ABSTRACT

Title of dissertation:	CONTEXTUALIZING DRIVERS AND OUTCOMES OF RURAL-TO-URBAN MIGRATION: LESSONS FROM MOZAMBIQUE
	Kelly J. Anderson, Doctor of Philosophy, 2021
Dissertation directed by:	Julie A. Silva, Associate Professor, Department of Geographical Sciences

Migration is a critical strategy for households negotiating environmental risk, yet the extent to which it represents an adaptation remains poorly understood. This dissertation research investigates the relationship between migration and climate change vulnerability using examples from two rural-to-urban migrant communities located in the coastal city of Beira, Mozambique. In order to understand the extent to which adverse weather influences migration decision-making and the vulnerability to climate change experienced by migrants relative to non-migrants, perceptions and lived experiences of adverse weather are explored. Over 2,500 households were mapped from which semi-structured interviews and surveys were conducted with a random sample of migrant (n=79) and non-migrant (n=79) households. Content analysis and descriptive statistics reveal (1) the weather's influence on rural-to-urban migration falls on a spectrum of attribution, (2) most migrants relocate in response to the impoverishing effects of

weather, (3) migrants and non-migrants experience comparable levels of environmental vulnerability in urban settings, and (4) neighborhood characteristics are significant in shaping experiences of urban flood vulnerability. Results indicate that people prefer *in situ* adaptation regardless of extreme weather, provided resilient economic livelihoods exist and government is held accountable. Decolonizing research methodologies offer a promising path forward to better understand the needs of those vulnerable to climate change and facilitate adaptation to climate change.

CONTEXTUALIZING DRIVERS AND OUTCOMES OF RURAL-TO-URBAN MIGRATION: LESSONS FROM MOZAMBIQUE

by

Kelly Jean Anderson

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2021

Advisory Committee:
Dr. Julie Silva, Chair
Dr. Melissa Kenney
Dr. Alan Neustadtl
Dr. Fernando Sedano
Dr. L. Jen Shaffer
Dr. Laixiang Sun

© Copyright by

Kelly J. Anderson

2021

Dedication

To my mother, Pauline

Acknowledgments

It is my pleasure to acknowledge the roles of those who were instrumental in the completion of my doctoral research.

This dissertation would not have been possible without the financial support of the Boren Fellowship program. In addition to funding the collection of data, this program introduced me to a number of Mozambican scholars who shaped my understanding of Mozambican history, politics, culture, and above all else, the capacity to laugh, love and endure despite profound pain and loss.

I would like to thank my doctoral advisor, Julie Silva. Your brilliant intellect, creativity, and generosity have been a source of inspiration over the course of my doctoral research, as well as in my personal and professional life. Ever an advocate for outsiders and misfits, thank you for taking a chance on a naïve undergraduate who managed to find a little bit of herself in your lectures.

I would also like to acknowledge the helpful suggestions from my committee members: Drs. Melissa Kenney, Alan Neustadtl, Fernando Sedano, L. Jen Shaffer, and Laixiang Sun. I would like to recognize in particular Drs. Fernando Sedano and L. Jen Shaffer for sharing their expertise and perspectives on conducting research in Mozambique.

Data collection in support of this dissertation research would not have been possible without the priceless insights, guidance and patience of Dr. Susana Baule and the students of Universidade Licungo: Otílio Americo, Temóteo Campira, Loduvina Cumbe, Martins Ernesto, Antonio Camandalima, Carvalho Gimurosse, Augusto Machire, Felismina Mineses, Leonardo Pita, Lino Timóteo, and Lourenço Edmilson.

To family and friends, thank you for preserving my sanity and encouraging emotional strength during a time of my life fraught with self-doubt. Success is sweet only when we celebrate with loved ones. To my partner, Reuben, thank you for the countless study dates and for ensuring I prioritize my health and well-being. Special thanks to Team LeFrak for your friendship and support: Nicole, Michael, Ana, Meredith, Douglas, Amanda, Courtney, Danielle, and Diana.

Finally, I would like to express the deepest gratitude to the residents of Praia Nova and Munhava-Matope communities who participated in this dissertation research.

Table of Contents

Dedication ii
Acknowledgments iii
Table of Contents v
List of Tables vii
List of Figures viii
Chapter 1: Introduction 1

1.1 Motivation of the Study 1
1.2 Research Design and Terminology 6
1.3 Organization of the Study 12

Chapter 2: Weather-related influences on rural-to-urban migration: A spectrum of attribution in Beira, Mozambique 15

2.1 Introduction 15
2.2 Literature Review and Conceptual Framework 17
2.3 Research Context 20
2.4 Material and Methods 23
2.5 Results 30
2.6 Discussion 41
2.7 Conclusions 46

Chapter 3: Urban environmental vulnerability according to migrant status: Lessons from Beira, Mozambique 47

3.1 Introduction 47
3.2 Research Context 55
3.3 Methods 60
3.4 Results 63
3.5 Discussion 81
3.6 Conclusion 84

Chapter 4: Decolonizing research methodologies: Reflections from fieldwork in two informal settlements of Beira, Mozambique 87

4.1 Introduction 87
4.2 Expectations 91
4.3 Reality 93
4.4 Insights 99
4.5 Conclusion 104

Chapter 5: Conclusion 108

5.1 Summary of Major Findings 108
5.2 Synthesis of Contributions 111

5.3 Policy and Other Practical Implications 114
5.4 Recommendations and Future Research 116
5.5 Concluding Remarks 118

Appendix A: Data Collection Instruments and IRB Approval 120
Bibliography 145

List of Tables

Table 2.1 showing descriptive statistics of respondent and household socioeconomic characteristics in the pre-migration (rural) context. 34

Table 3.1 showing results of significance tests of association between socioeconomic characteristics and migrant status in the post-migration (urban) context. 64

List of Figures

Figure 2.1 The decision tree flow chart showing criteria for inclusion in each migration attribution category. 28

Figure 2.2 Map of Mozambique showing the location of the case study area (Beira) and migrant origin districts. 32

Figure 3.1 Images of Praia Nova settlement. 56

Figure 3.2 Images of Munhava-Matope settlement. 58

Chapter 1: Introduction

1.1 Motivation of the Study

Human migration in response to changing climate is widely regarded as an adaptation strategy in areas of the world where people are vulnerable to the impacts of climate change (IPCC 2014a). Yet the relationship between climate change vulnerability and migration remains poorly understood. While it is generally accepted that people may move temporarily over short distances in direct response to storms and flooding, it remains difficult to estimate how many people abandon homes and livelihoods in response to prolonged drought and sea-level rise. The difficulty arises in part because of the magnitude of the challenge in accounting for the pervasive and often indirect effects of gradual, slow-onset events. It is also generally accepted that migration facilitates adaptation, and yet this assumption tends to obscure contexts and conditions in which alternatives to migration prove more feasible. This dissertation recognizes the need for a more nuanced approach to migration research and argues that just as climate change vulnerability may drive migration, migration may in fact drive climate change vulnerability. As policy initiatives increasingly emphasize the centrality of migration to adaptation (Lucci et al. 2016), the extent to which policy is inclusive and equitable will depend on the quality of research and representativeness of data. The research presented in this dissertation is motivated by a desire to better understand how people experience climate vulnerability, what factors condition their ability to respond to extreme weather and erratic rainfall, and how researchers implicate ourselves in the politics of building equitable and resilient futures for all.

Changing climate is expected to adversely affect the availability of resources essential for life, including freshwater, food security, fuel, and livelihoods. Developing countries are likely to experience the worst impacts, having reduced ability to cope with environmental, economic, and social shocks (Leichenko and Silva 2014). Between 2015 and 2020, nine of the ten deadliest storms took place in developing countries (EM-DAT 2021). The deadliest was Cyclone Idai in 2019, which impacted nearly two million people in Zimbabwe and Mozambique and caused injuries and deaths of approximately three thousand (EM-DAT 2021). The issue of climate change vulnerability is urgent, as developing countries such as Mozambique are expected to face an increase in the frequency and intensity of droughts, floods and tropical cyclones in coming years (IPCC 2007, 2014b).

For many in developing countries, migration in response to climate change may be an adaptation of last resort (IPCC 2014a). Because the relationship between migration and climate change is not always direct, there are opportunities for governments to intervene to mediate the destructive impacts of climate change, and in so doing reduce vulnerability. In one example, as early as the 1920s, the U.S. federal government reduced out-migration by distributing relief and investing in public jobs programs in drought-impacted Dust Bowl areas of Oklahoma (Fishback et al. 2006). In developing countries, the full potential of insurance schemes and social safety nets in reducing vulnerability has yet to be realized. Large numbers of people are employed in the informal sector or work as subsidence agriculturalists, and the costs of participating in cost- and risk-sharing schemes can be prohibitive for the poorest. As one example illustrates, the World Bank in partnership with the government of Kenya promotes mobile crop insurance as a way

forward to “provide protection for vulnerable populations” and effectively “restructure disaster relief efforts”, but widely adopted use is contingent on the ability of vulnerable populations to afford mobile phones and insurance premiums (World Bank 2015, pp. 5-6). In neighboring Ethiopia, where the telecom sector was government run until recently, two-thirds of the population did not own a mobile phone in 2019 (CIA 2021). Crop insurance is one example of many social safety nets designed to reduce risk associated with extreme weather shocks and overall vulnerability to climate change. However, the role of governance and political interests in facilitating or blocking efforts to reduce vulnerability to climate change cannot be overlooked. At the same time, adaptation runs the risk of marginalizing the poorest and most vulnerable members of society in the absence of careful scrutiny of proposed policies and their implications for inclusivity.

Against the backdrop of worsening impacts from climate change, the world has been urbanizing, surpassing a global tipping point in 2009 (UN DESA/PD 2010). Many cities of the developing world struggle to meet existing planning, infrastructure, and service needs of their populaces, stoking fears that population growth and rural-to-urban migration will exacerbate slum growth (Davis 2017). A slum is defined as a settlement lacking legal tenure that is characterized by overcrowding, poor quality housing, and inadequate access to water and sanitation (UN DESA/PD 2014). For the purposes of this study, the term *slum* is used interchangeably with *informal settlement* as both are used in the literature on slum areas. While the proportion of the developing world’s urban population living in slums has declined from 46% in 1990 to 30% in 2014, the absolute number living in slums has risen from 689 million in 1990 to 900 million (UN-Habitat 2016, World Bank 2021). Slums are characterized by a dizzying array of housing

configurations, varying in location, legal status, structural integrity, utility access, as well as ownership status and income level of occupants. Common to all, however, is "bad geology" and vulnerability to natural disasters, realities that exert downward pressure on land values in areas otherwise unaffordable for the poor (Davis 2017, p. 122). The resulting spatial configuration of urban environs in developing countries often reflects fortified pockets of wealth and areas of concentrated poverty and environmental risk.

Rural-to-urban migration in Africa and Asia is expected to account for 90% of population movements in coming decades (Chenal 2016). Sub-Saharan Africa in particular is expected to reach an urban majority by 2050 (UN-Habitat 2014), driven in large part by rural-to-urban migration (Grant 2015). Initiated by conflict, the dismantling of colonial legacies, and failed macroeconomic policy (Davis 2017), rural-to-urban migration has continued despite low urban wages, leading to what economists describe as the urbanization of poverty. Despite their precariousness and vulnerability to environmental disasters, slums are often the only option for newly arrived migrants seeking to gain a foothold in urban labor markets. Some scholars have gone so far as to defend slums as staging areas for migrants, thus providing cities with a constant source of new labor (Saunders 2011). From this perspective, rural migrants are relocating to urban centers, compelled by a combination of internal and external forces to settle in areas most threatened by climate change vulnerability. Their vulnerability as relates to slum occupation is seen as temporary and consequently acceptable, to say nothing of their neighbors who were born and may remain slum dwellers. And yet, the IPCC identifies migrants who relocate to urban centers of developing countries as particularly vulnerable to climate change impacts (IPCC 2014a), suggesting that migration is an adaptation

strategy to climate change vulnerability only when the destination is not the city.

In trying to understand the particular vulnerability to climate change faced by rural-to-urban migrants in developing regions of the world, it is instructive to recall that vulnerability is intersectional (Versey 2021). The experience of compounded vulnerability is the rule rather than the exception, so it astonishes when vulnerability scholars working in developing country contexts fail to mention--even briefly--colonialism. To quote Baldwin,

> *"...history is not the past. It is the present. We carry our history with us. We are our history. If we pretend otherwise, to put it very brutally, we literally are criminals."*
>
> (Baldwin and Kenan 2010, p. 154)

Colonialism is both an historical and contemporary process, embodied in the vulnerability of indigenous peoples that is measured and documented as data. Colonialism is also manifest in the act of research itself. Western research is fundamentally based on the colonial model of exploitation and extraction, and white men still in many ways occupy the ultimate positions of authority in academia. This means that not only are indigenous peoples particularly vulnerable to climate change impacts (Nakashima et al. 2012), but they must also contend with a dominant system of knowledge production that has for the greater part of its history dehumanized indigenous people.

In developing regions of the world, migration research is complicated by a lack of data on residency and population movements, livelihoods and employment, as well as amenities and services between origin and destination areas. Migration statistics are not

routinely collected by SSA municipalities, urban informal settlements present as logistical challenges to conducting fieldwork, and years of exploitation by elites (and colonizers) can further dampen motivation to participate in research studies (Wynn and Israel 2018, Capron 2018). To overcome the challenges of accessing hard-to-reach populations, researchers rely on methods of convenience (e.g., snowball sampling) that risk biasing research and privileging some participants over others. Given the complexity of weather-related migration, the significance of local context, and the lack of data, how scholars approach the study of migration will have a profound influence on how we understand and support a fundamental expression of human agency.

1.2 Research Design and Terminology

1.2.1 Design of the study

This study uses a mixed-methods phased research design, based on a comparative case study approach including data from extensive participatory mapping, semi-structured interviews, and fieldnotes. The selection of case study communities occurred on the basis of guidance from municipal officials and through interviews with 11 key informants, representing local non-profit organizations, businesses, university scholars, and the national government of Mozambique. A total of 2,560 households were mapped and 159 semi-structured interviews were conducted with a random sample of households in the case study communities over a nine-month period. In addition to household mapping, housing and neighborhood characteristics were documented through formal observation and captured using visual imagery. Data collection instruments were developed through a series of focus group discussions with community stakeholders and in consultation with

Mozambican scholars and municipal officials[1]. Resulting qualitative data are analyzed to provide insight into the everyday lived experiences of marginalized communities, in order to identify and better understand drivers and outcomes of migration. Quantitative data analyses are used to capture socioeconomic and demographic characteristics in order to contextualize qualitative findings. The study's research protocol governing the informed consent process and data collection was approved by the University of Maryland Institutional Review Board (IRB approval #968383).

