Consortium on Law and Values in Health, Environment & the Life Sciences

2015-16 Student Proposal Cover Page

Applicant Information			
Applicant name:	Michael Mahero	Email:	Maher140@umn.edu
Project title:	Food Security, Livelihoods and Household Health in Protected Mountain Environments of the Albertine Rift		
Department:	Population Medicine	College:	Veterinary Medicine
Degree program:	PhD Vmed	Faculty advisor name & email:	Dr Dominic Travis datravis@umn.edu ☐ NA
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How did you hear about this funding opportunity?
☐ Consortium e-mail ☐ The Brief ☐ Advisor ☐ Dept. email/newsletter ☐ Consortium website ☒ Other

Funding

Total amount of funding requested: **$ 7000**

Executive summary (maximum 200 words)

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. We propose an interdisciplinary research approach to assess linkages between farm productivity, food security, health (household nutrition), and exploitation of protected park resources. We focus this work in a fragile environment of immense biodiversity value – the Rwenzori Mountains in the African Albertine Rift. We will conduct household surveys and collect child anthropometric measurements, to determine how farmers make decisions regarding farm productivity and conservation strategies, and what these behaviors mean for household well-being and adjacent natural environments. Our research seeks to understand fundamental processes affecting the health and wellbeing of farm households and biodiversity in tropical landscapes.

Approvals

Check all appropriate approvals required for your proposal. Approvals must be obtained prior to receipt of funding. If you have applied for approval but have not yet received it, indicate that below.

IRB ☐ Yes ☐ No ☐ NA ☐ Application pending

Other ☐ Yes ☐ No ☐ NA ☐ Application pending Specify:

Checklist—for reviewer use

- ☐ The proposal is 1000 words or less excluding budget, biographies, references and citations.
- ☐ The proposal includes a work plan with a specific timeline using months or quarters to identify work to be done and completion dates.
- ☐ The proposal includes a 1-2 paragraph biography of the applicant and all co-investigators.
- ☐ The budget form is complete including the funds sought for this project, other pending applications for this project, and the amount/source of matching or other funds.
- ☐ The applicant's faculty advisor is copied on the application email. Professional students w/o advisors check NA.
- ☐ All necessary approvals are pending or received.

Introduction

Rwenzori Mountains National Park (RMNP) in western Uganda contains Africa's third highest peak, one of the continent's three remaining glacial sites, and unique, diverse assemblages of flora and fauna (~380 mi^2). The region is recognized as an IUCN biodiversity hotspot and a UNESCO World Heritage Site (Plumptre et al. 2007) and is considered one of the world's most endangered spaces given the level of species endemism and rates of habitat destruction (Kuper et al. 2004, Myers et al. 2000). Outside RMNP borders, the steep-slope landscapes are undergoing dramatic changes. Pushed by rapid population growth, smallholder households are farming further up the mountains on increasingly thin and fragile soils, affecting both household health and the environment (Romanelli et al. 2015). The challenges posed by such human-environment interactions are particularly acute in Africa's Albertine Rift, yet they are representative of the tradeoffs involved in sustaining rural livelihoods while conserving biodiversity across the global tropics (Fisher 2007). We propose an interdisciplinary research project to address a fundamental question underlying outcomes in these 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?

Background

Population growth of resource dependent farmers and livestock keepers has long been viewed as the principal threat to natural systems (Newmark et al. 1994; Roe 2008). In recent decades, the land area protected for biodiversity (hereafter, parks) has expanded dramatically and now covers an estimated 15% of terrestrial land globally (Juffe-Bignoli et al. 2014).

The wellbeing of farmers near forest parks and across rural areas in sub-Saharan Africa (SSA) is largely determined by farm production and availability of natural resources (Fisher & Christopher 2007; Foley et al. 2011; Wright et al. 2012,)Often, parks are viewed as essential not only as revenue generators but also for their provision of regulating and supporting ecosystem services which have positive physical and mental benefits to the surrounding communities. However, park-adjacent households suffer disproportionate costs from limitations of resource use and access (Wilkie et al. 2006) to increased disease burden (Daszak et al. 2000) and forced displacement (Brockington & Igoe 2006), Such tradeoffs pose challenges to both biodiversity and health (Naughton-Treves et al. 2005; Sachs 2012; Romanelli et al. 2015).

Crop-soil interactions drive the underlying mechanisms affecting farmers' decisions to intensify production and ultimately household food security and health. Simply put healthy soils produce wholesome food which results in healthy populations. Soil-fertility depletion from smallholder farming practices is the biophysical root cause of declining per capita food production in Africa and has been linked to micronutrient deficiency in humans (Alloway 2009).In low to middle income countries, undernourishment is the leading health risk factor, representing 10% of the total disease burden.

Collaborators
Dr Joel Hartter is an Associate Professor University of Colorado and co-lead on a long term project on Population Environment and Climate in the Albertine Rift called PECAR (http://pecar.unh.edu).
Dr Jonathan Salerno is an ecologist with experience looking at biodiversity conservation and rural households. Together they will focus on identifying the soil characteristics on farms along an elevational gradient up the Rwenzori Mountains to the RMNP border, and mapping natural resource extraction patterns from around, and within RMNP. Our collaboration will be important in establishing how these patterns are associated with intensification, livelihood strategies and health outcomes that we will be investigating.

Research Objectives
We will operationalize tour 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.

