, journalism, and education; nevertheless there are now more women in agriculture colleges than before. However, some women's applications were rejected, due to perception that spouses might prevent their wives from working in rural areas where there is a lack of school and health services.

Selection criteria in the hiring process for the academic teaching staff

In all the universities considered in this study, there is a committee chaired by the Vice Chancellor and other members, including the Secretary for Academic Affairs, the Principal, administrative staff, Deans of the colleges and Heads of Department. Final decisions of the Appointment Committee are based on performance during interviews and qualifications of candidates, so decisions will be taken in a democratic and fair way. However, as mentioned by some interviewers such arrangements were not followed by one of the universities, in which the Vice Chancellor respects the rule of sharing the final decision with the Appointment Committee...
In other universities the hiring and firing are done according to the university's regulations. Hiring teachers in agriculture is done on an equal basis between men and women because it is for capacity building purposes of the whole community. Human resource offices must be established, which must be independent enough and qualify to recruit staff needed for jobs.

Obstacles to career advancement based on gender

Extra responsibilities indeed divided over time and quality of new program.
Women are most affected by this, e.g. one interviewee stated that her sister could not finish her studies due too much work at home. The family responsibilities affect more women than men because of cultural bias, which is in favor of men in this regard. Sometimes they participate but with limited impact and resource contribution. Women have more responsibilities at home than men do; this weakens their performance at work and hinders their likelihood of promotion. Some issues, such as the dowry price removes the ability of women to consent of women on their rights. Dowry prices should be rationalized, so young couples will be able to invest in building their own house and supporting their family. Once the dowry is paid, it is distributed among the wife's family members, and does not benefit the young couple. Rationalizing the dowry will improve gender equality, in particular amongst partners so the husband and wife equally share the living expenses and family responsibility.
Services provided by institutions in the form of child support as mechanisms to help men and women with family responsibilities.
Women are more affected with the burden of working both in the office and at home. For example, one interviewee stated that his sister could not finish her studies due to a heavy workload and responsibilities at home. On the other hand there are no mechanisms yet, but some University offers health services for its staff, families and students. Some university still in the process to establish health care insurance for staffs other they do not have.

Gender as part of universities curricula

'Gender' as a subject is offered as part of social ethics, particularly in the context of human rights, women's rights etc. At the college level, social analysis of South Sudan that addresses the Millennium Development Goals and women empowerment etc. is conducted. At the university level, the College of Social and Economic Studies addresses the subject of gender.
Gender is already addressed in agriculture-related courses, but it should be addressed in every institution. Women are equally important as men if not more than them in some cases.

Obstacles experienced by people pursuing the agricultural profession on the basis of their sex (male/female)
There are a good numbers of such barriers. Among these are:
• Less energy/physical strength by female student areas like practical agriculture,

• Low opinion: not only women but also by men regard agriculture as a low profile profession,

• Early marriages in most communities have led to a high dropout rate in schools,

• Lack of empowerment and discouragement of girls pursuing education by men and boys in many communities

Issues preventing women from working in remote, rural locations

It can be said that women face problems in these areas because there is a fear she will be attacked due to insecurity - women are considered by men to be weak and only good for child care.
Obstacles women and girls face in South Sudan's university-level agriculture programs and agricultural professions and the way forward

- Admission willingness in sciences,
- Time poverty, resulting from women multiple and competing reproductive and productive responsibilities. These tasks are usually performing without the assistance of labor saving technology and adequate transportation.
- The coexistence of multiple laws which create ambivalence (for example customary and statue relating to early marriages)
- Cultural obstacles.

Many of the female students in higher agricultural learning institutions are orphans, so they tend not to be able to afford tuition fees. They have little funds to support their social lives and some of them are already mothers.

The way forward to overcome these problems is for the government of South Sudan to introduce affirmative action measures for women, and to implement policies, which favor the progress of women.
By introducing a possibility of free education at this early stage, they would be empowered to make more of themselves. The government should also introduce programs that promote girls education through media campaigns. Seminars and workshops should be held to sensitize girls on the relevance of education.
Potential opportunities for women and girls in South Sudan's university-level agriculture programs and agricultural professions
Through agriculture, girls and women in South Sudan can participate fully in both political and economic development of their country.
Give scholarships to interested and academically strong women.

Other comments on the topic of gender in agriculture

It will be useful for students to learn about the Millennium Development Goals and gender equality in agriculture. The interview went very well. The management staff at the two Universities was very cooperative in general and successfully organized FG meetings with the target students, convincing their colleagues to devote some time to answer the questionnaires.

Conclusion and recommendations

Improving gender equity and the position of women in South Sudan faces a lot of constraints, as identified above. In addition, the current political crisis that turned into an armed conflict mid-December exposed the extent of governance deficits and the fragility of the country. The most important lesson to be learned now is that this crisis needs to be turned into an opportunity to build up and strengthen organizations and institutions. In particular, women need to be empowered to reduce the risks of continuing and renewed conflict.
While there is currently instability and there are risks, there are feasible areas to support. From this study, the following possibilities emerge:

Academic staff:

- Develop gender study curricula for colleges of agriculture and natural resource.
- Motivate female enrollment in the Colleges of Agriculture and Natural Resource studies.
- Organize intensive program for girls to improve their performance with regard to mathematics, sciences and English language at school levels (primary and secondary levels).
- Provide short-term training on gender and agriculture issues targeting unskilled female staff employed by the Ministry of Agriculture and Fisheries as extension officers.
- Monitoring and evaluation the implementation of the gender national policy of South Sudan in terms of empowering South Sudanese women at all levels through measure progress against specific commitment.