1.2.2 Environmental migration

Contemporary debates in the environmental migration literature question the effect of environmental factors, including climate, on migration. Scholars have argued on the one hand that extreme weather events and climate variability motivate migration through environmentally induced hardship, while on the other weather-related impacts may exacerbate existing barriers to migration, resulting in trapped populations. Black et al. (2011) present a conceptual framework for the study of migration that places migration within demographic, social, political, economic, and environmental contexts. The framework accommodates the study of nuanced aspects of migration-environment linkages in that it considers direct as well as indirect effects of the environment, barriers and facilitators of migration, and personal and household characteristics.

The framework shaped the dissertation research in three fundamental ways. First, my co-author (Julie Silva) and I examine the relationship between adverse weather and rural-to-urban migration through the lens of Black at al.'s (2011) theoretical framework

[1] See Appendix A for the household survey, household interview protocol, observation of housing and neighborhood characteristics, and the key informant interview protocol.

in the second chapter of the dissertation. Separate literature reviews were conducted for each of the five families of migration drivers described in the framework (environmental, economic, social, demographic, political). Broadly, the literature reviews indicate the absence of an overarching coherent theory of migration and the presence of disciplinary biases in explanations of why people undertake migration. Second, the framework guided the development of the semi-structured interview instrument of the dissertation research. While respondents were asked directly why they migrated, additional questions prompted respondents to describe and reflect on changes in their immediate environment, including changes in the land, vegetation, animals, buildings, and the broader community. The inclusion of these questions provided the critical context (environmental, economic, social, demographic, and political) in which to interpret respondents' stated motivations for migrating from rural areas. Identical questions were included in the subsection of the interview applicable to the urban setting, in order to understand differences and similarities in vulnerability experienced by migrants and non-migrants (the subject of the third chapter of the dissertation). Finally, the framework provided a provisional list of migration push factors (e.g., loss of land productivity, food insecurity, disease outbreak), barriers (e.g., moving costs), and facilitators (e.g., social networks) to code for in the analysis of open-ended interview data that serve as the basis for the second chapter of the dissertation. The framework situates the study within prior theory, while drawing attention to migration processes that are as of yet not fully known.

1.2.3 Climate Change Vulnerability

Generally, three factors are considered in climate change vulnerability assessments: (1) exposure to a threat, (2) the severity of impacts, and (3) adequacy of capacity to adapt

(Wisner et al. 2004). Specific approaches to investigating climate change vulnerability often derive from differences in disciplinary orientations and research aims. Environmental sciences research, for example, tends to rely on quantifiable metrics and aims to produce generalizable findings with implications for policy (Birkenholtz 2011). Other approaches (e.g., political ecology) internalize processes of social power and decision-making that are not easily quantified, yet necessary in understanding causes of local vulnerability (Ajibade 2017). Polsky et al. (2007) offer a conceptual model that synthesizes quantitative and qualitative assessments of vulnerability to produce assessments of vulnerability informed by stakeholders and local context yet comparable to other areas. Importantly, such place-based approaches to vulnerability may yield useful insights in understanding how biophysical, social, and institutional dimensions come together to influence climate change vulnerability experienced by disparate groups.

In the third chapter, I explore how biophysical factors, identity characteristics, and access to resources relate to influence climate change vulnerability from the perspective of migrants and non-migrants living in Beira, Mozambique. The final selection of indicators of well-being (adaptive capacity) were selected based on generic determinants of vulnerability identified in the literature (e.g., access to potable water) as well as relationships to climate change vulnerability specified during participant interviews (e.g., homeownership). These variables represent a range of biophysical and social factors collected at the household level.

1.2.4 Decolonization

In my readings of the geographical literature, the contributions of local indigenous researchers are often underemphasized or worse, ignored. While indigenous researchers

make important research contributions as expert key informants, they often contend with multiple barriers to publishing in academic journals, leading to the perception among some that indigenous people are valued only as the subject of research rather than as researchers in their own right. In addition to discrimination and bias, barriers include a lack of funding, institutional support, and limited opportunities to develop skill sets and increase capacity as researchers. These examples illustrate the challenges indigenous researchers routinely encounter and have been addressed in the scholarship on decolonizing research for some time.

Key tenets of decolonial scholarship include a radical recentering of research around indigenous knowledge and local issues (e.g., co-defining research questions, producing actionable research that benefits research participants) and ensuring indigenous data sovereignty. Recent debates have centered on how to effectively bridge Western and indigenous research traditions. While findings and best practices from the decolonization literature have been taken up by an increasing number of research areas (e.g., community health), progress has not been evenly distributed. In the environmental sciences literature, contributions of indigenous knowledge and researchers are still underemphasized and often seen as "advisory and facilitative rather than instrumental and constitutive" (Latulippe and Klenk 2020, p. 7). The absence of critical engagement with indigenous knowledge systems and integration of indigenous perspectives in the environmental sciences potentially undermines research and the development of locally based and culturally relevant adaptation policies.

The issue of accessing hard-to-reach populations is addressed by geographer Robert Chambers in his book *Rural Development: Putting the Last First* (1983).

Chambers demonstrates how positionality can exclude participants from research for logistical reasons ('roadside' bias), but also for social reasons (e.g., 'elite' bias, a reluctance to speak due to self-perceptions of having lesser status, power, and social capital relative to others). Decolonial scholarship highlights ways to minimize harmful biases by involving community stakeholders in the research process. Community members share geographical and linguistic characteristics of respondents, in addition to cultural values. This minimizes the misinterpretation of findings and contributes to the richness of data and rigor of analysis. Despite ethical and practical reasons for involving community stakeholders in the research process, few qualitative methods handbooks offer explicit guidance (one notable exception, Devereux and Hoddinott 1992). Consequently, indigenous communities are often subjected to the trial and error of inexperienced foreign researchers while seldom benefitting from research findings.

If left unaddressed, biases potentially reinforce existing inequalities, harming and further marginalizing individuals who face the deepest deprivations. In addition to issues of feasibility, how research on hard-to-reach populations is carried out raises ethical concerns.

In the fourth chapter, I apply principles of participatory approaches identified in the decolonial literature to a retrospective analysis of data collection methods employed while conducting fieldwork for the second and third chapters. Specifically, post-field reflexivity and discussion generated insights and best practices for assembling a team of indigenous researchers to co-produce knowledge on hard-to-reach populations who are the subject of the second and third chapters.

1.3 Organization of the Study

1.3.1 Research Questions Addressed

Three papers comprise this dissertation, each corresponding to three separate but linked research questions. They illuminate the relationship between extreme weather and migration across the rural-urban divide. While they touch upon a range of topics, they have in common one central theme: how the poor are marginalized in increasingly interrelated and compounded ways. The second chapter deals with vulnerability to extreme weather events in the rural context and the resulting decision to migrate. The third chapter turns to migration outcomes in the urban setting and compares migrant and non-migrant experiences of vulnerability to extreme weather events. The fourth chapter explores the implementation of research targeting marginalized groups and its potential to minimize as well as amplify harm to study participants. While varied, all three papers address the interrelationship between human agency, extreme weather, and poverty.

The second chapter of the dissertation is titled "Weather-related influences on rural-to-urban migration: A spectrum of attribution in Beira, Mozambique". It addresses three interrelated research questions: 1) How do migrants characterize the role of weather when describing migration motivations? 2) To what extent do migrants attribute migration to extreme weather events and unpredictable rain? And 3) How do different types of weather events influence patterns of attribution? Using a comparative case study of Mozambique, the second chapter aims to better understand and theorize the role of climate change as a migration driver. The second chapter explores the relationship between experiences of adverse weather and the decision to migrate from rural areas, within the context of broader socio-economic and political factors. My co-author (Silva)

and I propose a novel methodological approach using descriptive and affective coding techniques combined with a decision-tree diagram to identify cases in which weather acts as a direct push factor or as an underlying driver of migration. A spectrum of attribution represents the strength with which migrants attribute the decision to migrate to weather-related factors relative to other drivers of migration (i.e., environmental, economic, and social). Four categories of attribution (strong, moderate, weak, and no attribution) demonstrate varied experiences of adverse weather, from extreme events to erratic rainfall. Importantly, respondents who directly attributed migration to the weather (the strong attribution category) were few, while those who indirectly attributed migration to the weather (the moderate and weak attribution categories) represented a majority of respondents, suggesting a resistance to environmental explanations for migration.

The third chapter of the dissertation is titled "Urban environmental vulnerability according to migrant status: Lessons from Beira, Mozambique". It addresses the research question: Under what contexts do urban migrants and non-migrants experience differential environmental vulnerability? The third chapter explores the environmental vulnerability of migrants in the post-migration urban setting using a place-based approach. The theoretical basis of this approach posits that biophysical, social, and institutional factors are linked and bounded by place. Experiences of, attitudes toward, and responses to environmental threats were solicited by referencing specific aspects of place during the interview, as were identity characteristics and resource access. Comparative analysis of migrant and non-migrant perspectives of vulnerability reveals no unique determinant of vulnerability among migrants; statistical tests reveal no association between migrant status and indicators of well-being.

The research findings of the third chapter challenge the a priori assumption that urban migrants are inherently vulnerable to extreme weather events. The practical applicability of findings from the third chapter relates to adaptation policies that target migrants specifically and slums more broadly. Policies may be more beneficial and effective for specific groups by focusing on issues that impact and potentially unite the community as a whole.

The work presented in the fourth chapter of this dissertation addresses the question: How can decolonial scholarship improve upon data collection practices to better represent hard-to-reach populations? The topic and introspective analysis arose from challenges I encountered during primary data collection in Mozambique, leading to an expanded role for local research assistants in the research design and data collection methodologies. The fourth chapter's main objective is to highlight the benefits of empowering local research assistants and colleagues, especially when studying hard-to-reach populations, and to share best practices on assembling research teams. The practical applicability of findings from the fourth chapter carries implications for participatory approaches to data collection to be more widely instituted within academia, for example, integrated into graduate school curricula, especially coursework on field methods.

Chapter 2: Weather-related influences on rural-to-urban migration: A spectrum of attribution in Beira, Mozambique[2]

2.1 Introduction

The likelihood that environmental vulnerabilities in the Global South will increase due to climate change is well documented (IPCC 2014a). Narratives of climate-induced displacement and migration remain popular in the policy and media domains (Wiegel et al. 2019). However, environmental explanations for migration have received criticism for ignoring the broader socio-economic and political factors that influence migration decisions (Boas et al., 2019). Moreover, empirical studies find that migrants rarely offer environmental reasons as the main motivation for moving (Black et al., 2011). Even when climate change or weather events do play a role in migration, it remains difficult to determine the magnitude of the influence.

We examine the weather-migration nexus from the perspective of long-term migrants in Beira, Mozambique. Similar to many climate-vulnerable countries in the Global South, Mozambique has been characterized by poor governance and rural neglect (Cunguara and Hanlon 2012). Large flows of international aid have created opportunities for corruption, weakening the autonomy and administrative capacity of local governance (Sidaway 1993, Hanlon 1991). In addition, economic liberalization has exposed rural economies to volatile international markets (Mittleman 2000). Weak administrative

[2] Note that this chapter has been published in *Global Environmental Change.* Please see the full citation: Anderson, Kelly J., and Julie A. Silva. (2020). Weather-related influences on rural to urban migration: A spectrum of attribution in Beira, Mozambique. *Global Environmental Change*, *65*, 102193.

capacity and failed development policies compromise the state's ability to support agriculturalists reliant on rain-fed crops (Cunguara et al. 2011), leaving households highly vulnerable to weather risk (Silva 2007, Silva 2013). Beira, a port city located at the mouth of the Pungwe River, serves as a vital trade hub in central Mozambique and attracts migrants from impoverished rural areas seeking employment (Shannon 2020, Patrício 2014).

Using examples from two migrant communities in Beira, we draw on Black et al.'s (2011) theory of interrelated environmental and non-environmental migration drivers to explore the degree to which weather events contribute to rural out migration. We investigate 1) how migrants characterize the role of weather when describing migration motivations, 2) how the strength of weather attribution varies and, 3) the types of weather events associated with specific attribution patterns. Following Neumann et al. (2015), we hypothesize economic drivers will encompass or relate to weather events, but we expect the relationship to vary by event type and across individuals. Following Koubi et al. (2016), we hypothesize that sudden-onset events will have stronger effects on migration.

The significance of the research stems from its novel methodological approach and focus on how migrants themselves describe and explain climate effects on migration, a viewpoint that is often lacking in the empirical literature (Pelling and Garschagen, 2019). This allows us to provide a more qualitative and humanized understanding of the relation between weather and migration. The research design involved extensive participatory mapping of each informal settlement to get an accurate population count and draw a random sample that represented the larger migrant population living in Beira

(for which no official figures exist). Using content analysis of semi-structured interviews with long-term migrants, we examine the motivations for migrating from the perspective of respondents. Drawing on Renaud et al. (2011) and Warner (2010), we conduct a decision tree analysis to evaluate and classify the perceived influence of weather-related factors and how they interact with other drivers in migration decision-making. We provide concrete reproducible steps to analyze past experiences of weather in relation to migration that could yield useful insights for research in both rural and urban settings of understudied regions. Finally, we employ a Marxist Political Economy perspective in the interpretation of our results to bring our findings into dialogue with broader theories of rural deprivation.

2.2 Literature Review and Conceptual Framework

Migration research in less developed countries often builds on economic theories of migration by examining how the weather influences rural economies of migrant-sending areas (Carr 2005, Beine and Parsons 2015). A number of studies attribute migration to environmentally induced hardship (Dercon 2002, Gröger and Zylberberg 2016, Rosenzweig and Stark 1989, Dun 2011, Marchiori et al. 2012, McLeman 2019). However, scholars have challenged the environmental migrant narrative on many grounds (Boas et al. 2019). One body of research indicates that extreme weather events suppress migration, highlighting how migration is a costly form of climate adaptation and often unavailable to the rural poor (Adams 2016, Morrissey 2013, Warner and Afifi 2014). The impoverishing effects of climate catastrophes over time may actually trap rural households in place (Call et al. 2017), raising the possibility that 'environmental hostage' is a more appropriate term for describing some rural households (Personal

communication). Moreover, the degree to which environmental hardship may influence or suppress migration may vary by event type. Koubi et al. (2016) find that sudden-onset events tend to increase the likelihood of migration, but slower onset environmental events (e.g., drought) tend to decrease migration. Even when climate change or weather events play a role in migration, it remains difficult to determine the magnitude of the influence (Neumann et al. 2015).