Methodology
A grant from the consortium will support 12weeks of household and group interviews in the agricultural landscape of the Rwenzori ecosystem. This program will be supported by ongoing work led by Dr Hatter within this ecosystem.

Group interviews and quantitative household surveys:
Five watersheds on the eastern slope of the Rwenzori Mountains will be selected. Within each of these watersheds, two communities will be identified (at high and low elevations) in which to conduct group interviews, which will explore perceptions and behaviors following each of the four objectives above, depending on community characteristics.

Next, we will conduct quantitative household surveys in two randomly selected communities in each of the 5 watersheds using a geographical sampling strategy as previously described (Hartter & Southworth 2009).We will randomly select 20 farm-households in each of the 10 community in which to administer questionnaires to household heads following proven protocols to quantify the following: livelihood and resource utilization strategies and farm intensification practices (Hartter 2010), food security and child nutrition (e.g., Lawson et al. 2014; Salerno et al. 2015 Wamani et al 2004), and incidence of fever, diarrhea, oral and dental diseases (Amalraj 2013; Crump et al.2013; WHO 2005).

Data integration and analytical strategy:
On farm soil characteristics generated by our collaborators will be integrated with household- and community-level data. Each research objective will be explored using a spatially explicit multivariate statistical model. Through an NIH funded Fogarty fellowship[1] I have gained extensive experience conducting qualitative and quantitative surveys examining how livelihood and socio cultural practices influence communities' health. Additionally our collaborating team has worked in this region and has extensive

[1] I will amend existing permits used for this research to cover the proposed work. I have just submitted intent for continued review with UMN IRB and will submit changes to IRB to cover the proposed work. The same applies to Ugandan IRB and UNCST

experience developing multilevel models to fit similar data from the region (Hartter et al. 2014; Salerno et al. 2015; Salerno et al. 2014).

The significance of this proposed research is summarized as follows: (i) we determine the relationships between farmer practices, and food security and health in fragile steep-slope environments; (ii) we test whether these relationships change near the borders of parks and how the changes affect protected biodiversity and health; (iii) we provide actionable information to the district health and agriculture officers (to help optimize farm productivity and improve child nutrition and household health), Uganda Wildlife Authority, conservation managers, and district land officers support conservation and management

Work plan

	2016-2017											
Activity/Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Team building community mobilization	x											
Household and nutritional surveys		x	x	x								
Data Integration and analysis					x	x	x	x	x			
Manuscript development										x	x	x

Biosketch

Dr Mahero is a PhD Student in the Vmed Program. He is also a board certified public health and preventive medicine veterinarian whose unique breath of knowledge includes expertise in public health, epidemiology of infectious diseases, community engagement, animal health and food safety. As a public and animal health professional Dr Mahero has dedicated the last 10 years of his career understanding the dynamics of disease transmission at the human, animal and environment interface. His research interests are in the control of zoonotic diseases at the human, livestock, wildlife confluence. Dr Mahero has worked extensively among cattle keeping communities in the East and Central African region including those affected by internal conflict or human-wildlife conflict. He was also part of a team that consulted for the Government of Kosovo's, Food and Veterinary Agency providing technical advice on the development of a surveillance system for bovine brucellosis within a post-conflict setting. In addition to his University of Minnesota appointment, he has worked as a technical advisor on the USAID funded Emerging Pandemic Threats program, working to build capacity for the better prediction and control of emerging infectious diseases and is a recipient of the NIH Fogarty Global Health fellowship.

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Consortium on Law and Values in Health, Environment the Life Sciences

Budget for Student Proposals

Project Title: **Food Security, Soils, and Livelihoods in Protected Mountain Environments of the**

Instructions: Provide justification along with costs.

			Requested funding	Matching/other funding	
	Category	**Description & justification**	**Amount**	**Amount**	**Source**
1	Your stipend	*What is hourly wage & fringe based on--departmental, community or other rate?*			
2	Speaker honoraria	___ speakers x $ _____ honorarium			
3	Supplies & Services	Field Vehicle rental given nature and vastness of terrain ($100/day for 30 days including car hire and driver for 4x4;Fuel: $150/week.Photocopy-$200, hard drives-$100, phone vouchers for field workers who will help with mobilisation and translations-$100, token gifts for interview participants-200, refreshments for group interviews $200	$4,400		
4	Equipment	Hand Held GPS Unit for recording household coordinates-This is important in order to generate spatially explicit models. After project unit will be handed to department supervisor for other similar field work in future	$300		
5	Travel	**Return Flight MSP-Entebbe,Uganda using Delta Airways (US Carrier) Tenatative Dates Dec 19th -Feb 20th-$2000. Ground Travel round trip from Kampala to Kasese-$300**	$2,300		
		Subtotal research expenses (2-6)	**$7,000**	**$0**	
	TOTAL BUDGET		$7,000	$0	

Budget Guidelines

1. Stipend justification. You must justify the amount of stipend you are requesting by identifying the number of hours you plan to work on the project and the hourly wage used for research assistants in your department. Include fringe benefits.

2. For colloquia, identify the number of speakers and the amount of honoraria you will provide.

3. Supplies and services. List out all supplies and their estimated costs. Explain in line 7 or in the body of your proposal what the supplies will be used for.

4. Equipment costs are allowable only if the justification clearly shows that the equipment is necessary for the project. Include explanation of what will happen to equipment at completion of project.

5. Travel costs must include a description of the purpose of the travel, start and stop dates of travel, transportation costs, housing costs, and allowable per diem (use University rates found at http:// travel/umn.edu).