For University administrators:

- Ensure that 25% of both academic/administrators bodies are female. This must be decided on a transparent way and on the basis of merits and qualifications.
- Offer female and male equal chances to participate in furthering their skills overseas, present the university inside and outside South Sudan.
- When it comes to services offered by the university for example access to houses, female academic staff must be treated equally as men, by allowing them to compete accordingly. Improve the level of sanitation, offer services such as kinder gardens facilities to young parent staff.
- Establish gender study center at the University of Juba.

For government (Ministry of Education, Ministry of Gender, Social and Child Welfare, Judiciary):

- Introduction of scholarships for girls with difficulties to maintain university's fees for admission in agriculture colleges. It should be tighten to the performance.
- Introduce girls' school dormitory facilities and school feeding programs. Management of girls' hostels should be jointly managed by public-private body that deals directly with students' parents.
- Enforce current legislation to protect women's rights such as Child Act.
- Provide a framework for discussion of the practice of customary law, which contradict the requirements of the new bill.
- Translate gender policy into an action plan with actors, timelines, funding, monitoring and evaluation criteria's.

For non-state actors:

- Support ongoing effort to enlighten local community about gender equity at school and community levels.

For international funders:

- Co-fund the following: establishment Center for gender study and women empowerment at the University of Juba, Student hostels, rehabilitation teaching facilities in female schools and universities.

- Monitoring and evaluation the implementation of the gender national policy of South Sudan in terms of empowering South Sudanese women at all levels through measure progress against specific commitment.

- Funding training programs for school teachers training on gender issues

- Support monitoring and evaluation the implementation of the gender national policy of South Sudan in terms of empowering South Sudanese women at all levels through measure progress against specific commitment.

- Support action plan with actors, timelines, funding, monitoring and evaluation criteria's.

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Appendix VIII. Higher Education Priorities and Direction for Agriculture, Natural Resources, and Environmental Sciences

HIGHER EDUCATION PRIORITIES AND DIRECTION FOR AGRICULTURE, NATURAL RESOURCES, AND ENVIRONMENTAL SCIENCES:

Viewpoints from South Sudan

Prepared for
Catholic University-Wau
John Garang Memorial University of Science and technology
University of Juba

HIGHER EDUCATION PRIORITIES AND DIRECTION FOR AGRICULTURE, NATURAL RESOURCES, AND ENVIRONMENTAL SCIENCES: Viewpoints from South Sudan

Monograph Number One

Prepared for
Catholic University-Wau
John Garang Memorial University of Science and Technology
University of Juba

in cooperation with
Norman Borlaug Institute for International Agriculture - Texas AgriLife Research
Virginia Polytechnic Institute and State University

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Executive Summary

Purpose—Using unique assessment methodologies, the scope of work called to identify planning and programming priorities for South Sudan higher education in agriculture, natural resources, and environmental sciences. The assessment included teaching, research, and community outreach functions. Needs of the institution, curriculum, subject matter, students, and stakeholders were examined with regard to institutional elements, beneficiaries, and consensus.

Audience—The population included the University of Juba (n=21), Catholic University-Wau (n=24), and John Garang Memorial University of Science and Technology (n=23). Ten participants stood as a national cohort who works across several states in South Sudan. Seventy-eight participants represent six peer groups—administrators (n=13), professors (n=21), students (n=17), stakeholders (n=17), donors and contractors (n=5), and NGOs (n=5).

Method—A pre-critical path method (PCPM©) deployed three tools by which to understand priorities, sequence, agreements, and relationships. Q-methodology rank-ordered the development sequence of 14 attributes associated with high performing universities. A seven-point Likert-type scale classified 50 associated items according to agreement and contribution to the development path. A semi-structured qualitative interview examined influences of four crosscutting constructs—cooperation, future view, receptivity to change, and sustainability.

Key findings—Among six peer groups, there was diversity of viewpoint for sequence and in the levels of agreement. Summing data from six peer groups may mask under represented viewpoints. However, participants concurred that in any sequence, four well-ordered attributes begin the development path—1) improving instructional technology and library resources, 2) improving technological infrastructure and facilities, 3) improving outreach, community development and extension, and 4) improving administrative services. Improving research, development and innovation followed as fifth, but with slightly more divergence in viewpoints.

Greater diversity was voiced when charting the next four attributes—6) increasing institutional capacity building, resource management, sustainability, 7) providing short-term human capacity building and short-term staff training, 8) improving curriculum development and design of academic programs, and 9) addressing gender issues.

Three initiatives follow in the development path—10) providing long-term human capacity building & long-term training, 11) improving faculty teaching, scholarship and writing, and 12) developing student leadership and student services. Participants held more diverse views when sequencing the two remaining attributes—13) improving environmental practices, and 14) engaging stakeholders, donors, and partnerships.

Conclusions, Recommendations, and Implications—A gap in higher education separates more developed countries from least-developed countries. Implementing attributes associated with high performing universities will reduce the gap. Least-developed countries must establish priorities and allocate resources to sequence development pathways, improve communication, and encourage collaboration among stakeholders.

Participants expressed deep commitment to higher education and had sound rationale for development strategies. If skillfully integrated and articulated, diversity offers energy and innovation. Dialogue and open communication are crucial ingredients for development. Sequencing activities requires planned transactional communication with strong linkages between the source, message, channel, and receiver. It is the responsibility of leaders to seek pathways to narrow the educational gap while increasing ownership and internal locus of control.

Higher Education Priorities and Direction for Agriculture, Natural Resources, and Environmental Sciences: Viewpoints from South Sudan:

Introduction

Forecasting the influence of global megatrends is challenging, but recognizing the positive influences of quality education is clear. Disruptive changes in population, technology, environment, and migration demand access to lifelong learning. A widening gap separates more developed countries, developing countries, and least-developed countries with regard to quality higher agricultural education. Without a critical mass of skilled and knowledgeable people, no country can ensure endogenous development.