Another challenge to the environmental migrant narrative draws on research which finds that rural migrants themselves resist the label. Black et al. (2011) finds that people rarely offer environmental reasons when asked about their migration motivations. Mortreux and Barnett (2009) and McCubbin et al. (2015) find that economic stress ranks as a much stronger driver of migration than environmental factors in Tuvalu despite on-going damage caused by sea-level rise. Afifi (2011) finds that while extreme weather contributes to migration in Niger, former farmers emphasize extreme poverty as the primary cause. Artur and Hilhorst (2012) find that the crisis narrative around climate change does not figure prominently among local people in central Mozambique. These studies find that economic considerations dominate migrant discourses.

The reasons migrants themselves attribute a relatively minor role to bad weather and climate change in rural displacement is less clear from the existing empirical literature. However, Davis' (2017) meta-analysis of urbanization in the Global South offers some insights. Taking a Marxist perspective of political economy, Davis argues that rural outmigration and urban slum growth results from economic marginalization and impoverishment, arising from international and state policies of underinvestment in rural areas. Davis describes a process of rural devastation, beginning in the 1960s, driven by

IMF and World Bank policies of agricultural deregulation and austerity that exposed rural agriculturalists to volatile commodity markets and other risks with few alternative off-farm livelihood options. For Davis, rural population movements represent a manifestation of severe economic hardship rooted in power imbalances inherent in the global capitalist system. When considered from this perspective, the primacy of economic explanations for leaving rural areas is understandable, although these economic decisions remain embedded in larger socio-political and environmental contexts.

A strong research consensus recognizes the need to better understand displacement and migration in the context of climate change, particularly in the Global South where the poor are disproportionately vulnerable to increasingly frequent and extreme weather events (IPCC 2014a). The ethical concerns raised by the inequitable consequences of climate change, and the need to address this form of environmental injustice, have been widely acknowledged among various academic disciplines, as well by NGOs, grassroots movements, and prominent public figures (see Walker 2012). Documenting the ways in which extreme weather harms already marginalized people remains central to evidence-based environmental justice efforts (Newell et al. 2020). Still, many migration scholars express concern with environmental explanations that can deflect attention away from the structural reasons underlying rural impoverishment and climate vulnerability (Ransan-Cooper et al. 2015, Bogardi and Warner 2009). Critiques of the view that climate change drives civil conflict offer similar objections, finding that causes for conflict often have political, rather than environmental, origins (Barnett 2019, Selby et al. 2017, Hartmann 2010, Buhaug 2010). For example, climate change magnifies on-going processes of economic marginalization in rural Sub-Saharan Africa that result

from state neglect and the lack of state accountability (Benjaminsen 2016, Benjaminsen et al. 2012). In the same way, the environmental migration narrative may serve governments that fail to promote rural development or provide disaster assistance. Indeed, disaster aid funding from international donors may provide a perverse incentive for governments to de-prioritize meaningful capacity building efforts (Arnall 2014, Artur 2013).

2.3 Research Context

Mozambique provides an appropriate case study for investigating the weather-related effects on rural-to-urban migration in the context of high economic insecurity: (1) the country is highly vulnerable to extreme weather, including droughts, floods, and tropical cyclones (Matyas and Silva 2013), (2) rural areas experience persistent poverty and government neglect (Smart and Hanlon 2014), and (3) rural Mozambicans have traditionally employed migration as a critical strategy to negotiate weather risk (Newitt 2017, Patrício 2016). Mozambique's urban population has increased from 9% in 1975 (UN DESA/PD 2010) to 37% in 2020 (CIA 2020), fueled in large part by rural-to-urban migration (Cau 2016, World Bank 2018).

2.3.1 Poverty & Governance

Mozambique faces many of the development challenges common in sub-Saharan Africa with a GDP per capita of $1,200 and an estimated 46% of people living below the poverty line (CIA 2020). Despite the decline in overall poverty rates over the past decade (MEF/DEEF 2016), Mozambique remains one of the world's poorest countries with the absolute number of poor people increasing due to rapid population growth (World Bank

2018). In 2018, the UN's Human Development Index ranked Mozambique 180 of 189 countries, indicating a low quality of life (UNDP 2019).

Poverty remains a challenge in rural areas where close to two-thirds (63%) of the population lives (CIA 2020). In 2015, 56% of the rural population lived below the national poverty line and 89% experienced multiple dimensions of nonmonetary deprivation (World Bank 2018). Most rural households rely on low-tech cultivation of rain-fed crops, which leaves them extremely vulnerable to extreme weather events and economic shocks (Silva et al. 2015). In central Mozambique, 91% of rural households depend upon rain-fed crops for food consumption and sale in local markets (MASA 2018). During abnormally dry conditions, risk of crop loss can exceed 50% (FAO 2005). Evidence suggests droughts, which typically occur every three to four years, are an increasing threat to crop yields (MASA 2018), as is flooding (Artur 2013). As agricultural livelihoods become increasingly unviable, rural people face increased pressure to migrate to cities (Warner 2010, IPCC 2014b).

Some researchers attribute declining agricultural productivity to government neglect of rural areas (Cunguara and Hanlon 2012) where investment in rural connectivity and market access has declined significantly since 2009 (Mahdi et al. 2019). Moreover, in an increasingly market-driven society, Mozambican farmers who lack access to infrastructure or insurance take on more climate-related risk (Eriksen and Silva 2009). Hanlon and Smart (2008) argue that the Mozambican government has continued unsuccessful economic reforms despite the negative consequences in a bid to appease international organizations like the World Bank and IMF. The situation in Mozambique is consistent with the Marxist interpretation of a capitalist state that acts against the best

interests of its rural citizens to advance the economic interests of international capital (Caporaso and Levine 1992).

In terms of poverty, urban areas fare better than rural ones, with only 2 out of every 10 poor households living in cities (World Bank 2018). Overall, urban residents experience less monetary poverty than rural ones (32% compared to 56%), but many urban dwellers live in poor conditions. In 2007, UN-Habitat (2014) estimated that 80% of the urban population in Mozambique lived in informal settlements. Most of these settlements exhibit characteristics of slums, as defined by Davis (2017), including overcrowding, poor quality housing, inadequate transportation infrastructure, poor sanitation, poor water quality, and limited availability of health care services (World Bank 2018). Although Mozambique does not publish official poverty rates for individual cities, national figures show that 63% of Beira residents lack access to electricity, almost half (47%) lack access to piped water, and 30% have no toilet (INE 2010).

2.3.2 History of Migration

In central Mozambique, like elsewhere in Africa, colonial authorities heavily regulated migration to supply the forced labor of the plantation economy (Newitt and Tornimbeni 2008). Rural areas served as little more than sources of labor, systematically excluded from investment and the development of infrastructure by the colonial state (Newitt and Tornimbeni 2008, Patricio 2014). The city of Beira offered an appealing alternative to the harsh conditions of the rural plantations, as major infrastructure projects (e.g., port, railway, oil pipeline) fueled the expansion of indigenous Mozambican neighborhoods (Sheldon 1999). As much as 35% of internal migrants from central Mozambique resettled in Beira, the largest city in Sofala Province, by the end of the colonial period (Newitt and

Tornimbeni 2008).

After political independence from Portugal in 1975, a 16-year civil war (1977-1992) occurred with Sofala as the geographic stronghold of the political opposition (Vines 2013). The area's countryside experienced a high level of guerrilla warfare (Human Rights Watch 1992), including an estimated 100,000 landmines (Vines 1998), leading rural dwellers to relocate *en masse* to larger cities seeking security. Between 1975-1980, 13% of Sofala's population relocated to new residences annually, double the national average over the same period (de Araújo 1990).

After the civil war, an estimated 1.7 million people returned to their villages (Newitt 2002) and the population remains predominantly rural (INE 2017). However, Beira's port and railway have attracted male internal migrants seeking formal employment since the mid-1900s through the present (Shannon et al. 2020). Patrício (2014) describes the Beira Corridor as an artery of economic activity in central Mozambique buoyed by foreign investment. Between 1997 and 2017, Beira's population grew by 25% to more than five-hundred thousand (INE 2007, 2017).

2.4 Material and Methods

2.4.1 Data Collection

This study takes a qualitative, interpretive approach to investigating weather-related effects on rural-to-urban migration, drawing on open-ended responses to semi-structured interviews with migrant households (n=79). We also analyze quantitative data collected from each interview respondent to provide socio-economic and demographic context of our study sample. Data collection occurred between March and August 2017. The process involved two data collection phases waves completed over a nine-week period in Praia

Nova and Munhava-Matope, two informal settlement neighborhoods of Beira city.[1] The University of Maryland Institutional Review Board (IRB) approved this study (Approval # 968383).

The first data collection phase consisted of a participatory mapping exercise to construct an accurate tally of all households located in each neighborhood, their geographic location, and migration status. This information generated lists of eligible residents from which we draw a random sample of study participants. With the help of local leaders and Mozambican research assistants, the author (Anderson) scouted main thoroughfares and recorded community landmarks using GPS devices and graph paper. Research assistants later identified all residences located between landmarks. They assigned each residence a unique code and recorded the household head's gender, birthplace, duration of Beira residency, preferred language, and contact information. Assistants also recorded the year of migration for migrant households. Additionally, the mapping exercise helped to establish rapport and trust between members of the community and research team.

The second phase of data collection involved semi-structured interviews with a random sample of migrant households identified during the first phase. Participatory mapping identified 1289 and 1271 households in Praia Nova and Munhava-Matope, respectively, of which 810 households in Praia Nova and 812 in Munhava-Matope met the study's participation requirements. Respondents selected for semi-structured interviews met three inclusion criteria: (1) had attained 18 years of age or older, (2) had migrated from a rural area to Beira after February 2000, the landfall date of Cyclone Eline, and (3) had maintained a residence in Beira for at least 12 continuous months prior

to the interview date. Due to Cyclone Eline's widespread destruction, this event served as a familiar reference point for most Mozambicans and enabled quick identification of longer-term migrants. From eligible participants, we selected every third household to participate in the semi-structured interview. If a household declined to participate, research assistants substituted with the household's nearest non-selected but eligible neighbor. A follow-up round of interviewing increased representation of female household heads.

Seventy-nine individuals from migrant households participated in the study. At the start of each interview, respondents completed a questionnaire consisting of 32 questions concerning the socio-economic and demographic characteristics of the household. The open-ended component of the semi-structured interview included two thematic sections. The first thematic section consisted of two questions to identify the factors most directly associated with migration: (1) why did you migrate and (2) why do some families remain in the village and not migrate? The second question prompted respondents to compare and contrast their situation with others from the same origin area and elaborate on the conditions needed for rural households to adapt to economic and environmental change. This question provided respondents the opportunity to further elaborate on why they chose to migrate while others do not. The second thematic section focused on the environmental history of the migrant's rural origins, including questions on any weather-related events that had occurred, factors they believed influence environmental vulnerability, and other changes present in the physical environment and community.

Interviews lasted approximately 1.5 hours and were recorded on paper and in

digital format using audio recording devices. We conducted interviews over two sessions, allowing for detailed follow-up questions and clarifications to responses given during the initial interview session, as well as corrections to missing or conflicting data. If respondents were dependents at the time of migration and did not make the decision themselves, we asked them to share why their family had decided to move or how the family had explained the decision to move to them. All interview guides were written in Portuguese, and members of the research team were selected based on the ability to speak a range of local languages common to rural areas near Beira (e.g., Chisena, Chindau, and Chinhungue). Interviews conducted in local languages were first transcribed into Portuguese and then translated to English by Mozambican research assistants. The author (Anderson) completed transcription and English translation of all interviews conducted in Portuguese.

2.4.2 Data Analysis

Quantitative data from the household questionnaire completed at the start of each interview were analyzed in STATA to calculate basic descriptive statistics for the study sample. All semi-structured interview transcriptions were entered into NVivo 12 qualitative software for database construction and analysis. The interviews were coded in two phases.

The initial phase of descriptive coding was an application of a provisional list of themes developed from the conceptual framework presented by Black et al. (2011). As *a priori* codes were applied, an additional list of emergent codes was developed for migration decision factors not identified by Black et al. but recurring in interview responses. Emergent codes included, for example, the role of agricultural pests and

infrastructure damage in motivating migration. A subsequent round of coding was then performed in order to formally apply emergent codes in a systematic way to the complete body of interview transcriptions.

In the second coding phase, we employ affective methods, defined by Goleman (1995) as a technique to investigate the subjective qualities of personal experiences and expressed beliefs. Specifically, we use emotion and values coding to identify if, when, and how respondents emphasized or de-emphasized the importance of weather in motivating migration throughout the interview. Per the guidelines outlined by Saldaña (2016), codes were applied to specific language indicating emotion (e.g., fear, ambivalence, apathy, etc.). For the values coding, we identified language indicating attitudes (e.g., dismissive, etc.) and beliefs (e.g., jobs are in the urban areas, etc.). Descriptive and affective coding approaches were combined to enhance and contextualize interpretation of objective (e.g., historical events) and subjective (e.g., perception) aspects of human experience (Saldaña 2016). The final codebook includes 12 affective codes (six for emotion, two for attitudes, and four for beliefs), six thematic categories, and 45 sub-codes with corresponding illustrative text.

All participants in the study recalled motivations for migration and provided detailed accounts. The authors developed a decision tree flow chart to distinguish respondents according to the degree to which they attributed migration to weather-related factors (see Figure 1). Using the decision tree, the authors placed interviews into one of four categories. Categories capture how strongly participants attributed migration to weather and fall along a spectrum of attribution, reflecting the varying degrees to which weather influenced migration.

The decision tree process permitted an in-depth analysis of the circumstance leading up to migration (Renaud et al. 2011). We explicitly looked for qualitative differences in how people discussed the weather (e.g., emphasis, de-emphasis) in relation to their decision to migrate. We link experiences of weather to the migrant's motivation for leaving and evaluate the relative strength with which respondents attributed migration to weather-related factors. This approach focuses attention on the challenges of climate change from the perspective of migrants and produced a transparent and reproducible set of analytical steps to identify cases in which weather acts as a direct push factor or as an underlying driver. Additionally, such an approach teases out the interactions of these factors in the lead-up to a migration decision.

