

**Consortium on Law and Values in Health, Environment & the Life Sciences
Consortium Scholar Final Report**

Project Title

Food Security, Soils, and Livelihoods in Protected Mountain Environments of the Albertine Rift

Your name, department, and degree program

Michael Mahero

Veterinary Population Medicine Department, CVM

PhD VMED Program

Introduction

Across the tropics, biodiversity conservation and human well-being outcomes are directly linked near the borders of parks/protected areas. Increasing human populations in bordering agricultural lands force households to intensify land use and farm practices, to maintain food security. In marginal lands, particularly on mountainous terrain with poor soils, farm productivity declines more rapidly than in other farm systems with detrimental household health impacts. Further, as more of the landscape is cleared for intensive cultivation, habitat and species loss outside parks accelerates, while declining resource availability (e.g., fuelwood) can result in resource extraction extending inside park borders.

To address these challenges, we have launched an interdisciplinary research approach to assess linkages between soil fertility, farm productivity, food security, health (household nutrition), and exploitation of protected park resources. We seek to answer a fundamental question underlying human-park systems- *“How do interactions between peoples’ livelihood decisions and farm productivity influence household food security, health, nutrition, and natural resource use practices around parks?”* We focus this work in a fragile environment of immense biodiversity value – the Rwenzori Mountains in the African Albertine Rift.

Project Update

This work was originally proposed for the spring/summer of 2017 but had to be postponed to the summer/fall of 2018 to accommodate the field schedules of our collaborators at the University of Colorado Boulder. During the Fall of 2017 and Spring of 2018, Dr. Michael Mahero-Consortium Scholar and his advisor, Dr. Dominic Travis developed a working group to help prepare and plan for the Rwenzori research. This group was comprised of our project collaborators from the University of Colorado Boulder led by Dr. Joel Hartter (<https://www.colorado.edu/ses/joel-hartter>), Dr Lynne Gaffkin Public Health Consultant with years of experience working with government and public health institutions in East Africa (<http://inogo.stanford.edu/about/people/lynne-gaffikin?language=en>), Dr. Shamilah Namusisi –Public Health Veterinarian and Project Coordinator.

Subsequently, the collaboration was expanded to include more in-country partners working at the community level.

These collaborators include:

1. Dr. Esther Mwanguzi MOH
Uganda-Community Health
Department
2. Mr. Joastas Mwembembezi-RCRA
Uganda

Field work was conducted in May 2018 and commenced with training of enumerators and pretesting of household surveys before actual data collection. The overall goal of this research was to understand the fundamental processes affecting the health and wellbeing of farm households and biodiversity in tropical landscapes.

Research Objectives:

We operationalized our guiding question through the following objectives:

1. Determine the effects of farm intensification strategies on farm productivity, crop yield, food security, and ultimately household health (child nutrition and household incidence of febrile illness and diarrheal episodes).
2. Determine the biophysical and sociocultural factors predicting the use of intensification strategies.

To address these objectives we conducted household surveys, collection of child anthropometric measurements and on farm soil sampling. We worked in two villages in the South (*Kabingo* and *Kanyatsi*) and North (*Kyahundu* and *Kyanya*) of Kasese District, and were able to conduct 157 household surveys; each survey lasted between 50 to 60 minutes focused on household heads, although only female household heads were interviewed to provide health data. The survey covered broadly the following topics:

1. Household, demographics, health and nutrition. This included anthropometric measurements and self-reported diseases (by female household heads) of children below five years.
2. Farm and livelihood information for each household surveyed; soil samples were collected from all the 157 households. These samples have been dried and are soon to be analyzed.
3. Climate and rainfall data, participants' understanding of various predictors of rainfall patterns and farmers' access to information that guide their farming activities.

General observations

- Generally, the people in hilly areas did not grow their food near home because of the reduced soil fertility that they attributed to soil erosion and overuse of the land. Most households in the hilly areas planted their crops near the park where they have acquired bigger and fertile land for crop farming. These gardens about 5-7km away from home.