Education in agriculture, natural resources, and environmental sciences contributes to the general welfare of a nation. Higher education contributes even more. South Sudan has latent resources—human, economic, political and physical—that can increase food security, foster peacebuilding, elevate livelihoods, improve human health and wellness, and enrich the economic wellbeing of its people. However, this potential is largely unrealized.

High performing universities have defining attributes. Recognizing these attributes is the first step toward effective development. Sequencing and harmonizing the attributes is essential for effective and efficient institutional development.

Operational Framework

An operational framework identified attributes of high performing universities. The intent was to sequence and harmonize a development pathway. The framework identified participants as sources of contextual knowledge. Identifying levels of agreement among associated statements followed the sequencing of attributes. Four crosscutting constructs described social perceptions that affect change and harmony. Understanding these perceptions provided insight into opportunities and barriers that influence implementation and explain at what point implementation threats occur within the development pathway of the higher education system.

Purpose and Objectives

By combining unique assessment methodologies, the scope of work called to identify planning and programming priorities for South Sudan higher education in agriculture, natural resources, and environmental sciences. The assessment included teaching, research, and community outreach functions. Needs of the institution, curriculum, subject matter, students, and stakeholders were examined with regard to institutional elements, beneficiaries, and consensus.

Method

A pre-critical path method (PCPM©) deployed three tools by which to understand priorities, sequence, agreement, and relationships. Q-methodology rank-ordered the development sequence of 14 attributes associated with high performing universities. Each attribute was provided on a 2.5”x 4.5” card and was sorted based on its position in the final sequence.

A seven-point Likert-type scale classified 50 associated items according to agreement and contribution to the development path. Each statement was provided on a 2.5”x 4.5” card and was sorted by the participant based on the level of agreement.

A semi-structured qualitative interview examined influences of four crosscutting constructs—cooperation, future view, receptivity to change, and sustainability. The interview began with a description of the personal relationship with the specific university and the context in which the participant lives and works.

The selection of participants used a snowball process ". . . through referrals made among people who share or know of others who possess some characteristics that are of research interest" (Biernacki & Waldorf, 1981, p.141). Those interviewed were members of the larger higher education community to whom others in their peer group often turn for advice, opinions, and views.

Four phases guided the inquiry—1) process development, 2) data gathering, 3) preliminary hypotheses and analysis, and 4) conclusions, recommendations and implications for program planning and development.

Findings

The population for this study included the University of Juba (n=21), Catholic University-Wau (n=24), and John Garang Memorial University of Science and Technology (n=23). Ten individuals stood as a national cohort who works across several states in South Sudan and the region.

Capturing synergy among diverse participants is a catalyst for high performance. The 78 participants represented six peer groups—administrators (n=13), professors (n=21), students (n=17), stakeholders (n=17), donors and contractors (n=5), and NGOs (n=5). Among peer groups, there was diversity of viewpoints for sequence and in the levels of agreement of associated statements. Summing data from six peer groups is a limitation that may mask under-represented viewpoints.

Rankings

Seventy-eight participants recognized the importance of the 14 attributes and the need to sequence the development of higher education in agriculture, natural resources, and environmental sciences. However, participants concurred that in any sequence, a sub-set of four well-ordered attributes began the development path.

The composite of participants ranked "Improving instructional technology, library resources" **first** in the sequence of 14 attributes for development. There was minimum divergence from one to 5 in the rank-order. The group of administrators & professors, and donors & NGOs ranked this attribute first while vice chancellors ranked the attribute fifth. Table 1 shows the rank-order of attributes by peer group.

"Improving technological infrastructure & facilities" ranked **second** in the sequence by the composite of participants. There was minimum divergence from one to 5 in the rank-order. The groups of administrators & faculty, and students ranked this attribute first while stakeholders ranked the attribute fifth. "Improving outreach, community development & extension" was ranked **third** by the composite group. Vice chancellors and faculty ranked this attribute first while donors & NGOs ranked the attribute sixth. The composite of participants ranked "Improving administrative services" **fourth** in the sequence. Donors & NGOs ranked this attribute third while vice chancellors, administrators, and faculty ranked the attribute sixth.

"Improving research, development & innovation" ranked **fifth,** but with more divergence than among the previous four attributes. Faculty ranked this attribute second while students ranked the attribute 8th and donors & NGOs ranked it 9th among fourteen.

Greater diversity was voiced when charting the next cluster of attributes. "Increasing institutional capacity-building, resource management, sustainability" finished **sixth** in the composite rank-order. Vice chancellors ranked this attribute third while donors & NGOs ranked the attribute in a tie for 12th. Interestingly, administrators ranked this attribute eighth. The composite group ranked

"Providing short-term HR capacity-building & short-term training (<2 years)" in a three-way tie for **seventh** place. There was divergence from fifth by administrators to 11th by students and 12th by donors & NGOs. "Improving curriculum development, design of academic programs" also tied for **seventh** place. There was divergence from fourth by donors & NGOs to 14th by administrators. There was divergence from fourth by donors & NGOs and fifth by students to 14th by administrators. "Addressing gender issues" also tied for **seventh** place. There was maximum divergence ranking first by administrators to 13th by vice chancellors and faculty and 14th by donors & NGOs.