The authors identified participants who described migrating in direct response to

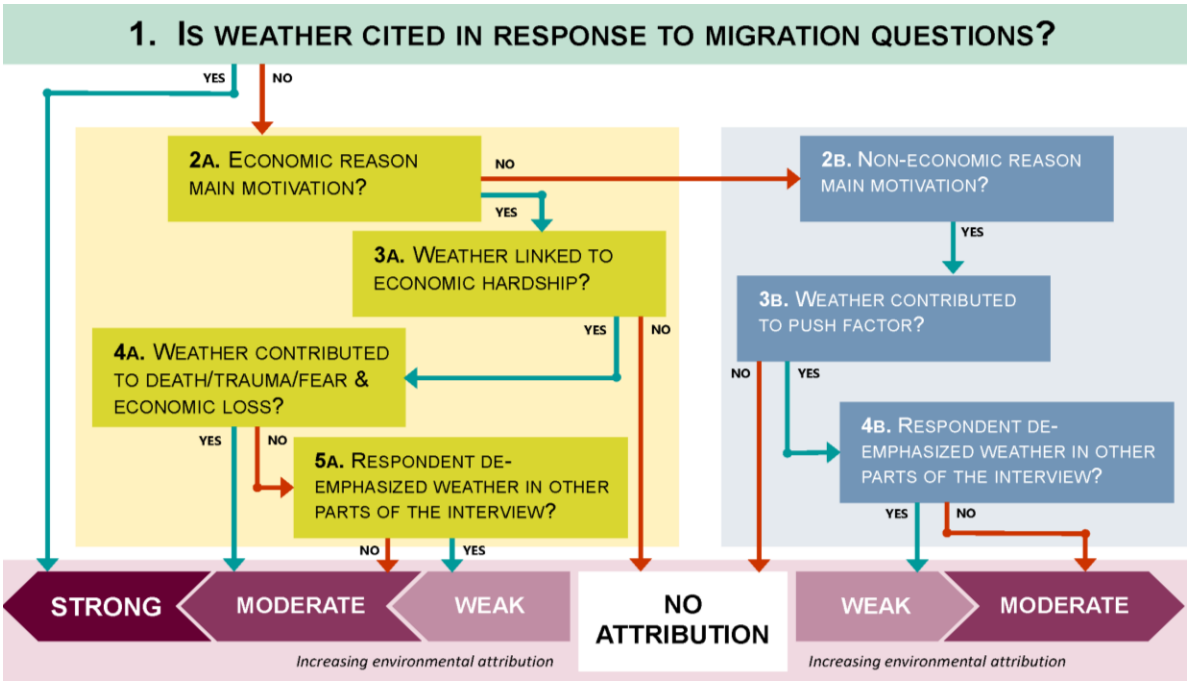

Figure 2.1 The decision tree showing inclusion criteria for each attribution category. "Migration questions" refer to the following: 1) Why did you migrate? and 2) Why do some families remain in the village and not migrate?

weather and assigned these interviews to the strong attribution category. Guided by Black et al.'s (2011) treatment of migration drivers as falling into distinct thematic categories, the authors gauged strong attribution by whether or not the respondent introduced the topic of weather as a discrete reason for migrating in response to at least one of the following questions: (1) Why did you migrate and (2) why do some families remain in the village and not migrate? We included responses for the second question in the classification criteria because many respondents elaborated on their own reasons for migrating by comparing and contrasting their circumstances with the families that remained in rural areas.

Participants who described migrating due to factors (including economic, demographic, and socio-political conditions) that had been negatively affected by weather were assigned to the moderate category. Following the approach of Neumann et al. (2015), we trace weather impacts (e.g., crop loss) to migration through interacting economic and non-economic drivers. Progressing along the attribution spectrum from the strong to moderate category represents greater complexity and an increasing degree of separation between driver and migration response. The inclusion criteria for the moderate group was participants indicating a causal relationship between weather impact and the named factors prompting migration, although linked through an indirect effect (e.g., income loss).

If participants discussed the topic of weather in the context of migrating but de-emphasized a causal relationship between the two at any point in the interview, the authors assigned these interviews to the weak category. Affective coding played a strong role in making such assessments. These respondents explicitly attributed less importance

to weather relative to other factors prompting their migration (e.g., they mention weather-related problems but say this was not the main reason). Respondents were also placed in this category if they made contradictory statements. For example, in some cases, respondents attributed migration to non-environmental factors in the first section of the interview but later described serious negative consequences of weather-related events in rural areas as a reason for not wanting to live there. Finally, if participants described migrating for reasons unrelated to the weather and did not elaborate on the weather's negative effects on rural life and livelihoods in other parts of the interview, the authors assigned these interviews to the no attribution category.

2.5 Results

2.5.1 Respondent Characteristics

Before turning to the results of our qualitative analysis, we briefly discuss geographical patterns of rural (origin) areas and present descriptive statistics from the household questionnaire to provide socio-economic and demographic context for our study sample. As shown in Figure 2, respondents migrated from 24 districts between the years 2000 and 2016. Over half (54%) of respondents migrated from villages within five kilometers of a river, 28% migrated from a low-elevation coastal zone, defined as an area within 100 kilometers of coastline and a maximum elevation of 10 meters (McGranahan et al. 2007), and 14% fell into both of the previous categories. Only 13% migrated from villages distant from both rivers and coastlines. While a quarter of respondents (25%) migrated from districts adjacent to Beira, others came from much further away, suggesting Beira's prominence as an important economic hub within central Mozambique.

Table 2.1 provides respondent- and household-scale socio-economic

characteristics. Most respondents (82%) were male and averaged 22 years old at the time of migrating. 15% of respondents were under the age of 15 when left their rural origin area, the youngest being 10 years old. All respondents in this age group recalled motivations for migrating and each attribution category includes at least one member of this group. The oldest age at migration was 71 years, with the next oldest being 44 years. Most respondents had lived in agricultural households prior to migration. Of the 79 respondents participating in the study, only one lived in a household that did not participate in semi-subsistence farming. Households reporting formal employment income were underrepresented in higher attribution categories (strong and moderate) when compared with weak and no attribution categories. As typical in rural Mozambique, living conditions tended to be poor for respondent households in their origin area as measured by housing materials, water access, and electricity. Almost half of the respondents reported weather-related crop loss in the 12 months prior to migrating. 25% mentioned rapid-onset events, with flooding being the most common, while 25% mentioned losses due to drought.

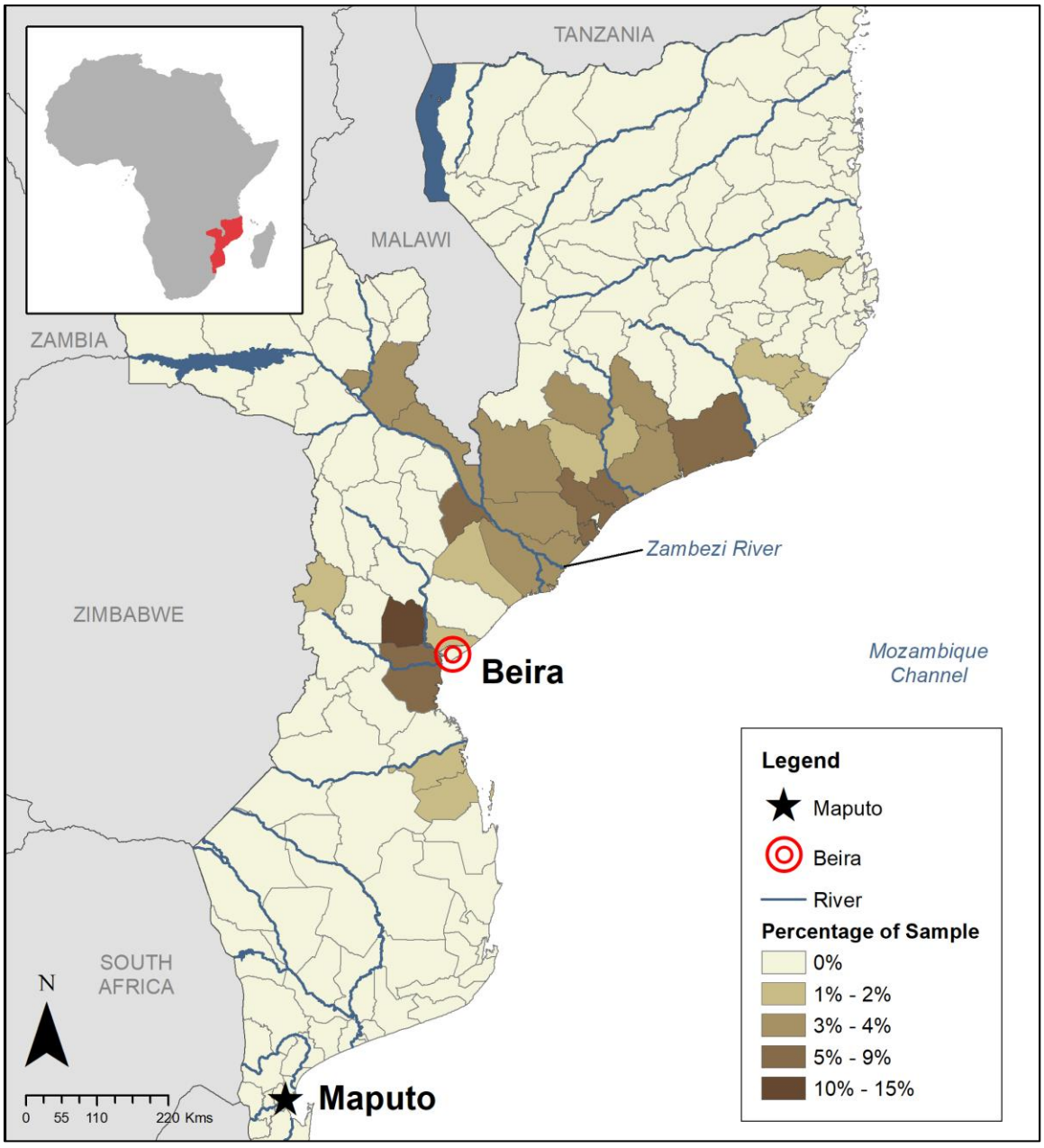

Figure 2.2 Map of Mozambique showing the location of the case study area (Beira). Shaded districts represent origin areas from which respondents migrated

2.5.2 Unifying Characteristics of Beira Migrants

2.5.2.1 Primacy of Economic Factors

Economic factors served as the basis for how most respondents articulated their migration motivations, particularly the desire to find off-farm employment. Most respondents stressed the role of economic conditions, and not weather-related factors, when describing why they left rural areas and embarked on urban life. Respondents listed primarily negative economic factors, speaking more about what they lacked in rural areas as opposed to any benefits of living in a city. Even among respondents who directly attributed their migration to weather, they discussed weather-related factors in conjunction with economic motivations.

The narrative that emerged was one in which people migrated because it was no longer economically possible to make a living in the rural area. However, respondents frequently mentioned the weather throughout the interviews. When asked to describe their experiences with the weather in the years prior to migrating, nearly all respondents gave detailed accounts of adverse weather with wide-ranging experiences. At one extreme, weather presented as little more than a daily inconvenience. On the other, devastating cyclones and prolonged drought resulted in famine and death. Most respondents described rural life as full of hardship and recurrent crisis where weather emerged as a formidable adversary affecting well-being in profound ways.

Table 2.1

Descriptive Statistics of Respondent and Household Socioeconomic Characteristics

Individual and household characteristics prior to migration	Attribution Group				
	None (%) (n=28)	Weak (%) (n=19)	Moderate (%) (n=23)	Strong (%) (n=9)	Total (%) (n=79)
Respondent Characteristics					
Female	25	11	4	44	18
Age at time of migration					
Under 15 years	14	5	17	33	15
15-24	61	53	61	56	58
25-34	18	32	22	0	20
35+	7	10	0	11	7
Household Characteristics					
Livelihoods					
Agriculture	96	100	100	100	99
Artisinal fishing	43	53	61	78	54
Small-scale informal commerce	63	63	48	33	52
Skilled self-employment	21	58	39	44	47
Formal employment	39	37	17	11	29
Living Conditions					
Zinc or cement roofing	29	37	26	22	29
Cement Flooring	21	32	17	22	23
Piped/pumped drinking water	32	53	26	22	34
Electricity/battery as principal energy source	14	11	4	0	9
Weather-related Experiences					
Negative impacts to crops/belongings due to weather[a]	29	42	61	78	47
Negative impacts to crops/belongings due drought[a]	21	21	35	22	25
Negative impacts to crops/belongings due flooding[a]	11	26	22	56	23
Negative impacts to crops/belongings due cyclones[a]	0	11	9	22	8

[a] = Loss occurred in the 12 months leading up to migration

The weather was the most frequent reason given for economic deprivation in rural areas. Respondents blamed the diminishing viability of agricultural livelihoods on rainfall variability and extreme events. Respondents emphasized migrating in order to seek-out off-farm livelihoods in response to falling agricultural yields.

> *Trade motivated me [to migrate] more than anything ... I was going to my cultivated fields and when I began to see that they were failing, I already preferred to leave there for [Beira]. (Jorge, Inhassunge District, 37, Male)*

Hunger was the most frequently reported and persistent result of weather-induced crop loss.

> *[In the village] they suffer from hunger. When there is drought, there is no food. When there is too much rain, there is no food. Always hunger exists. (Sefa, Nhamatanda District, 26, Male)*

The destruction of crops and food reserves due to drought, flooding, and cyclones impeded the ability of household heads to provide for their families. As many migrants described, village life was typified by economic underdevelopment and few alternatives to farming livelihoods, exacerbating challenges brought about by weather-related impacts.

> *When the weather is unfavorable, there are no resources through which to earn an income… [I] became tired with that life. (Taza, Inhassunge District, 45, Male)*

These excerpts illustrate how poor economic conditions brought about by the weather

prompted some respondents to seek out alternative means and locations in which to earn a living.

2.5.3 The Weather-Migration Attribution Spectrum

As detailed in the methodology section, we categorized respondents into four groups based on the strength of the weather's role in influencing migration: strong, moderate, weak, and no attribution.

2.5.3.1 Strong Attribution

The strong attribution group (*n*=9) consisted of respondents who directly linked migration to one or more extreme weather events. Most reported migrating within 12 months following the destruction of crops, livestock, domestic items, or a combination of these due to the weather. Indeed, migration typically occurred within six months of a destructive weather event. Strong attribution respondents were more likely to emphasize severe impacts from flooding, and over half discussed cyclone-induced flooding. Respondents tended to migrate from coastal districts.

