Flood Management in Informal Urban Settlements in Sub-Saharan Africa

Project Purpose

My research will answer the following questions:[1]

1. What are the primary types of flood management[2] in urban sub-Saharan Africa and their defining characteristics? Where impact is known about efficacy of a practice, what is the impact?
2. Why do these practices take the forms and functions that they do?
3. Should these practices be replicated, and if so, how can they be improved?

Project Importance

Identifying, describing and critiquing practices of flood management can help inform future practices and adaptations in other communities. This thesis is not intended to provide a singular case study of any one practice, but rather to compare and contrast various practices intended to address the same problem in similar contexts. Additionally, where possible, I will describe the specific perspectives from which various practices or combinations of practices were developed.

The geographic focus on sub-Saharan Africa is of particular importance, because many planning practices and research revolve around Western cities and economies. Often, official stormwater management/flood control approaches in Sub-Saharan Africa are chosen and informed by success in very different cultures and economies that may not transfer effectively to Sub-Saharan Africa. An analysis of practices being used in Sub-Saharan Africa will allow for more accurate contextual information about the ecosystem of practices, their function, efficacy and gaps.

An understanding of varied approaches, along with their impact and gaps across academic and professional fields can help inform future practitioners what combinations and coordinated responses might best protect their communities from the effects of flooding.

Project Overview

From the years of 1995-2015, flooding affected the lives of 2.3 billion people in both low and high-income countries across the world.[3] Although floods are one of the few natural

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[1] "Student: Linda Shi," MIT Urban Planning, https://dusp.mit.edu/student/linda-shi.

[2] Phillip A. Williams, "*Flood Control vs. Flood Management*," Civil Engineering - ASCE 64, no. 5, (1994) 51-54, http://cedb.asce.org/CEDBsearch/record.jsp?dockey=0088371.

[3] "The Human Cost of Weather-Related Disasters 1995-2015," United Nations Office for Disaster Risk Reduction, accessed August 7, 2017, https://www.unisdr.org/2015/docs/climatechange/COP21_WeatherDisastersReport_2015_FINAL.pdf.

disasters with largely preventable impact,[4] flooding still accounts for 47% of people affected by weather related disaster.[5]

Flooding is caused by heavy rainfall or excess amounts of water. When soil is saturated to the point it cannot hold any more water, the water runs off on top of the soil either into rivers, overflowing their capacity, or over surface areas where normally water does not flow.[6] There are three main types of flooding that affect urban areas in Sub-Saharan Africa: pluvial (surface), fluvial (river) and coastal flooding.

While flooding does happen in both high-income countries and areas and low-income countries/areas, its impacts are typically more severe in low-income countries and areas. Research suggests that the effects of flooding are greatest for low-income women.[7] This is because in Sub-Saharan Africa, many of the vulnerable poor live in high density urban areas.

Informal settlements in urban Sub-Saharan Africa are uniquely vulnerable to flooding and struggle with post-flood resilience. Rapid urbanization, no/poor planning, rapid increases in man-made infrastructure, and increasing extreme weather events (attributed to climate change) contribute not only to a greater frequency of flooding, but flooding's increasing impact on humans. Additionally, many informal settlements are located in floodplains or low elevation coastal zones, increasing human impact from extreme weather events.[8]

Studies in Africa suggest that coordinated responses between various approaches to flood control may be necessary to improve flood management.[9] However, flood risk governance faces significant barriers, especially in informal settlements.[10]

My Research

As a student, I am personally qualified to do this research because of professional, personal and academic experience during my time at BYU. I have lived in Zambia and Malawi for nearly two years, including time as facilitator of the Malawi International Development internship for BYU. I was a Program Evaluation and Assessment Team intern for the School of Agriculture and Family Independence in Dowa, Malawi. I will soon be a published author of

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[4] https://www.unisdr.org/2015/docs/climatechange/COP21_WeatherDisastersReport_2015_FINAL.pdf

[5] "The Human Cost of Weather-Related Disasters 1995-2015," United Nations Office for Disaster Risk Reduction, accessed August 7, 2017, https://www.unisdr.org/2015/docs/climatechange/COP21_WeatherDisastersReport_2015_FINAL.pdf.

[6] Adebayo Johnson Adeloye, Rabee Rustum, "Lagos (Nigeria) flooding and influence of urban planning," *Urban Design and Planning*, 164, no. dp3, (September 2011) 175-187, DOI: 10.1680/udap.1000014.

[7] Idowu Ajibade, Gordon McBeana, Rachel Bezner-Kerrb, "Urban flooding in Lagos, Nigeria: Patterns of vulnerability and resilience among women," *Global Environmental Change* 23, no. 6 (December 2013) 1714-1725, https://doi.org/10.1016/j.gloenvcha.2013.08.009.

[8] United Nations Office for Risk Reduction, *The Human Cost of Weather-Related Disasters* (2015), https://www.unisdr.org/2015/docs/climatechange/COP21_WeatherDisastersReport_2015_FINAL.pdf

[9] Kevin Musungu, "Collecting flooding and vulnerability information in informal settlements: the governance of knowledge production," *South African Geographical Journal* 98, no. 1 (January 2016), 84-103, http://www.tandfonline.com/doi/abs/10.1080/03736245.2015.1117013#page=21.