Three attributes follow in the development path. The composite group ranked "Providing long-term HR capacity-building & long-term training (>2 years)" in **tenth** place. There was divergence from seventh by faculty and students to 13th by administrators. "Improving faculty teaching, scholarship and writing" tied for **eleventh** among the 14 attributes by the composite group. There was divergence from seventh by donors & NGOs to 12th by administrators & faculty. "Developing student leadership & student services" also tied for **eleventh** among the 14 attributes by the composite group. There was greater divergence ranging from second by donors & NGOs to 14th by vice chancellors, faculty, and administrators & faculty. Students ranked this attribute 8th among the fourteen.

Participants held diverse views when assigning the sequence for the two remaining attributes. "Improving environmental practices" was ranked **thirteenth** by the composite group. There was minimum divergence from eighth by faculty to 11th by administrators and students. The composite group rated "Engaging stakeholders, donors, and partnerships" last among the 14 attributes. There was divergence from seventh by donors & NGOs to 14th by students.

Ratings

Participants accepted the concept of adopting and modeling attributers that are associated with high performing global universities. As a second step in the implementation of a critical path, each participant analyzed 50 Likert-type items associated with the high performing attributes and provided their viewpoints ranging from strongly disagree (1) through strongly agree (7). Only items to which participants disagreed or strongly disagreed (>3.0) or to which they agreed or strongly agreed (<5.5) are included in this discussion.

When sequencing the first four attributes, participants sequenced "Improving instructional technology, library resources" first. They agreed (5.87) that, "This university does not have adequate scientific and academic journal holdings." The composite group strongly agreed (6.14) that, "Community development is equally important as campus-based teaching for the welfare of South Sudan." The composite group strongly agreed (6.37) that "Extension workers should be trained in agriculture and teaching methods" and agreed (5.67) that "Smallholder farmers (< 2 ha) should be the primary focus of extension and outreach efforts." Participants strongly agreed (6.68) that, "High performing universities depend on administrative vision, efficient support systems, and transparent allocation of resources."

When sequencing the fifth attribute, "Improving research, development & innovation," participants strongly agreed (6.71) that, "Agricultural research is essential to increase food security in South Sudan."

Participated agreed (5.51) that, "Each university should have a unique specialty (e.g., agronomy, economics, environmental biology, technology)" when they focused on "Improving curriculum

development, design of academic programs." Participants strongly agreed (6.22) that, "Women make important contributions in agriculture, natural resources and environment."

As participants sequenced "Long-term human capacity building & long-term training," they strongly agreed (6.01) that, "Younger professors should have priority access for long-term training." Participants also agreed (5.51) that, "This university should be judged on employability of its graduates" as they sequenced "Student leadership & student services."

Participants agreed (5.86) that, "Land tenure and ownership should be promoted for South Sudanese people" as they work to "Improve environmental practices." They also agreed (5.55) that, "Environmental science is a primary factor affecting food security."

As participants sequenced "Engaging stakeholders, donors, and partnerships," they agreed (5.95) that, "This university creates a 'public good' and should be supported with public funds." They agreed (5.88) that, "There are untapped opportunities for linkages between this university and private business."

Crosscutting Constructs

Semi-structured qualitative interviews examined the influence of four crosscutting constructs—cooperation, future view, receptivity to change, and sustainability. There was substantial diversity in viewpoints expressed regarding foundational issues related to institutional climate, collaboration, and direction associated with university and peer group. Each interview began with a self-description of personal relationships with the specific university and the context in which the participant lives and works. The discussion often dug deeply into complex interrelated relationships that affect aspirations, expectations, policies and practice. The following are samplings of more than twelve hours of interview discussion.

Spirit of Cooperation

Participants expressed a full spectrum of viewpoints when asked to describe broadly the "spirit of cooperation" that permeates the university community. Generally, students and vice chancellors were more positive while professors and stakeholders were less positive. Clearly, cooperation is tied to resources and relationships. Views of cooperation differed among the three universities.

Students (0313, 0413, 2523, 2623, 2723, 2823, 2923, 3013, 3113, 3613, 3712, 6033, 6133) agree that there is good cooperation among students. A student (0313) observed, "Cooperation between professors and student is very good. If we [students] are not cooperating, we cannot complete the journey from year one to year four. The faculty cooperates with each other a lot. All the students are cooperating. University does cooperate with other organizations." Another student (0413) said, "Cooperation between the administration and faculty and students is very good. When we have a problem, they are willing to help us." In an opposing view, student (6133) opined, "The cooperation is good between students and the faculty, even though there is none between students and the administration."

An administrator (7621) declared, "Cooperation is good to very good. The community is a challenge and we do our best for outreach plans. The ministries are very active and cooperative. We need to do more with the community and NGOs. We have a few that we interact with but need others." Another administrator (0211) observed, "Among students and staff, there is a lot of cooperation. Students see the staff as giving them something new. Something they are expecting to have. There are some students because of their upbringing they resist cooperation, but they are exceptions. In my context, students are cooperating much." Another administrator (1921) noted,

"Cooperation is good within the college. When I am traveling, I ask someone to sit in the chair while I am gone. Everyone is willing. Outside cooperation comes from ministries who are willing to lecture on their specialty—they are willing to cover for our lack of expertise." Another administrator (1921) observed, "Communities of pastoralists have a long way to go; even the respect for women. There is a high disrespect for women. The women are objects. They are still treated poorly." He continued, "One thing that would move [gender issues] forward is to teach cooperation." A stakeholder (2246) agreed, "There is no balance in gender equity—no balance at all—opportunity, education, social justice, health, money—all these things are way out of balance."

A professor (0612) said, "Cooperation within the faculty is more independent, with limited cooperation. Students cooperate well within and among themselves. I can say the cooperation is good, but not excellent. A professor (2122) reported, "Good cooperation and support from INGOs, especially German and US. They are helping improve our research through training and a demonstration farm." Additionally (0612) observed, "Cooperation with the ministry is very good; we cooperate with their tractor and they help us with some seed. That was the first time. I would not call it good cooperation, but rather activities that we are sharing. We should share information up and back."