> *We suffered so much from cyclones, many houses were destroyed… The floods caused us much suffering, some people even died. In addition to the livestock, people lost many things, their belongings and food. (Julieta, Buzi District, 37, Female)*

In addition to emphasizing rapid-onset events, another distinguishing characteristic of this group was the frequency with which they expressed fear of future extreme events had they remained and not migrated.

2.5.3.2 Moderate Attribution

Respondents in the moderate attribution group indirectly linked migration to weather.

These respondents migrated for economic reasons but explicitly identified that the weather contributed to poor economic conditions in the rural areas. Two-thirds of respondents in this group (*n*=23) reported migrating within 12 months following the destruction of crops, livestock, domestic items, or a combination of these due to the weather. Particularly destructive weather events occurred on average three to four years prior to respondents migrating. Respondents in this attribution group originated from districts throughout Mozambique with no evidence of geographic clustering.

Whereas strong attribution respondents emphasized rapid-onset events, moderate attribution respondents were more likely to discuss drought and flood events with equal emphasis. Respondents frequently reported experiencing both dry and wet weather extremes, often describing flood and drought events occurring within the span of a few years of one another.

> *It really began to change [in the rural area], because in previous years there hadn't been these kinds of rains and flooding. These years, it's already become worse. Jeez! Either the rain does not stop, or there is a drought when it doesn't rain. (Chico, Caia District, 26, Male).*

To respondents, the frequency and volatility of extreme weather events had serious economic consequences. There was little time to recover and prepare ahead of the next potentially catastrophic event. The cycle of flooding and drought impoverished those reliant on rural livelihoods, contributing to the poor economic conditions that many claimed as their motivation for migrating.

> *When it rains there or when it floods with water, this provokes problems with hunger, like a crisis, famines, and some lose their belongings … Like cows, and livestock. When flooding appears and affects people who have*

already planted, the fields fill up with water and you aren't able to harvest anything. (Horácio, Caia District, 26, Male)

Flood and drought impacted farming livelihoods, but off-farm livelihoods could also be at risk. One respondent migrated to Beira for employment after his carpentry business failed when a flood that destroyed the bridge linking his village to the national EN1 highway, cutting off his access to customers. He said he realized then that survival was "not possible in the *distrito* (outside of the city)". Seeing few alternatives, he decided to relocate to Beira.

A subset of respondents within the moderate attribution group discussed how the erosion of traditional coping strategies against drought and recurrent flooding made it more difficult to remain in the rural area. For example, coconuts provide a critical source of food and income for millions of rural Mozambican households (Bila et al. 2015). The emergence of a coconut palm pathogen had resulted in the loss of this strategy according to respondents migrated from coastal districts of Zambezia province in central Mozambique. As one respondent described,

At that time there had been live coconut palms, and the coconut palms were close to home and they were not difficult to harvest even when we were flooded. Everyone was helped by coconut palms. Everyone would have coconuts to sell and feed themselves… but now there are no more. (Vasco, Inhassunge District, 27, Male)

Respondents complained that in the aftermath of the disease, "coconut palm graveyards" replaced the healthy groves that had sustained households for generations.

2.5.3.3 Weak Attribution

Respondents in the weak attribution group (*n*=19) emphasized either single instances of anomalous weather events or persistent abnormally dry conditions. Fewer than half of respondents migrated within 12 months following the destruction of crops, livestock, domestic items, or a combination of these due to the weather. Particularly destructive weather events occurred on average 9-10 years prior to respondents migrating. Respondents in this group migrated from distant and neighboring districts of Beira, indicating no geographic concentration of origin areas.

In many cases, the adverse weather events mentioned by respondents in this category at one point in the interview were later de-emphasized or contradicted. For example, one 29-year old male respondent from Mutarara district spoke of flooding as a commonplace occurrence and unrelated to his decision to migrate: *"There, a time may come during the year when the Zambezi river floods residential areas. However, floods always occur there, and I became accustomed to it. I was used to that life. No, the flooding was not my motive* [for migrating]*."* However, in a subsequent section of the interview, he emphasized that weather could not be withstood in the rural area without government assistance: *"Problems with drought and rain have always existed there. Even until now, my family calls me and says, 'we have problems, we are always managing problems here.' There, you can only live through help from the government."*

A subset of respondents described migrating to search for a better life, including educational and employment opportunities. But in later parts of the interview, when asked to describe conditions in the rural area, these respondents often gave harrowing accounts of weather-related hardships. For example, when asked about motivations for migrating, one respondent said, "*I wanted to experience a new*

way of living and go to school" (Cristovão, Nicoadala District, 27, Male). Yet in the second half of the interview, this respondent spoke of devastating experiences with extreme weather. "*The cyclone ruined our food, it ruined so much corn and cassava. When that cyclone happened, flooding followed. So many animals died. People's houses collapsed, the trees fell down*." In addition, this respondent reported in the survey portion of the interview negative impacts due to cyclones, floods, and drought in the 12 months prior to migration. Although the prospect for a better life led the respondent to migrate, he spoke of weather conditions as a major reason village life had been hard. This account illustrates how our content analysis revealed that migration could be weakly attributed to weather-related events.

Respondents in the weak attribution category were more likely to emphasize disaster aid and its role in reducing vulnerability and mention traditional drought coping strategies (e.g., farming swampy areas, foraging roots and wild vegetables) as a means of dealing with weather-related hardship. Given that respondents in this category remained in rural areas for a greater length of time following an extreme event (9-10 years) than those in other attribution groups, they would likely have had more experience and greater familiarity with coping strategies employed after these events.

2.5.3.4 No Attribution

The no attribution group (*n*=28) includes households that did not attribute migration to weather-related events. However, many of these respondents did discuss the weather. Respondents in this group were more likely to emphasize insufficient and unreliable rain as the predominant environmental threat, and all but one of the individuals in this group were farmers in the rural area. Changes in precipitation patterns affected the ability of farmers to predict the arrival of the planting season.

> *When I was there, we would plant seeds in the month of October… But following climate changes, we began to plant our seeds in the month of November, and even until now we are planting in the month of December! (Bernardo, Nhamatanda District, 26, Male).*

Other than irregular and shifting rain regimes, respondents in the no attribution category shared few common experiences of weather. Respondents in this category migrated from neighboring districts of Beira as well as distant districts, indicating no geographic concentration of origin areas.

Respondents who gave economic motivations for migrating (*n*=8) tended to focus on the benefits of urban living rather than rural economic hardship. For example, several respondents spoke of wanting a new life and the opportunity to earn more in Beira. Other respondents (*n*=20) identified social reasons for migrating. While some reported migrating to attend school, most of these respondents cited either personal reasons for migrating or being asked to migrate by a family member already located in Beira. In the case of the former, respondents were reticent in revealing private affairs. In the case of the latter, respondents were either young children at the time of migration or women who joined their husbands. These respondents tended to speak of the migration decision as being made by others.

2.6 Discussion

Our results encourage a broader interpretation of the ways in which adverse weather and extreme events can be understood to influence migration, both directly and indirectly. We find little evidence of geographic or demographic clustering as different rural origin areas and ages at migration are distributed throughout our attribution categories. The strength of the weather's influence and the degree to which

respondents attribute migration to weather fall along a spectrum. Certain types of extreme weather events are associated with stronger degrees of attribution. The most notable example of this was among respondents who experienced cyclones in their origin area. However, more frequent types of extreme events (e.g., drought and flood) were not associated with any one attribution category. Drought in particular was reported across the attribution spectrum, suggesting that individual characteristics underpin differences in how people perceive these events. When respondents discuss the weather in relation to migration, we find that perspectives of and experiences with extreme weather are not homogenous.

In some cases, extreme weather triggers migration. This was not common and tended to result from catastrophic events. Respondents in the strong attribution group, our smallest group, tend to leave rural areas within a year of experiencing rapid-onset events (e.g., cyclones) characterized by threats to safety and devastating effects on livelihoods and assets. Our findings comport with those of Koubi et al. (2016) that more extreme events have greater direct effects on migration.

A more complex narrative emerges from respondents in the moderate and weak attribution groups, the majority of our sample. Similar to Black et al. (2001), Afifi (2011), and other environmental migration studies, we find that these respondents resist attributing migration to environmental factors, despite offering numerous accounts of negative experiences with extreme events and erratic rainfall. Among moderate attribution respondents, weather-related crop losses are a dominant cause of worsening economic conditions. Yet they emphasize a lack of alternatives to farming and the need to migrate from rural areas in search of employment. Weak attribution respondents explicitly de-emphasize the role of weather in relation to broader economic issues, maintaining that, although the weather causes widespread

suffering in rural areas, it was not a migration motivation. Taken together, it is apparent that what drives people to leave rural areas is not bad weather *per se*. Indeed, many say that they would have remained in the rural area if they could have found ways to construct economic livelihoods less vulnerable to weather extremes. They blame economic factors for making rural life impossible. For example, they portrayed the collapse of the rural economy as a failure of rural development rather than extreme weather.

Resistance to an environmental explanation for migration among our moderate and weak attribution groups may at first appear paradoxical, given the widely held view among respondents that adverse weather and poverty are intricately linked. However, migrant accounts are consistent with Davis' Marxist political economy perspective, which argues that rural out-migration is a manifestation of the structural barriers, embedded in international power imbalances and state neglect, impoverishing rural areas in the Global South. Rural Mozambican experiences with state-sponsored reforms and rural underinvestment clearly align with the conditions Davis (2017) describes. While the weather falls largely outside of human control from the perspective of our respondents, unemployment is discussed as a function of government priorities or lack of outside investment. Our respondents are more inclined to focus on what can be controlled (e.g., economic conditions and post-disaster responses) as opposed to what is beyond the scope of human control (e.g., the weather). By choosing to emphasize the lack of necessary economic conditions (which government officials and other elites could theoretically be held accountable for) rather than adverse weather, respondents offer an alternative vision of how governance could potentially empower rural homesteaders leading to more resilient livelihoods. From the viewpoint of our respondents, the people in power could

conceivably improve the employment prospects in rural areas, as well as disaster preparedness and response.

In interrogating environmental migrant narratives, our findings illustrate the importance of accounting for the multiple mechanisms through which weather contributes to impoverishment in rural areas. In addition to crop loss and subsequent income loss, floods damage infrastructure (e.g., roads and electrical grids), stymying livelihoods and the development of local economies more resilient to environmental change. Government coordination of resources and the mobilization of communities to bring about timely and effective disaster response has been fraught with challenges in Mozambique. The inability (or unwillingness) of government to provide and enable off-farm employment in rural areas further exacerbates the vulnerability of rural dwellers to the destructive forces of extreme weather. The multiple, converging pathways linking weather and economic conditions illustrate challenges with isolating the effect of extreme weather when discussing rural-to-urban migration.

When viewed in this light, it is understandable as to why people might reject the migration narrative that presents them as victims of the weather as opposed to casualties of failed rural development. Issues of state accountability help explain why people might reject the environmental migrant label while at the same time acknowledging the impoverishing effects of extreme weather. The environmental migration narrative may serve governments that fail to promote rural development or provide disaster assistance more than it serves those who find themselves compelled to relocate. Attributing migration to extreme weather offers too narrow an explanation for how people perceive themselves experiencing social and environmental change. Insisting on the economic causes of migration forces attention to the structural inequities that undermine rural economies in addition to environmental threats

occurring within the context of weak or predatory states.

We also find that migration may have little to do with environmental hardship in some cases, even for semi-subsistence agriculturalists that move away from areas characterized by extreme events. The largest category in our analysis consisted of people who did not attribute migration to any environmental reason, despite giving accounts of bad weather, especially erratic rainfall and drought. Further edifying the theme of primacy of economic drivers in migration motivations, we find that while respondents mentioned other migration drivers, such as a desire to follow family and seek education (social) or evade disease (demographic), these were rarely mentioned in isolation, and frequently in conjunction with the desire to secure employment. These findings are also consistent with Davis' (2017) assertion that a broad range of structural issues undermine rural markets and make them less attractive than urban areas. Although our respondents primarily offered examples of what they lacked in rural areas when discussing migration, our findings suggest that the lure of the city, and the economic prospects for attaining a better life there, even if unlikely to be realized, remain a powerful force driving rural-to-urban migration.

Ultimately, our results provide a cautionary note on the use of the environmental migrant label. Given the stark consequences of climate change facing vulnerable communities, it is important to call attention to those disadvantaged and apparently displaced by extreme events. However, our findings show that the use of that term runs the risk of whitewashing the degree to which governance and lack of rural development contributes to the hardships prompting migration. When analyzing the push factors associated with rural-to-urban migration, we need to balance the desire to highlight environmental injustice associated with the global forces of climate change against the recognition that localized issues of governance and development

share the blame.

2.7 Conclusions

Using examples from two rural-to-urban migrant communities located in Beira, Mozambique, we explore how experiences with extreme weather influence migration in contexts of economic hardship. In sum, we find that the people rarely attribute migration to weather, except in instances of catastrophic flooding and cyclones. Most respondents reject the term environmental migrant while at the same time acknowledging the impoverishing effects of extreme weather. Instead migrants mainly frame migration as an economic necessity. The results from our analysis are significant for understanding the importance of rural economic development, as well as disaster preparedness, to allow people to remain in origin areas.

Our study shares the strengths and limitations typical of case study research and, as such, the generalizability of our empirical findings is difficult to determine. However, our respondents confront many of the challenges facing rural-to-urban migrants in the Global South and originate from areas that typify distressed rural economies. From a theoretical perspective, our analysis suggests that the environmental migration narrative may serve to mask the role of governments and elites in perpetuating rural hardship. We find that people resist narrow environmental explanations in favor of broader accounts of economic hardship and collapsing rural economies underpinned by structural power imbalances and poor governance. Resistance to attributing migration to extreme weather may underscore an awareness that not all rural places are limited to farming-based livelihoods and, had their own origin received more state investment and support, people could have remained.

Chapter 3: Urban environmental vulnerability according to migrant status: Lessons from Beira, Mozambique[3]

3.1 Introduction

Despite the recognition that migration is a human right and critical strategy to preserve life and livelihood in response to environmental threats, a considerable amount of literature has found that migrants are just as likely to move into areas of environmental vulnerability as they are to move away (Black et al. 2011; Tompkins, Hurlston, Poortinga 2009). As climate change accelerates and threatens rural livelihoods across the developing world, the poor are migrating to urban areas where they attempt to gain a foothold in a broad and diverse set of economic opportunities (Anderson and Silva 2020). This means cities have immense potential to not only facilitate upward mobility and alleviate poverty but also enhance adaptive capacity and well-being in the face of environmental change.