[10] Gina Ziervogal, "Flooding in Cape Town's informal settlements: barriers to collaborative urban risk governance," *South African Geographic Journal* 98, no. 1, (March 2016) 1-20, http://web.b.ebscohost.com/ehost/detail/detail?vid=0&sid=433e9c36-96ab-475e-ab12-ced737e4ce2c%40sessionmgr4007&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=112968368&db=aph.

research about access to water in rural Malawi and have worked on environmental research in sub-Saharan Africa in several classes and research projects. This experience, plus my minors in Middle East studies and International Development, allow me to ensure that I do not approach this research from a colonialist mindset. Additionally, I am the founding Editor-in-Chief of Ballard Brief, a BYU Ballard Center publication that will provide would-be changemakers with access to accurate information about social problems and effective solutions. In my time at Ballard Brief, I have spent a great deal of effort on various forms of best practice research within the field of social impact. Finally, this semester I am in several urban planning and design classes, including a research team lead for a marketing and educational project for Utah Transit Authority's new bus rapid transit line in Provo and Orem.

I want to create a full review of flood management practices in informal urban settlements in Sub-Saharan Africa. Many attempts to manage floods are based on poorly coordinated, siloed expertise - engineering, sociology, planning, etc. However, nowhere does there exist an overview of various practices in a place in which they can be compared and contrasted or understood in a system or landscape of practices with data describing their efficacy. Additionally, most urban planners and designers plan and design for the wealthiest people in the world, so the poor rarely have access to communities with good urban planning and design. My focus on informal urban settlements in Sub-Saharan Africa matters because it can help inform interventions in areas where people are particularly vulnerable to the disastrous effects of flooding. Additionally, acknowledging where there is no data on specific practices or designs can help inform future research, particularly regarding widespread practices that have no data backing up their use. Furthermore, writing this paper at an intersection of various fields allows the research to be disseminated in a common language so people approaching flood management from many different fields will be able to understand concepts and practices.

Methodology

- Literature review
  - Academic journal review
  - Plan and document review
  - Impact evaluation reviews
- Expert interviews[11]

Qualifications of Thesis Committee

Honors Coordinator & Faculty Advisor: Dr. Jacob Rugh

Dr. Rugh is a professor in the sociology department. He has received Masters' degrees in both Urban Planning and Public Administration at Princeton University, both of which are remarkably relevant to this thesis. He then went on to receive a Ph.D. in Sociology from the same university. I am currently in Dr. Rugh's sociology of Race and Ethnicity class and we have already spent time discussing my educational goals and how my thesis might fit into those. Additionally, he specializes in racial inequality and housing. Because many of the issues related

[11] The subject of the research is flood control interventions, not humans. Therefore, I do not need to apply for an IRB.

to flood management also have to do with a lack of access to housing for the poor, Dr. Rugh's expertise will be invaluable.

Faculty Reader 1: Dr. Michael Clay
Dr. Clay is the head of the urban planning major at BYU. He received a Masters' degree in community and regional planning from Iowa State University and a Ph.D. in Transportation Technology and Policy from University of California, Davis. He has extensive experience with urban planning in international contexts. I am currently in Dr. Clay's Intro to Urban Planning class. His practical experience with planning, particularly outside of the US, makes him a valuable addition to my thesis committee.

Faculty Reader 2: Aaron Miller
Aaron Miller is a professor in the Romney School of Public Management. He has degrees in both public administration and law, with specific focuses in nonprofits and social impact. Aaron and I have been working together for more than a year on Ballard Brief - a BYU Ballard Center initiative to help would-be change makers have access to accurate information about social problems and solutions. My thesis will be largely based off of research I have been working on for Ballard Brief, so Aaron is quite familiar with the structure, language, rigor, and purpose of my thesis. He is also an expert in the language of social impact and social innovation, which is an important lens through which I will approach my research.

Faculty Reader 3: Greg Haws
Greg Haws is an urban designer. He teaches Urban Design at BYU; I am currently in his Urban Design class. He will serve as an additional reader specializing in the more technical aspects of flood control and urban design.[12]

[12] Dr. Rugh fully supports my decision to include an additional reader on my thesis committee.

Project Timeline

Month	Tasks
September	Find advisor & faculty reader. Complete proposal. Receive approval.
October	Complete introduction/literature review. Create outline/map (have framework built of the various practices and how they might fit together/be differentiated one from another)
November	Continue filling in outline. Complete description of each practice - including background/development information.
December	Develop specific interview questions for experts to understand gaps that literature does not appear to fill. Identify experts to interview.
January	Interview experts about gaps in literature. Complete first draft.
February	Revise draft. Schedule thesis defense.
March	Complete final draft. Defend thesis.

Culminating Experience

Although I am a sociology major, much of my experience is in the field of social impact. Therefore, this thesis will be a non-traditional sociology paper/research project. It is intended to utilize my understanding of social impact and innovation alongside my experience in sociology while also allowing me to develop expertise in the field of urban planning. I am planning on getting a masters' degree in urban planning, and this thesis will allow me to be a competitive applicant for top programs in the field.

Additionally, I am team lead for an on-campus internship with Greening Youth Foundation. We are working researching the feasibility of green infrastructure in Nigeria as green space, stormwater management infrastructure, and a means of job creation. Not only will my work with them will help inform my thesis, but it creates a pull factor for such research. My paper will be disseminated to practitioners, government workers, and others involved in community design and development to inform future interventions in Nigeria.