From a different perspective, a professor (2322) declared, "In every country, the university should have technical strength and research. This is not happening here. The ministry is not engaging the faculty to do the research. The ministry is the executive body. They should involve the university in conducting research; they should implement the research." Another professor (3222) confided that he is satisfied with his work, but "I am getting nothing for my work from the university or college. Things to do with my experiments, I have to pay myself." Another (2222) lamented, "Cooperation is not very much—maybe a little better than three or four years ago." He explained, "Government officials want outsiders rather than those of us [professors] who are here and well-qualified."

A stakeholder (7444) boasted, "There is good cooperation among the universities. When we were in Khartoum, there was a lot of cooperation. We exchanged lecturers across the universities. This is a strong cooperation. I do not know if they are still doing that because of distances. The universities are cooperating with the ministries. Good relationships increase cooperation—the Catholic University is encouraging field attachments. We should be able to share programs with other states. We want students to experience field attachments."

Another stakeholder (3346) confided, "I don't see very much cooperation. It seems everyone thinks only of what they need, or how they will benefit personally, but they don't see how improving the university is best for everyone as a whole. Faculty members do not seem to really cooperate, not deeply. Faculty and administrators; I don't see any evidence of cooperation."

Receptivity to Change

Generally, all peer groups boasted of their own receptivity to change. Perhaps students voiced the most receptive, yet the most impatience for change. A student (0313) declared, "The university at times is not all that quick to change." The student explained, "We have a problem; the classes are designed for a semester not a crop calendar. This makes it difficult for students to do practice at work. The course should follow the seasons rather than an academic calendar. We may make a request and they [administrators] tend to turn most of our requests down." A professor (2322) chided, "Willing to change—of course, people must accept change. Change must happen, whether they want or not. If they accept, we will go forward." He continued, "We

need change for university administration to accept new developments. People must work very hard for change."

Administrators generally pronounced their own widespread receptivity to change. One (0211) rhetorically asked, "Why not?" Another (7621) declared, "People are eager to change when they see personal benefits for change. The society is very receptive to change." Later a confident administrator (0211) injected, "Students are eager to change—*enthusiastic*." He added, "The faculties are generally willing to change. Oh, there may be groups that are reluctant. The curriculum must be transformed, but again we have bright ideas for change." Another administrator (1921) posited, "Faculty members are very eager and very receptive to change." From a broader perspective, an administrator (1921) said, "You get people to believe in themselves [by saying], 'I can do it, not I cannot do it.' It all depends on how you approach them."

A professor (0612) noted, "Among our students, they are willing change. However, only one or two [students] really influence change. They are trying. Again, when it comes to curriculum, the students are ready for change." A professor (2322) sarcastically cautioned, "Administration is not willing to change—administration has its agenda. They are not working for the well-being for the university." A professor (3222) estimated, "Seventy-five percent are receptive to change—I am talking about the university as a family. The others are not. Today, those who hold key positions but lack the education and training for new jobs will not accept change. They will lose their positions—they become obsolete. Organizational structure is somewhat ridged. Some think we should be a university of the '70s. We must work in the 21st Century and face the 21st Century challenges." Another professor (2322) explained, "The faculty change because change occurs every four years; deans have a four year term; department heads have 4 years. Ministries—that one is politics—the ruling party is the SPLM and they say 'We fought for 21 years so we need to rule for 21 years.' The ruling party constitutes the majority so they rule South Sudan. Even if there is change within the party, in reality, there is no change."

Students (0313, 0413, 2523, 2623, 2723, 2823, 2923, 3013, 3113, 3613, 3712, 6033, 6133) agree that they are willing to change. They generally agree that that is the primary purpose of their enrollment at the university. Student (5334) confirmed, "Students are willing to change—any change. We are looking for opportunity. We are willing." Student (3713) noted, "In order to change, we need everyone to contribute. Everyone must see the benefit. Sometimes there is change that is not applicable, so students do not accept it. There are some courses in general agriculture, but we need courses that are more specialized." Students (6033, 6133) were critical of the lack of change in the curriculum. Student (6033) reflected, "Actually, our curriculum has not changed over the past five years. They [administrators] do not reflect what changes need to be made. We have not seen any change." Student (6133) concluded, "Those [professors] who came from old Sudan do not accept change. The old professors like new ideas, but they do not put them into practice. Student (6033) noted, "People [fishermen] on the river are very willing to change anytime. They are flexible. The people on the river like us. They look at what we are doing and they like the ideas. They are trying, but they don't always accomplish it."

A stakeholder (7444) explained, "There is a big challenge in changing language—Arabic to English. Language is culture and cultures are different." He continued, "Students are very interested and this is very encouraging [to me]. Students have been deprived of field experiences for the past twenty years. This has affected their methods—some cannot tell one crop from another." Another stakeholder (7744) clarified, "Change is so tied to our psychological profile. If

you have been beaten so much, you cannot tell me anything. This is very difficult for us to change." Regarding the university, (7844) suggested, "The attitude of change is missing. Change at the university does not exist. They do not have a vision for change. There is nothing beyond superficial—infrastructure. However, [there is] no receptivity for new teaching methods." When describing community receptivity, another stakeholder (7844) warned, "Some elders want some modern things to come to their community. Change in Jonglei State is not impossible, but it is difficult." Another (3346) explained, "There is eagerness to change at the bottom of the social ladder and it is reduced as you go up. People at the bottom don't have much to lose, so they are willing change. Farmers are eager to change. People show up for training, they listen and they take notes—every little bit of information. During the breaks, they scramble around and copy notes from each other. They almost seem desperate. They believe anything they can learn is the "right answer." As you go up the ladder, change adds to the workload. They [administrators] do not see change as part of their mission."