Where urban planning is weak, however, cities struggle to absorb the influx of people, overwhelming infrastructure, public services and amenities (Adger et al. 2020). Devastating effects result for the urban poor and other marginalized groups who are likely to lack quality housing, healthcare, education, and other resources that reduce vulnerability to environmental threats (Davis 2007). One-third of the urban population in developing countries live in slum conditions (UN-Habitat 2016). There is an urgent need to better understand how, why, and for whom migration produces vulnerability to environmental hazards in urban areas (Jokisch et al. 2019; Meerow, Newell, and Stults 2016; Meerow and Newell 2019).

[3] Note that this chapter has been submitted to *Annals of the American Association of Geographers* and is under review.

The empirical evidence as to whether migrants experience differential vulnerability when compared to non-migrants is inconclusive. Many studies presume migrants in urban settings are more vulnerable to environmental threats than non-migrants, and few have examined how and under what conditions migration contributes to uneven burdens of environmental risk (Jokisch et al. 2019). Characteristics such as lacking awareness of environmental threats in destination areas, risky occupations, limited social networks, and language barriers are associated with vulnerability and typically attributed to migrants (Norman et al. 2012). But there is also evidence to suggest that migrants may be no worse-off, and in some cases may even fare better than non-migrants (Danzer et al. 2014). A lack of understanding of how and under what conditions migration contributes to uneven burdens of environmental risk undermines participatory approaches to adaptation and the resilience of urban areas.

The present study aims to address these gaps in understanding the environmental vulnerability of migrants by exploring their lived experiences of, attitudes toward, and responses to environmental threats. This paper employs a largely qualitative approach using data from a comparative case study of two low-income urban communities marked by high levels of environmental vulnerability. Semi-structured interviews (n=158) were conducted with both migrants (n=79) and non-migrants (n=79) to characterize how environmental vulnerability is understood by migrants. A quantitative analysis of survey data supplements interview data to better contextualize differences in environmental vulnerability between both groups.

The port city of Beira in central Mozambique presents as an appropriate case study to investigate the relationship between migration and environmental vulnerability. High exposure to storm-surge and sea-level rise and persistent poverty

despite impressive economic growth has characterized Beira in recent years (Shannon et al. 2018). Between 1997 and 2017, Beira's population grew by 25% to more than five hundred thousand (INE 2007, 2017). While no contemporary migration statistic exists for Beira, migration figured prominently in its history. Under the colonial Portuguese, major infrastructure projects (e.g., port, railway, oil pipeline) fueled the expansion of indigenous Mozambican neighborhoods (Sheldon 1999) and the increasing segregation of urban space: elite colonial Portuguese concentrated in the urban core or 'cement city'; an emerging industrial merchant class of primarily Asiatic people settled adjacent to the core; and finally indigenous Mozambicans were permitted to settle outside the city in areas termed the 'reed city' (Sidaway and Power 1995). After political independence from Portugal in 1975, an extended civil war prompted rural dwellers to relocate *en masse* to Beira. By the 1980s, conflict, white flight, and natural disasters increased the influx of rural populations from neighboring districts into Beira. After the Civil War, Beira's port and railway continued to attract migrants seeking employment (Shannon et al. 2020). In many ways, contemporary Beira replicates the city planning of the Portuguese, exacerbating spatially concentrated wealth, poverty, and environmental risk.

3.1.1 Environmental Vulnerability and Migration

Vulnerability is a central organizing concept in investigations of coupled human and natural systems (Polsky, Neff, and Yarnal 2007), encompassing exposure, sensitivity, and adaptive capacity (Wisner et al. 2004). As such, it reflects the material reality of biophysical processes and the outcome of social processes that mediate human-environment relations (Frick-Trzebitzkey, Baghel, and Bruns 2017).

While physical scientists tend to emphasize exposure, social scientists have demonstrated the importance of social factors in shaping how environmental

vulnerability is experienced. Some groups are more exposed relative to others, for example, migrants settling flood-prone areas. Similarly, some groups are more sensitive to environmental risks. For example, age (Jonkman et al. 2009), gender (Ajibade 2017), and racial groups (Gemenne 2010) experience pronounced sensitivity to flooding. Additionally, a reduced capacity to cope often characterizes the poor (Brouwer et al. 2007) and others who lack social or institutional support necessary to prepare for and respond to flood-related impacts (López-Marrero 2010). Disparities in social vulnerability explain why individuals within a community have diverse experiences of flood risk and severity of impacts (Frick-Trzebitzkey, Baghel, and Bruns 2017). Characterizing differential vulnerability and determining how, why, and the degree to which some groups are more vulnerable than others remains a central concern and priority in the vulnerability literature.

3.1.2 Migrants as a Vulnerable Group

There is a significant body of work that suggests migrants in urban settings are vulnerable to environmental threats. The literature often attributes vulnerability of migrant households to their narrow time frame of experience in a given place (Rufat et al. 2015). Continuous "history-in-place" cultivates valuable knowledge of environmental threats (Hardoy and Pandiella 2009), and lacking this experience influences the ability to perceive threats, for example, where floods are seasonal and highwater marks not posted (Tompkins, Hurlston, and Poortinga 2009). Migrants fleeing problems in rural areas often encounter a previously unknown combination of risks in urban areas (McNamara, Olson, and Rahman 2015; Adger et al. 2015).

Being able to successfully call on others for resources enhances adaptive capacity in the face of environmental risk. For migrants, establishing new relationships and building trust can be slow and complicated by language barriers.

Information about employment, housing, and how to navigate systems of political patronage offers protection against risk (Chu and Michael 2019; Boyd et al. 2014). For example, understanding who can facilitate access to resources can be cumbersome in cities but critical in securing safe and appropriate land for building and to access aid in the aftermath of a disaster. Migrants must contend with new surroundings, including the built environment, social institutions, and norms (Birkman et al. 2013; Cutter, Boruff, and Shirley 2003). In addition, discriminatory attitudes can relegate migrants to living in the most marginal of lands (Ward and Shackleton 2016; Braimoh and Onishi 2007). In more extreme cases, conflicts have emerged between migrants and their neighbors in receiving areas (Dodman, Archer, and Satterthwaite 2019). In noting the precarity of migrants in urban areas, scholars have called on governments to address urban vulnerability through policies targeting migrants specifically (Sutherland 2013).

In contrast, another body of work finds no significant differences in environmental vulnerability between migrants and non-migrants. Danzer et al. (2014) found that migrant households earned incomes on par with non-migrants. In terms of support networks, migrants rarely relocate to urban areas without someone who can facilitate a launch into urban living, such as where to find work or locate a safe and affordable home (Suckall, Fraser, and Forster 2017). It is common to find migrants living in neighborhoods where they share traits with neighbors, such as a common homeland, language, ethnic background, or religion, all of which can encourage relationships and resource-sharing and reduce vulnerability to environmental risk (Ayeb-Karlsson et al. 2016).

Several studies suggest migrants may be less vulnerable to environmental threats when compared with non-migrants. Danzer et al. (2014) finds that migrants

report higher subjective socioeconomic status than non-migrants. In terms of support networks, migrants often benefit from resource-sharing with rural households, building capacity through bridging rather than bonding social capital (Potts 2010). This ability to access resources across spatial contexts is beneficial given that environmental threats can cover entire urban centers, straining the availability of local resources in the immediate aftermath of disasters as well as in later recovery phases. Beguy, Bocquier, and Zulu (2010) find that migrants often visit their rural homeland and maintain strong connections. In anticipation of an extreme weather event or during a prolonged recovery, migrants have the option to relocate temporarily to rural areas out of harm's way.

Some scholars point out that using socially constructed labels runs the risk of oversimplifying experiences of vulnerability and ignores the heterogeneity of migrants. Newly arrived migrants differ from those who have lived in urban areas for several years, for example in healthcare practices (Cau 2016). Some migrants experience more violence if they relocate to areas outside of their traditional ethnic neighborhood (Linke et al. 2018). Gender discrimination results in female migrants being some of the most marginalized residents and most at risk to environmental impacts (Porio 2014). Finally, migrants relocating due to climate-related factors earn and save less, spend fewer years in school, and have less access to credit and fewer contacts when compared to migrants who relocated for other reasons (Adri and Simon 2017). These studies highlight that just as impacts from climate change are distributed differently across groups, so will some individual migrants be more impacted than others (Jokisch et al. 2019).

Consequently, the evidence regarding differences in vulnerability between migrants and non-migrants is inconclusive and gaps remain in understanding how

lived experience, perception, and social factors vary according to migrant status. Migrants relegated to living in the most marginal of lands, such as estuaries and wetlands, can inhibit the functioning of the built environment and ecosystem services impacting many (Ward and Shackleton 2016). Diverse neighborhood composition can impede community cohesion and collective organizing around mitigating impacts of environmental threats. These factors and others shape overall adaptive capacity and form much of the basis for research linking urban resilience and migration (Adger et al., 2020; Dodman, Archer, Satterthwaite 2019; Rain et al. 2011).

3.1.3 Place-based Vulnerability

In an increasingly mobile and urbanized world (UN DESA/PD 2014), place-based approaches may yield useful insights in understanding how biophysical, social, and institutional dimensions come together to affect differences in how urban environmental vulnerability is experienced by disparate groups, such as migrants and life-long urban residents. These approaches acknowledge that vulnerability is rooted in both social and biophysical contexts and is highly variable across time and space (Pelling 2003; Cutter, Boruff, and Shirley 2003; Polsky, Neff, and Yarnal 2007). While in recent years the focus has shifted to the related concept of resilience (Meerow, Newell, and Stults 2016), these approaches nonetheless emphasize beginning with an understanding of localized vulnerability (Cutter et al. 2008).

How social vulnerability intersects with hazards to produce differing experiences of environmental vulnerability is the subject of much research based in the Global North and developed country context. For example, studies of Hurricane Katrina highlight how minorities, renters, the elderly, the poor, and those unable or unwilling to evacuate were disproportionately impacted by flooding and experienced greater mortality than other groups (Gemenne 2010; Jonkman et al. 2009; Kamel

2012; Rufat et al. 2015). Studies of impacts due to Hurricane Katrina detail how group characteristics, quality of the built environment, and biophysical hazards interacted to produce vulnerability. For example, Fussell (2006) has shown that those without social networks located close enough to access, yet sufficiently distant from the threat of flooding, were the last to evacuate and were at greater risk, as were those lulled into a false sense of security by nearby levees which would ultimately prove fatal.

Comparatively less scholarship is based in the developing country context. One exception takes place in Lagos, Nigeria, where Ajibade and McBean (2014) investigate flood vulnerability in two slum communities. The authors find that the radical transformation of the physical landscape by elites in the name of sustainability is perceived by slum residents as a driver of flood vulnerability. The authors conclude that the alterations to the physical landscape exacerbated vulnerability, in part due to a lack of participatory adaptation planning and accountability.

Some scholars have criticized the practice of portraying slums as problems (Satterthwaite et al. 2018). Kovacic and Atia (2020) caution that to frame slums so singularly ignores the ways in which slums came to be, and how the manner in which they are governed is embedded in broader contexts within and beyond the state. Leck et al. (2018) and others point to the vital urban functions performed by informal settlements. For example, Celhay and Gil (2020) highlight the beneficial proximity to workplaces provided by slums, and the lower rates of crime reported by slum dwellers relative residents of government housing programs. For rural-to-urban migrants who are more likely to choose informal settlements as their migration destinations (Liu and Balk 2020), informal settlements can play a positive role in facilitating adaptive responses. Popular media such as Arrival City (Saunders 2011) conceptualizes

informal settlements as launching pads for migrants to reach more affluent neighborhoods, providing opportunity for social and economic mobility. Some scholars argue that because of these vital functions, informal settlements should be "encouraged, defended, and extended" (Obeng-Odoom 2013).

This paper explores the environmental vulnerability of migrants and non-migrants by comparing their lived experiences of, attitudes toward, and responses to environmental threats in the context of informal settlements. Integrating findings from across the vulnerability literature suggests biophysical factors, identity characteristics, and access to resources are linked through place. The remainder of the paper explores these intersections from the perspective of migrants and examines the influence of migrant status on the equality of environmental impact and adaptive capacity in communities characterized by economic and social marginalization.

*3.*2 *Research Context*

Migrants may be more vulnerable to environmental threats such as flood risk in Mozambique because most rural-urban migrants in Mozambique end up in informal settlements (Cau 2016), which are often characterized by slum conditions and located in flood zones or hillsides. In Beira, almost half of the population lives in precarious housing (for more on Beira, see Anderson and Silva 2020). The study takes place in two informal settlements of Beira city, situated within a mile of the coast and threatened by recurrent flooding, torrential rains, sea-level rise, and erosion. While these case study sites share many similarities (e.g., high poverty, common migrant destinations), their differences highlight the diverse range of urban contexts found in urbanizing and developing countries contributing to the generalizability of study findings.

3.2.1 Praia Nova Informal Settlement

Figure 3.1 The top image shows one of two main entrances into Praia Nova from its eastern boundary. The bottom image depicts the settlement interior and an example of housing and flooding that are commonplace in Praia Nova, contrasted against a high-rise in the background. Photo credit: Author.

Most households identified in the mapping exercise migrated to Praia Nova and originated in rural areas (79%) (10% identified as indigenous to Beira). Praia Nova has served as an important trade hub linking local fishermen to surrounding markets since colonial times. Despite its importance to the local economy, Praia Nova is often missing from colonial maps, suggesting settlement took place in and after the 1990s.

Often referred to as the Bairro dos Pescadores (Fisherman's Neighborhood), Praia Nova's commercial activity has diversified from the harvesting, processing, storage and transportation of fish into a range of income-generating activities, including alcohol production, trade in a number of perishable goods and household items, and services (e.g., personal grooming, phone repair). What was once fish camps and bungalows has transformed over time into a vibrant commercial neighborhood with a rich atmosphere of languages, cultures, and religions.