Outputs of this working group included:

- Development of community engagement strategy for the study. This involved obtaining permission from local leaders at various levels of administration to community level before finally obtaining consent from study participants
- Protocol development. This was done through various discussions with the rest of the team and consultations with country partners
- IRB processing particularly ensuring that all study materials/ tools were translated into local languages (*Runyoro*, *Rukiga* and *Rukonzo*)
- Quick community consultations regarding their current health challenges (higher altitude vs lower altitude farms in the Rwenzori region)

- Most mothers with children below five years had health cards for their children although there were indications that they did not quite understand the information recorded on the cards
- Mothers spent more time in the garden than fathers and in some cases, mothers went with their babies to the gardens returning in the evening
- Communities have access to health center III facilities



Figure 1: Agricultural settlement patterns around the Rwenzori



Figure 2: Anthropometric measurement of under 5's and soil sampling

Pending Field Work

In order to triangulate the health information gathered from the households we still have a short period in the field that will last about six weeks and will involve the review of medical records at health center III's and the district referral hospital to estimate:

1. Birth weight of babies born to mothers from the study area over the last 5 years (2013-2018).
2. Prevalence of childhood malnutrition reported in the area and characteristics of affected children.
3. Baseline measurements of height and weight among the *Bakonzo* tribe in the District.

Focus group discussions (FGD) will also be conducted in addition to the medical record review. These FGDs will focus on the following areas:

1. The conservation benefits of 'buffer farms' that community members own further away from their homesteads near the park.
2. The nutrition advice mothers receive from the health centers and how this influences dietary choices for their children who are less than 5 years of age.
3. What are the costs and/or benefits associated with farming near or within the park?

Financial summary

Describe how your award funds were used. Attach copies of receipts.

The bulk of these funds were spent on hiring a field coordinator to help manage the day to day running of the field teams and data collection process. Key objectives of the field coordinator were:

1. Support training and management of the field team.
2. Deliver completed surveys and samples at the completion of the 4-week period

The payment for the four-week period was \$3,200 (*See attached agreement*). We still have \$2218.15 of the awarded funds. These funds will be used to complete the last portion of the work as detailed above.

Expense Category (spent funds)	Amount
US Fed Withholding Tax	\$1,505.85
Field Coordinator Stipend	\$3,200.00
Bank Fees	<u>\$76.00</u>
	\$4781.85

Budgeted Item (unspent funds)	Amount
Bank Fees	\$76.00
Ground Transportation	\$500.00
8 FGDs	\$300.00
FGD RA Stipend	\$400.00
FGD field coordinator stipend (data collection and transcription)	<u>\$1000.00</u>
	\$2276.00

Results

Publications (planned, in press, or published)

1. Work in progress

Presentations (planned or completed)

1. American Public Health Association Annual Conference –October 2019
2. American Society of Tropical Medicine and Hygiene- November 2019
3. UMN CVM Points of Pride Research Day October 2019

Grant proposals (planned or submitted)

1. Conservation Food and Health Foundation-Jan 1 2019
2. Healthy Foods and Healthy Lives- Oct 2019
3. Nat Geo-Submitted and awarded 2017
4. UMN GPS Travel Award-submitted and awarded fall 2016

For curriculum development, course description and schedule

This information will be included in VPM 3850W (fall 2018): Health and Biodiversity, as well as a module of GCC 3020/5020 (spring 2019): ecosystem approaches to grand challenges in health. The cases in both classes focus on intersection of Biodiversity, Health, Poverty, Conflict and Migration. I co-taught the former session (alongside Dr Cheryl Robertson from the School of Nursing) for the last 2 years and will use information gleaned from our work within the Rwenzori's to create a new case study for this class as well as Dr. Travis' GCC course next spring.

For conferences or lectures, agenda and example of publicity and/or handouts

Future project plans

If this project is part of a graduate student's dissertation, include goal date for dissertation completion.

Describe how the work completed during the period of time funded by the Consortium will lead to further research, etc.

The outputs of this research add to a growing partnership in this region. This pilot data will help us begin to understand the links between conservation and farming decisions, and how this complex interplay affects soil fertility/health and consequently household health. Thus, this represents our first exploration into soil ecosystem services that support health of animals and humans. The data obtained will be used for further grant seeking efforts. Funds will be sought to conduct a longitudinal study that will disentangle these dense interconnections and thus better advise policy and practice. The partnerships and collaborations emerging from this study will support further work as well. NSF and NIEH grants are both being planned for further investigation.