Future View

There was a general tone of optimism among the six peer groups. Students, however, were most optimistic while stakeholders were less so. An optimistic student (0313) remarked, "When you move forward, you expect good things. [The year] 2010 was much better than 2009. Yes, tomorrow will be better than today." Another (2823) said, "From the side of the students, we are really looking forward to positive change." A less optimistic stakeholder (3346) declared, "Today is worse than 2010. There should be an emphasis on leadership and more dialogs. We need to break the academic hierarchy; if you have a PhD, you [think you] are an 'intellectual' and you don't have to do anything. The academic culture is very hierarchical."

Is today better? An administrator (7621) said, "This depends—yesterday (early 1970s) was better. The university was smaller. We had an international community that was helping us. The British provided professors. Water was running through our taps. There was enough [electrical] power. However, tomorrow will be better." Another administrator (0211) asserted, "Today is much better than yesterday. [Compared to] when we started in 2009, things are now much better. We now have facilities under construction. We have cooperation with universities and donors. My children will have better future. My son was born in 2010. He has a bright future. I was born in exile in Uganda, then I moved back after the agreement was signed. My son will have it better than me, both within the country and outside."

A professor (2322) observed, "We just got our independence; still not much being done. In the future, the future will be better than today." Another professor (3222) said, "Today is better than yesterday for me. I think we see more training and if we have more training, then tomorrow will be better. We must do research to improve our teaching. With no research, then we are just teaching literature; that is not effective." Another (0612) agreed, "Today is quite better. [The year] 2013 is better than 2012, especially with the development of the farm and the forming of [new] classes. This has all happened in six months." Another professor (0512) compared 2013 vs. 2009. "I came in '09 but I was not associated with this faculty. There is a great improvement since 2011. This is related to returning students from the outside. Now the number is increasing. Now we have 170 students. Technology is coming. This university is willing to change. I can see the results of this transformation. In 2008, we only had that upper building. They [administrators] are also working to increase the number and quality of the staff." Another professor (2222) advised, [we need] "fresh work that moves away from corruption. Really, all of our revenue depends entirely on oil, we must diversify."

Reflecting a future view, students (2423, 2523, 2623, 2723, 2823, 2923, 3023, 3123) agreed generally that things are far better than yesterday. One (2623) noted, "Our environment here may need to be improved, but yesterday professors did not even have chalk. Now we have projectors and PowerPoint. This change is good." Another student (3123) said, "Our conditions are much better than 2007—six years ago. There are more students at the university. There are more opportunities. Many students want to come to the university. However, there are a number of students who are from far away. When the university closes the dining hall, this causes difficulty for those students. This is not a big problem for me. I am from Juba. However, this causes big problems for others. Students from Juba have more opportunities because they have a place to live and to eat." He continued, "The government should help all students to get an education. When they take away free education, it puts education out of reach for many students." Another student (0313) remarked, "When you move forward, you expect good things. [The year] 2010 was much better than 2009. Yes, tomorrow will be better than today." I have two children, a boy and a girl, and I am a student. Will my children have a better life than me? No, I cannot say they have a better life now. Yes, it will be better in the future. The environment will determine. I cannot say how they will be better." A student (0313) said rhetorically, "Is today better, 2013 vs. 2007? Today when I look back to October 2009, we did not have any of these facilities or library or offices. We only had one classroom. Due to the work together, we are developing a demonstration farm along the riverfront. I go to the demonstration farm almost every day; I went this morning. My [student thesis] research will be conducted there. My plot with be about 15x14 meters. I will use five varieties for the test; two are local varieties. Yes, today is better and I even hope tomorrow will be even better than today. I am very optimistic. When I have children, I am very optimistic that my children will have a better life and better education than I have."

A stakeholder (7744) remarked, "In general, today is better. Why? I do not have a soldier of a different color stopping me to ask where I am going." Another stakeholder (7844) said, "There is a lot of talk about peace dividends after the war, but we have not seen the benefits." A stakeholder (7744) criticized today's student preparation. "When I went to high school, students were very articulate. The rewards were only intrinsic. However, there was a lot of recognition for excellence. Competitiveness is important. This is one of the reasons that Uganda is doing so well. They still have competitiveness in education." A stakeholder (7444) observed, "In terms of progress and materials, this is a mixed bag. In the olden times, there were many things. At the moment, things are not better. We should bring back practical work—the students should be exposed to fieldwork. They should spend more time out of the classroom. Students confirm that they want more practice. In the olden days, we had a farm [on which] to learn practical work." Another stakeholder (3346) forewarned, "Today is worse than 2010. As a comparison to the 1990s – if things are not better, what should we do differently? There should be an emphasis on leadership skills and more dialogs. Things can be better even without more resources if there is cooperation and an increased sense of unity. Also, we need more training on leadership about self-motivation vs. "the government should do this for me."

Sustainability

The discussion regarding sustainability exuded a positive tone emerging from the discussion of future views. There was a general optimism and commitment, but it became more somber with further discussion. There is a deep concern about the austerity program now in place. The question poised, "Can you continue to do what you are doing?" Students said yes. Professors generally said yes, but conditionally. Administrators and stakeholders generally said no.

An administrator (0211) answered, “Yes, I can continue what I am doing.” [Rhetorically, he asked,] “Why not? An adjustment for increasing sustainability is to increase financial and institutional capacity. Also, more personnel—that is most important. We need to teach the community how to make money. Short courses. This would increase sustainability.” Later he added, “There is huge corruption. Donors contribute unknowingly to corruption of government officials. Donors do not follow their money. Private institutions are better because there is less corruption. [Overall] this is a very weak system.”