There is a long history of human transformation to the land in and around Beira that has contributed significantly to Praia Nova's environmental vulnerability. To establish and maintain access to Beira's critical seaport, more than 700,000 cubic meters of sediment were removed annually, the build-up of which created the beach upon which Praia Nova was settled (dos Muchangos 1989). Over the years, much of the vegetation that stabilized Praia Nova's sands was removed for construction. Colonial authorities responded by planting trees to protect against erosion, and coastal protection has continued to preoccupy city planners until today. Municipal plans to erect a seawall and plant mangroves and trees to combat coastal erosion have been reported by Mozambican media outlets, but at the time of data collection these plans had yet to be realized. Multiple attempts have been made by the municipal government to relocate residents, but these have been viewed as unsuccessful as families often return.

3.2.2 Munhava-Matope Informal Settlement

Figure 3.2 The top image shows a street view of Munhava-Matope along its southern boundary (houses are to the left of the road). The bottom image depicts the settlement interior and an example of housing and flooded footpaths that are commonplace in Munhava-Matope. Old tires are useful for marking and elevating footpaths. Photo credit: Author.

Approximately half of the households identified in the mapping exercise migrated to Munhava-Matope and originated in rural areas (48%) (45% identified as indigenous to Beira). Munhava-Matope is located far from the urban core in an industrial zone in stark contrast to the centrally located Praia Nova. Due to the construction of the nearby seaport and railway terminal in the 1900s, most residences were settled prior to Independence from the Portuguese and appear on maps as early as the 1960s.

The local economy of Munhava-Matope contrasts with the dynamism of Praia Nova. Just as in earlier times under the colonial regime, many residents work for formal wages as dockworkers and security guards, supplementing household incomes with sales of rice and pork cultivated in neighboring fields. Market stalls are uncommon, and the few income-generating activities observed beyond agriculture include mat weaving, alcohol production, metalworking, and repurposing grain sacks.

Munhava-Matope developed a negative reputation among outsiders over the years, often represented as a hotspot of criminality. Anecdotes of theft from cargo trucks in transit through the neighborhood were encountered on more than one occasion. The heavy policing presence, stigmatization of residents by potential employers, and the author's observation of reticence to enter the neighborhood on the part of research assistants during informal interviews with residents. Beyond Beira, the neighborhood is associated with the opposition to the main political party in power (FRELIMO).

Munhava-Matope is considered a seasonal wetland area, located on a low elevation floodplain ideal for rice cultivation. Acute flooding and the lack of drainage systems have long been documented as a severe challenge, resulting in almost constant temporary shelter-seeking by Munhava-Matope residents (dos Muchangos 1989). One resident in describing Munhava-Matope stated that "When it rains, this

neighborhood becomes very bad. Do you know why it's named Munhava-Matope [muddy Munhava]? It's true. You will have mud even inside your house." The municipal government acknowledges the risk of flooding to Munhava-Matope residents yet has responded with a city-wide rehabilitative project. At the time of data collection, a large new drainage canal was near construction completion yet lacking connections to the Munhava-Matope settlement.

3.3 Methods

3.3.1 Data Collection

A qualitative approach supplemented with survey data was chosen to investigate environmental vulnerability of residents living in Praia Nova and Munhava-Matope. A semi-structured interview and survey were conducted with migrant (n=79) and non-migrant (n=79) households. Data collection occurred March through August of 2017. Before commencing the study, approval was obtained from the University of Maryland College Park (UMCP) Institutional Review Board (IRB) [Approval #968383-5].

Participatory mapping was carried out to identify migrant and non-migrant households and provide the sampling frame from which candidate households were randomly selected to participate in the interview (the number of migrants living in Beira is currently unknown). To begin this process, the author and Mozambican research assistants first mapped footpaths and landmarks with the help of traditional neighborhood leaders. After explaining the study objectives and obtaining consent from respondents, assistants identified and mapped residences using GPS devices and graph paper. Each building was confirmed as a residence by the occupant. Next, assistants assigned a code to residences and recorded the birthplace, duration of

residency, gender, preferred language, and availability of household heads. Before moving to the next house, assistants solicited residents' interest in being interviewed at a future date.

Households were selected to participate in the interview if they met the following criteria: 1) respondents were at least 18 years of age; 2) migrant respondents originated in rural areas; 3) migrant respondents relocated to Beira after February 2000; 4) migrant respondents lived in Beira for a minimum of twelve months preceding the interview. February 2000 is the landfall date of Cyclone Eline, a 500-year flood event with which most Mozambicans are familiar. By referencing Cyclone Eline, assistants were able to quickly identify longer-term migrants, increasing the probability of locating permanent rural-to-urban migrants, as opposed to temporary migrants. Urban residency of at least one year increased the likelihood of migrant respondents having experienced Beira during both dry and rainy seasons. Of the 1289 and 1271 households mapped in Praia Nova and Munhava-Matope, respectively, 810 and 812 were identified as eligible households.

Every third household was solicited for an interview, and if a household declined to participate, research assistants substituted the nearest neighbor. A follow-up round of interviewing took place to increase representation of female household heads. A total of 158 individuals were interviewed (migrant=79, non-migrant=79). Of the 158 respondents, 74 resided in Praia Nova (migrant=38, non-migrant=36) and 84 in Munhava-Matope (migrant=41, non-migrant=43).

The purpose of the interview was to scope for factors related to environmental risk and gain a deeper understanding of respondents' lived experiences of environmental vulnerability. The three-part interview began with a survey followed by two sets of open-ended questions. The survey questionnaire of 32 questions

captured socioeconomic and demographic characteristics of the household. Following this, open-ended questions prompted respondents to reflect on their everyday experiences of living in informal settlements characterized by slum conditions and environmental risk. For example, respondents were asked the following: (1) what environmental threats have you experienced in your neighborhood, and (2) how do these threats make life more challenging for you and your family? These questions allowed the identification of factors associated with environmental risk from the perspective of respondents. The final set of open-ended questions asked respondents to describe notable changes in their immediate environment and physical surroundings, and how these changes, if any, influenced the impact of environmental threats identified by respondents.

3.3.2 Data Analysis

To assess quantitative differences between migrants and non-migrants, Mann-Whitney *U* significance tests were conducted in STATA. Testing for socioeconomic characteristics of migrants and non-migrants at the neighborhood-level enabled validation of relationships between key variables suggested by interview data. Transcriptions of semi-structured interview responses were analyzed using NVivo 12 qualitative software.

The qualitative analysis was first guided by themes and constructs relating to environmental vulnerability, such as perceptions and experiences related to environmental threats, coping strategies undertaken in response to such threats, as well as factors that exacerbate environmental risk, such as poverty and in the case of migrants, barriers to community integration. Descriptive coding techniques were applied to interview text. Line-by-line coding was used to give a basic structure to the arrangement of the data gathered (Corbin and Strauss 1990). The qualitative data

analysis was an iterative and inductive process, in which themes and findings from the data directed the development of hierarchically organized key categories and sub-categories. All 158 interview transcripts were coded using the same coding scheme. This technique was seen to be the most effective way of identifying similarities and differences among respondents' perceptions and lived experiences of environmental vulnerability.

3.4 Results

The section begins with results of significance tests that examine socioeconomic data for associations between well-being and migrant status, summarized in Table 3.1, followed by results from the content analysis that sifted for differences in experiences of environmental vulnerability by migrant status.

3.4.1 Socioeconomic Characteristics

Survey results revealed general challenges with well-being for most respondents and few statistically significant differences between migrants and non-migrants. However, three exceptions suggest greater economic precarity for migrants relative to non-migrants. Daily-earnings of migrants were on average 20% less when compared to non-migrants, migrants were more likely to rent as opposed to own their homes, and migrants were more likely to pay to commute to their place of work (often too far to walk). Additional indicators suggested low levels of well-being for migrants, however, these values were not statistically significant. They include migrants being less inclined to share resources with neighbors when compared to non-migrants and attaining fewer years of education. However, migrants reported better access to sanitation facilities and fewer instances of illness.

Table 3.1

Well-being and socioeconomic characteristics	Migrant (*n* =79)			Non-migrant (*n* =79)				Total (*n* =158)		
	Praia Nova (n=38)	Munhava-Matope (n=41)	Migrant Total (n=79)	Praia Nova (n=36)	Munhava-Matope (n=43)	Non-migrant Total (n=79)		Praia Nova (n=74)	Munhava-Matope (n=84)	Total (n=158)
Demographic										
Female (hh head) (%)	18	17	18	19	16	18		19	17	18
Age (hh head)	30.9	30.7	30.8	33.4	36.6	35.2		32.1	33.7	33.0
Years of Schooling (hh head)	7.1	7.0	7.0	7.0	8.3	7.7		7.6	7.0	7.3
Economic										
Formal Employment (%)	55	39	51	22	47	38		42	46	44
Daily Income per capita, USD PPP	2.64	2.33	2.48	3.71	2.49	3.05	*	3.16	2.41	* 2.76
Durable Housing (%)	53	73	63	61	56	58		57	64	61
Homeowner (%)	55	32	43	78	77	77	*	66	54	* 60
Commutes using public bus (%)	18	44	32	22	16	19	*	20	30	25
Health										
Access to drinking water (%)	95	88	91	94	88	91		95	88	91
Access to sanitation facilities (%)	95	81	87	89	81	85		92	81	* 86
No reported case of infant mortality (%) (*n* =154)	74	68	75	78	67	72		77	70	73
No reported illness within last 30 days (%)	45	34	39	39	28	33		42	31	36
Social Connectivity										
Participates in a religious community (%)	74	58	65	61	65	63		68	61	64
Speaks multiple languages (%)	37	49	43	58	54	56		47	51	49
Shares resources with neighbors (%)	34	32	33	31	56	44		32	44	39
Desires to remain in community (%)	13	34	23	6	14	10	*	8	24	* 16

Notes: *p < 0.1 Mann-Whitney *U* tests

Turning from migrant and non-migrant comparisons to neighborhood comparisons, Praia Nova and Munhava-Matope share many socioeconomic characteristics, yet there are several statistically significant differences. Munhava-Matope respondents reported 30% less in daily earnings relative to Praia Nova respondents and were less likely to own their own homes. Munhava-Matope residents reported less access to sanitation facilities. Other indicators of health between communities, while lacking statistical significance, show that few Munhava-Matope households reported regular access to drinking water, and many reported ill-health among household members.

Despite a greater number of Munhava-Matope residents reporting illness and less income, these residents were three times more likely than Praia Nova residents to express a desire to remain in Munhava-Matope, as opposed to migrating. This suggests a sense of belonging among Munhava-Matope residents in contrast to the many who prefer to migrate from Praia Nova.

3.4.2 Qualitative Assessment of Vulnerability

Results of the content analysis reveal nine themes central to respondents' understanding of how environmental vulnerability influences their lives and well-being, and the many ways in which socioeconomic factors - often obscured to slum outsiders - intersect with environmental threats to exacerbate the severity of impacts. The first four themes compare narratives of environmental vulnerability between migrants and non-migrants. The final five highlight neighborhood-level perspectives regarding the role of locational characteristics in exacerbating flood vulnerability.

3.4.3 Flooding as a Challenge of Slum Life

Content analysis revealed that migrants and non-migrants perceived the threat of flooding as a pervasive challenge affecting well-being in profound ways. Identified as the principal challenge of slum life, flooding violated a fundamental sense of safety and security on an increasingly frequent basis from the perspective of both migrants and non-migrants:

> *When it rains, it floods the whole area, so whether you are inside the house or outside, it's everywhere. It's the same even without rain. Waters circulating here always enter houses. Sometimes we have nowhere to sleep because the inside of the house is flooded with water. (Delfina, Migrant, Munhava-Matope, 78, Female)*

And,

> *The floods cause suffering, and consequently people have turned into nomads, changing residences, and moving from one area to another. The floodwaters invade our homes. (Rosario, Non-migrant, Praia Nova, 60, Male)*

What was once episodic and discrete has over time evolved into the growing constancy of flooding. Migrants and non-migrants alike described an increasingly 'nomadic' existence, seeking shelter and places to sleep in nearby market stalls, schools, and between doorways of warehouses. Families who chose to remain in place during flooding attempted to carry on with their former lives, for example, arranging plastic jugs

and stacking concrete blocks for resting places and surfaces to cook meals. Minor inconveniences were transformed into burdens as the "invasion" of water disrupted mundane but essential aspects of life, like sleeping, going to the bathroom, bathing, and cooking. Flooded conditions were known to persist over several days if not weeks and carry serious implications for health and safety. Health and safety are essential for any life, but especially one aspiring to overcome poverty, inadequate sanitation, pollution, crime, and limited employment opportunities typically associated with slums.

3.4.4 Economic Impacts of Flooding

Although respondents did not hesitate to cite economic benefits of living in their neighborhoods (e.g., proximity to place of work, affordable housing), central to the narrative of both migrants and non-migrants was the impoverishing effect of flooding:

> *All this water affects my work. It is difficult to find someone at home (to solicit hired work) ... You can walk all day, but you will not meet anyone. This area here always floods with water. (Jose, Migrant, Munhava-Matope, 22, Male)*

And,

> *My entire fish camp was destroyed by flooding. Everything inside no longer exists. We all lost something, but most of all, we lost fishing nets and canoes... So, at this moment I am not working. (Alberto, Non-migrant, Praia Nova, 42, Male)*

These quotes illustrate how migrants and non-migrants similarly viewed flood risk as a driver of economic vulnerability. Despite different occupations, both described livelihoods threatened by flooding and reduced capacity for economic recovery. In the migrant case, flooding prompted would-be clients to evacuate the neighborhood altogether, and in a context where available work is ambulatory (e.g., carrying loads, road-side selling, etc.), distance to customers and the manoeuvrability of terrain impeded his ability to earn a living. In the non-migrant case, a storm surge destroyed his fishnet and canoe. The fisherman's experience of losing an important productive asset echoes many who lost their means of earning a living.

Irrespective of whether a respondent was a migrant or non-migrant, flooding influenced the capacity for economic recovery and the ability to accumulate assets. Respondents identified valuables lost or damaged due to repeated flooding, including furniture, cookware and basins, shoes and clothing, electronics, and school materials. This was often due to poor quality housing collapsing in on its occupants, an experience shared by both migrants and non-migrants, as was food spoilage and small livestock injury. Losing important documents, such as identification cards, health records, and school transcripts, was cited as a significant barrier to moving out of poverty.