When asked if the university can continue, an administrator (1921) warned, “We cannot continue to do what we are doing. There is a time either to improve or not. We have a lack of training. The VT project is important. GOSS cannot provide all support. We must find new partners.” Another administrator (2021) advised, “We cannot keep on doing what we are doing now. We have thousands of students sponsored by government and government is not paying. We do not have infrastructure. There is no water or public electricity. The [infrastructure of the] university has not been well established—this was formerly a school for 500. Now we have 10-12,000 students in this space—with limited infrastructure. This is a problem.”

Administrator (2121) said. “No, we cannot sustain the library without resources. There are no resources coming from GOSS and only limited student fees.” Administrator (2021) continued, “Now we must make tough decisions about political issues. The world becomes more globalized. In Europe, you have communities open to students and students can rent. However, our families are poor. You have to start somewhere.” Administrator (2021) recognized, “University administration must provide vision and organizational development. Prior to independence, the university was sustainable, but not for the past seven years.” Another administrator (0211) declared, “Unless we continue building the relationships, we will not have sustainability.” Still another (7621) confided, “We hope that we can follow our plan and move forward.”

Professor (0512) said, “Yes, I can keep doing what I am doing. I have no problem doing what I am doing. I do not have a recommendation for a change, but I am willing to assist with any change that is recommended. If I could make a change, it would be to add a laboratory for biology and chemistry. The students need laboratory practice.”

A more introspective professor (3222) noted, “Our College is a college of science. You cannot be a scientist on your own. I have discussed this with colleagues at this university and at another university, but first there has to be trust and willingness to work. This is very slow to develop.” Another (0612) forecasted, “[Our] sustainability is OK because we are going step by step. The students see each step.”

For many professors (1322, 1422, 1522, 1622, 1722, 1822, 2222, 3222), funding and conducting research are major concerns. All recognize that research is important for their careers, as well as for the university and the country. They expressed broad concerns that resources are not available. Professor (1522) noted that only one [professor] can attend a conference, but “they come back telling us about the good food, but not about the things they learned.” He lamented, “The person who is approved for travel is usually the senior professor.”

Professor (2322) recognized, “We need to have good relationships with other ministries, especially with those with similar expertise. We have natural resources; we need to manage these natural resources. There is a concern that natural resources must be protected to meet the needs of the current generation as well as future generation.” Professor (3222) concluded, “A university that does not invest will not have new resources.” So for us, teaching without resources will not be sustainable. My own research without adequate resources is just a waste.”

Students had less to say about the sustainability and more to say about their own condition. Two students (6033, 6133) agreed that if their university makes the necessary changes, then the university will be sustainable. However, they warned that if it does not make the changes, it is not sustainable. Student (3713) was more confident, "Yes, I can continue doing what I am doing. I think the institution will continue." Student (5334) resolved, "I can continue doing what I am doing; there is no other way. I will earn my degree and continue my work." Student (6133) expressed a common disillusionment among his peers, "If I had known then when I entered the university, I would have stayed in my community. This university has not met its obligations. I have spent six years and still do not have a degree. But I cannot stop now."

Stakeholders generally questioned the sustainability of higher education. Most stakeholders discussed funding, but several identified organizational, communication and leadership issues. A stakeholder (7744) warned, "There are a number of issues affecting the university. Universities are very much constrained by the so-called austerity measures. The austerity affects the future. Unless we can change this, it [the university] is not sustainable." Stakeholder (7844) cautioned, "The university cannot continue to do what it is currently doing. There has to be payments to keep the university open. Students cannot continue forever without earning degrees." Stakeholder (3346) coincided, "There is a lack of transparency and a lack of communication—students don't seem to know what is going on. Stakeholder (7844) cautioned, "We offered a technical workshop, but professors would not attend. Professors will not participate if they are not being paid."

When asked about the sustainability of projects, stakeholder (3346) said, "Yes, some projects are sustainable. However, I don't know if the university is sustainable. A lack of resources is a threat. At the lower social levels, there is motivation for sustaining project work—I am not sure at the higher levels. For example, project activities with small farmers use funds to purchase tools and seed so it should be easy to sustain those activities, especially with food in short supply. At the university level, funds spent to develop programs need continued funding to be sustainable. The Ministry does not provide operational funds. Another stakeholder (7744) warned, "We cannot explain how some Ministers have multiple houses. Some even live in their own houses and the government still pays them rent."

Stakeholder (2224) responded; "I don't understand the question—are we going to have austerity, or are we going to ameliorate the situation with proper management by the political administration? Once we have funding, we will bring new faculty and improve their situations. In the past, many people died because of lack of medical care—they did not have money. If the government can provide money for health care, things will improve. This will trickle down. If the President wants sustainable solutions, then things will improve." Stakeholder (3346) concluded, "I don't know if the university is sustainable.

Conclusions, Recommendations, and Implications

An ever-widening gap in higher education separates more developed countries, developing countries, and least-developed countries. Implementing attributes that are associated with high performing universities will begin to reduce the gap. To be successful, least-developed countries must establish priorities and sequence development pathways, seek core agreements, improve communications, and promote collaboration among peer groups.

This assessment used unique assessment methodologies (PCPM©) to identify planning and programming priorities for South Sudan higher education in agriculture, natural resources, and environmental sciences. The appraisal examined attributes of teaching, research, and community

outreach associated with high performing universities. The process searched for consensus in an environment of continuous improvement. Gaining consensus on overarching constructs requires improved transactional communication with strong linkages between the source, message, channel, and receiver. Active listening is an essential element for success.

Recommendations

It is the collectively responsibility of this group of participant leaders to seek a common pathway and support the priorities for agriculture, natural resources, and environmental sciences in South Sudan.

The need for strategic planning increases in importance as resources diminishes. Effectively identifying the priorities and sequence in which to stage and develop activities will increase the speed of development. Least-developed universities are not likely to accomplish complex activities simultaneously—the work must be accomplished systematically. A harmonized strategic plan will aid in achieving the potential of the South Sudanese people and improve the efficient use of their resources.

Diversity among the peer groups can be a catalyst for development. If skillfully integrated and articulated, diversity offers energy and innovation. Finding agreement among peer groups is important. Least-developed universities are more likely to be successful with the support of the larger community. Transparency and open communication are essential ingredients for development. Multiple communication methods increase the probability of success.

Implications

These findings suggest a number of important connotations for future practice. Participants expressed deep commitment to higher education and had sound rationale for development strategies. The challenge is to communicate a vision and empower peer groups to seek pathways to close the educational gap while increasing ownership and internal locus of control. Another practical implication is that austerity programs decrease innovation and ownership, and austerity fosters dependence. Clearly, identifying resources and matching them to development initiatives is crucial. There is, therefore, a definite need for leveraging collaborative development solutions that improve the quality, speed the adoption, and rally public opinion.

In 1872, the Virginia General Assembly incorporated a new institution called the Virginia Agricultural and Mechanical College—now Virginia Polytechnic Institute and State University, popularly known as Virginia Tech (VT). Texas A&M University opened in October 1876. Working closely with state and federal research and extension agencies, the two universities have a direct presence in each of the counties in their respective state, as well as an international presence. Texas A&M University College of Agriculture and Life Sciences was recently recognized as the fifth world-ranking college. The conclusion—this recognition has required more than a Century of relentless pursuit of excellence. Good luck in the pursuit.

Keywords: Africa, Capacity Building, Development, Higher Education, Infrastructure, Needs Assessment, Q-Sort Methodology, South Sudan

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Proprietary Interest: The pre-critical path method (PCPM©) is a proprietary method that uniquely deploys three tools by which to understand priorities, sequence, agreements, and relationships. The PCPM© is copyrighted by GCS—Global Consulting Solutions. Use of PCPM© should follow fair use guidelines and cite the method appropriately when used. Nothing in this document limits what may be considered willful infringement. Global Consulting Solutions. (2013) Pre-critical path method (PCPM©). College Station, TX.

Table 1. Rank-Order of Attributes Defining High-Performing Universities

Rank	Item No	Initiative	*Composite N=78*	VCs n=3	Admin n=13	Faculty n=21	Adm-Fac n=34	Student n=17	Private n=27
1	R12	Improving instructional technology, library resources	1 (5.8)*	5 (5.6)	2 (5.8)	4 (5.7)	1 (5.8)	3 (5.7)	1 (5.9)
2	R14	Improving technological infrastructure & facilities	2 (6.2)	2 (5.1)	3 (6.0)	3 (5.4)	1 (5.8)	1 (5.3)	5 (7.3)
3	R01	Improving outreach, community development & extension	3 (6.4)	1 (4.0)	4 (6.4)	1 (5.2)	3 (5.9)	2 (5.4)	6 (7.6)
4	R10	Improving administrative services (e.g., vision, ethics, recruitment, governance, social justice)	4 (6.6)	6 (6.1)	6 (7.1)	6 (6.1)	5 (6.7)	4 (6.2)	3 (6.6)
5	R13	Improving research, development & innovation	5 (7.4)	3 (5.4)	7 (7.3)	2 (5.3)	4 (6.6)	8 (8.2)	9 (7.8)
6	R11	Increasing institutional capacity building, resource management, sustainability	6 (7.7)	3 (5.4)	8 (8.3)	5 (5.8)	7 (7.3)	6 (7.5)	12 (8.2)
7	R08	Providing short-term human capacity building & short-term training (<2 years)	7 (7.9)	11 (9.0)	5 (6.9)	9 (8.2)	8 (7.4)	11 (8.5)	12 (8.2)
7	R02	Improving curriculum development, design of academic programs	7 (7.9)	12 (9.8)	14 (9.0)	11 (9.1)	13 (9.1)	5 (7.2)	4 (7.0)
7	R07	Addressing gender issues (e.g., economics, health, leadership, social, violence)	7 (7.9)	13 (9.9)	1 (5.4)	13 (10.0)	6 (7.2)	11 (8.5)	14 (8.4)
10	R09	Providing long-term human capacity building & long-term training (>2 years)	10 (8.1)	8 (8.1)	13 (8.8)	7 (7.4)	9 (8.2)	7 (8.0)	11 (8.1)
11	R06	Improving faculty teaching, scholarship and writing	11 (8.2)	9 (8.5)	8 (8.3)	12 (9.2)	12 (8.6)	8 (8.2)	7 (7.7)
11	R03	Developing student leadership & student services (e.g., advising, mentoring, internships)	11 (8.2)	14 (12.2)	8 (8.3)	14 (11.3)	14 (9.5)	8 (8.2)	2 (6.5)
13	R05	Improving environmental practices (e.g., best practices for water, land)	13 (8.3)	7 (7.4)	11 (8.5)	8 (8.1)	10 (8.4)	11 (8.5)	10 (8.0)
14	R04	Engaging stakeholders, donors, and partnerships	14 (8.5)	9 (8.5)	12 (8.7)	9 (8.2)	11 (8.5)	14 (9.5)	7 (7.7)

*Note: 1 (5.8) designates a rank of 1 and a mean ranking of 5.8.

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