3.4.5 Homeownership

Although non-migrants were more likely to own their own homes, migrants, and non-migrants both discussed homeownership in qualitatively similar ways. For example, migrants and non-migrants related homeownership to flood vulnerability by implying owning one's home encouraged investment in flood mitigation:

> *Here, water always floods our homes. I search for trash and sand to raise the floor inside of my home, so I can have a (dry) place to rest because I am only renting this house. There is no certainty of how long I will end up living here. (Marcia, Migrant, Praia Nova, 35, Female)*

And,

> *I have never had problems with flooding in my house. (Water) doesn't enter here or inside because I built a high foundation. I knew (to do so) because I was born here, and so I knew how high the water can be when it floods. So, for me, I haven't given up yet. (Marcelo, Non-migrant, Munhava-Matope, 39, Male)*

In addition to general anxiety regarding eviction, migrants emphasized that as tenants they felt discouraged to invest in cement flooring, raised entryways, and elevated embankments. Conflicts between landlords and tenants stemmed from the question of who should cover the costs of cement and other flood-resistant materials to improve housing. Both migrants and non-migrants described engaging in illegal sandmining of public beaches and along roads, and those unwilling to risk harassment by authorities described competing with others for discarded trash that provided poor protection against flooding.

Non-migrants, however, claimed several advantages over migrants. Their greater familiarity with the neighborhoods, such as knowing the location of flood-prone areas and having a sense for historical high-water levels, translated into knowing where not to

build and at what height to elevate foundations.

3.4.6 Environmental Vulnerability

Findings between migrants and non-migrants suggest comparable levels of flood vulnerability. The similarity between the two groups is even more striking when viewing general environmental vulnerability at the neighborhood-level. There was a high level of agreement between migrants and non-migrants regarding the perception that flooding was a growing threat, and that flooding was related to changes in rainfall:

> *This year things changed, but they haven't changed for the better. It has become worse because this year it rained with a vengeance. The houses were flooded, and the sea is eroding the beach. (The water) always came toward us, but not as far as it reaches now. (Olga, Migrant, Praia Nova, 25, Female)*

And,

> *In the past, it rained normally and only in recent years has the manner of the rain changed. In recent years, it rained a lot, incessantly. It rained! The rain doesn't stop for an entire month! As we are seeing now, it is worsening. It's not like it was before. And the sea has changed. Every day the sea-level is coming closer and closer. (Santos, Non-migrant, Munhava-Matope, 67, Male)*

Migrants and non-migrants attributed flooding to increasingly extreme and unpredictable weather. They framed noteworthy weather events of the last five years (e.g., a drought in

2016 was referenced frequently) within general discussion of how the weather had become more problematic. And yet, while respondents similarly attribute flooding to rain, temporal differences formed the basis for two distinct narratives. In the first narrative, flooding was portrayed as more immediate, offering little time to prepare, and was frequently used to describe Praia Nova. In the second, flooding was a perpetual condition rather than a series of discrete events and was most closely associated with Munhava-Matope.

Findings suggest that who ascribed to which narrative was linked to where the respondent lived, more so than migrant status. The thick clay of Munhava-Matope was described as preventing water absorption, in contrast to the sandy grains of Praia Nova. In the absence of drainage facilities, an unobstructed expanse of land needed to be maintained for rainwater to drain from the settlement and out to the nearby Pungwe river.

Praia Nova residents describe flooding that coincides with diurnal tides and storm surges. They stressed the difficulty of estimating the reach of high tides (and subsequent flooding), yet consistently reported that the highest tides overlapped with the onset of cyclone season. In contrast, flooding was described by Munhava-Matope residents as a persistent waterlogged condition occurring exclusively because of heavy precipitation and trapped rainwater. These diverging narratives can be traced to locational characteristics of the neighborhoods by examining the following: (1) immediate impacts of flooding, (2) attribution of blame, (3) structural solutions, (4) the role of activism, and (5) future threats.

3.4.6.1 Experience with effects of flooding: Costs to Health versus Mobility

Respondents emphasized day-to-day inconveniences of flooding, but why flooding was

problematic varied by neighborhood. Residents of Praia Nova emphasized the health consequences of flooding, while residents of Munhava-Matope emphasized constrained mobility:

> *In 2014 there was no mud here. Not anything. It was sand. Now, as the sea is coming closer, it's becoming mud… It causes illnesses like malaria because when the sea floods into the neighborhood, it brings many illnesses. Not just children but also adults can be attacked by that illness from the sea. (Castigo, Migrant, Praia Nova, 28, Male)*

And,

> *All this water is dirty and mixes with trash and other filth, causing filariasis. It gets in between your toes like this (pointing). When flooding combines with the trash and filth, there are germs that cause (a vulnerable situation). (Paulina, Non-migrant, Praia Nova, 27, Female)*

Migrants and non-migrants living in Praia Nova most directly linked water-logged soil with health. The link to disease as explained by respondents was due to open defecation on the beach in an absence of latrines. Rising tides mixed human waste with 'trash and filth' resulting in illness. Both migrants and non-migrants cited the need for neighborhood organizing to improve sanitation practices.

In contrast, Munhava-Matope residents emphasized how flooding diminished the maneuverability of terrain:

> *(Mud) is a problem here in Munhava-Matope. When it rains, it floods badly.*

> *All this mud is hard to walk through. The truth is that it is bad here.*
>
> *(Centavo, Migrant, Munhava-Matope, 37, Male)*

And,

> *More than anything, there is no way for cars to enter. For example, I have a vehicle, but I have no way to bring (my wife) home. It's these kinds of things. When it floods here with all the water and mud, everything is bad. Ultimately, so much of living here takes strength of mind in the absence of resources.*
>
> *(Marcelo, Non-migrant, Munhava-Matope, 39, Male)*

In Munhava-Matope, water-logged soil impaired mobility. Indeed, *matope* (mud) was a defining feature of the neighborhood and forms part of the settlement's very name. Our respondents here related their frustration at the growing constancy of flooding and muddy conditions to the idea that people should be able to move about with dignity rather than covered in mud. Multiple respondents expressed anxiety about arriving to work either late or dirty. Respondents coped by carrying an extra pair of shoes but often expressed resentment at the lack of road maintenance and neighborhood planning present in other areas of the city.

3.4.6.2 Attributing Blame for Environmental Vulnerability

Neighborhood-level differences emerged when respondents were asked why flooding occurred. Praia Nova respondents viewed flood defense as a common public good and emphasized ways in which the government could intervene but chose not to:

> *The only way to reduce suffering is to take us from here. Because if we stay here, water will always come, and we will suffer. The only way is for someone to come take us from here and relocate us to an area where there is no flooding. (Marcia, Migrant, Praia Nova, 35, Female)*

And,

> *Most people who are accustomed to living here in Praia Nova, I think they have two residences, two or three. Opportunists. They have already been told a long time ago. Some were already given money to leave here and live in another place. But after some time, they return because their house is still here. It's their house. (The government) didn't destroy it or anything, and so over and over (families) return here. (Lucas, Non-migrant, Praia Nova, 27, Male)*

Many Praia Nova residents desired large-scale government response in the form of assisted resettlement from Praia Nova to elsewhere in Beira. Others stated that simply posting public warnings, indicating highwater marks, and destroying condemned homes would have been effective deterrents against future construction in high flood risk areas. In contrast, residents of Munhava-Matope directly attributed flooding to a neighboring coal storage facility owned by Jindal, Inc.:

> *My house collapsed this year because of flooding. Before it didn't flood like this. It's because of Jindal's new railway. There is no way for the water to drain. Now flooding is normal. (Francisco, Migrant, Munhava-Matope, 34,*

Male)

And,

> *We suffered flooding in 1973, and we also experienced floods in 2003. Now, there hasn't been as much rain, but when it rains the water does not drain easily…That mineral coal company (Jindal) built a railroad and didn't leave open a drainage ditch to allow the water to drain. And because the water has nowhere to drain, we've become muddy. (Meque, Non-migrant, Munhava-Matope, 58, Male)*

Not only did migrants and non-migrants blame flooding on Jindal, but their responses also converged in terms of where and when problems with Jindal started. According to respondents, Jindal constructed a railway to the northeast of Munhava-Matope in 2015, on a location historically used by respondents for rice cultivation. Prior to the construction of the railway, rainwaters drained out to the Pungwe River. Once Jindal arrived, waterlogged soil and flooded homes became commonplace.

3.4.6.3 Solutions: Seawalls versus Drainage Ditches

Respondents of both neighborhoods envisioned engineering solutions to flood risk. Many Praia Nova residents identified seawalls as a potential solution due to the settlement's beach location:

> *Construct a wall to prevent the sea from entering… Over there, where there is no wall, (Praia Nova) is being consumed. (The sea) will invade the entire*

city of Beira... There is a place where you could put a wall, space where the sea enters. Building a wall there could block the sea from entering. (Castigo, Migrant, Praia Nova, 28, Male)

And,

They could build a wall in order for this neighborhood to continue. They could build a wall that defends against the sea. Where (the sea) is headed, ultimately it will end up invading everyone. (Tio, Non-migrant, Praia Nova, 27, Male)

Respondents often referenced memories of an NGO that began construction of a seawall, however, funding ran out before the project was completed. The partial wall - submerged by the sea - was hardly visible from the beach, yet well-remembered by Praia Nova residents and frequently introduced in discussions of ways to mitigate flood risk.
In contrast to a seawall, migrants and non-migrants of Munhava-Matope sought the expansion and maintenance of the sanitation system:

When it rains, the water stagnates for a long time, and we cook on top of cement blocks and the children sleep on tables… If I was the neighborhood leader, I would arrange resources to mitigate the suffering that the flooding causes here. I would open drainage ditches to allow the water to drain. (Felipe, Migrant, Munhava-Matope, 46, Male)

And,

> *Open more drainage ditches for the water to drain. Drainage ditches, and latrines and bathrooms so people aren't forced to defecate on the railroad tracks. (Chico, Non-migrant, Munhava-Matope, 26, Male)*

Munhava-Matope residents frequently prefaced their discussion of solutions with "if I was the boss" or "if I had power." They ascribed worsening flooding and quality of living to the construction of Jindal's railway and discussions of ways to mitigate flooding often turned from building a tunnel under the railway to broader needs of public investment in drainage systems and sanitation infrastructure.

3.4.6.4 Climate Change versus Capitalism

Residents of both Praia Nova and Munhava-Matope anticipated that their neighborhoods would be displaced, and homes lost, but for different reasons. Praia Nova residents perceived sea-level rise to be the principal threat:

> *(A)t any moment (the seawater) could destroy the city. The city of Beira is being consumed without a wall, without protection. It's going to impact the entire city of Beira, it's going to. (Castigo, Migrant, Praia Nova, 28, Male)*

And,

> *The sea used to be a good distance away, probably more than 100 meters. But now, the sea has more momentum and the neighborhood will be gone from here. I believe within 10 years this neighborhood will no longer exist. (Abel, Non-migrant, Munhava-Matope, 27, Male)*

Tropical cyclones, storm surges, torrential rains, and sea-level rise were the principal threats mentioned by Praia Nova respondents when prompted to reflect on future threats to their neighborhood. Residents of Munhava-Matope perceived encroaching industry and the failure of the government to intervene on their behalf as contributing to flooding:

> *We have known for a while that the government will come here and tell us to leave. Part of this place will be removed because this area belongs to C.F.M. (Railways of Mozambique). And so, this is already a government demand. But in the meantime, I will remain living here. I would live here forever. (Francisco, Migrant, Munhava-Matope, 34, Male)*

And,

> *Before (2005), no one could have electricity here. Why exactly could no one have (electricity)? Because of the municipality… They said that in the future, this neighborhood cannot exist because it's an industrial zone. At any moment, the residents could be removed from here. It's because of this that they do not improve (living) conditions. (Agnaldo, Non-migrant, Munhava-Matope, 33, Male)*

Blocked by Jindal, rain-induced flooding transformed the physical conditions of Munhava-Matope. When asked what could be done to alleviate flood risk, Munhava-Matope residents expressed a desire for the municipal government to assume responsibility for the well-being of residents and to bear the costs of flood mitigation and sanitation infrastructure. The most emphatic respondents argued for what they saw as just

treatment by the municipality, claiming that the municipality invested in richer areas of Beira but not in Munhava-Matope.

3.4.6.5 Community Activism: Diverging Responses to Vulnerability

Residents of both neighborhoods claimed the government could and should act to reduce flood vulnerability. But respondents' willingness to come together and advocate for the preservation of their homes and neighborhood contrasted between communities. When asked what could be done to prevent flooding, Praia Nova respondents tended to emphasize external factors beyond their control:

> *I am not doing anything. I am only waiting for God, who knows? If the sea continues to invade us, I will find another place. This is my only option. (The sea) is still coming closer. It's coming closer. (Gentil, Migrant, Praia Nova, 42, Male)*

And,

> *Elevate the land... There is no other solution. What more can you do? The water always invades your house. This is just for the short-term, you know? Here, defending against the force of the sea when it comes – It's really destructive. There is no long term. Ultimately, the only thing that could exist here is an abandoned neighborhood. (Antonio, Non-migrant, Praia Nova, 38, Male)*

In focusing on external factors, Praia Nova portrayed flood-induced displacement as

inevitable. Without divine or government intervention, nothing could be done to reduce flooding. They represented the magnitude and nature of flooding with militaristic terms, for example, ‘invasion’ by, the ‘destructive’ power of, and ‘defending against’ the sea. They often introduced abandonment of the neighborhood as the only way to effectively eliminate flood risk.

In Munhava-Matope, respondents emphasized a desire for neighborhood-level responses and organizing:

> *Come into the neighborhood, and meet with the people to organize trash disposal, and also a space to build bathrooms and toilets, because that is what is most needed here in the neighborhood. When it floods with water, we are in a bad way. (Lidia, Migrant, Munhava-Matope, 28, Female)*

And,

> *Now, it floods, no one comes here, no one says anything, they maintain it like this! Now, we are telling these people who approach us that in the future, we want management committees as a starting point. From my perspective, create a management committee to alleviate this situation because when we have gone to speak, no one has resolved it. (Agnaldo, Non-migrant, Munhava-Matope, 33, Male)*

Residents of Munhava-Matope expressed a more pro-activist stance throughout interviews, which was largely absent in accounts of Praia Nova residents. They discussed the actions they were taking to bring about change. Several respondents recounted

meetings in the past between residents, community elders, and municipal leaders. Residents protested the municipality to find a solution to Jindal's negligence in building a railway that blocked the drainage of rainwater and exacerbated flooding. Whether or not these efforts will achieve success remains to be seen, yet they speak to a spirit of activism and the determination of Munhava-Matope residents to be heard.

3.5 Discussion

It was hypothesized that migrants would experience more environmental vulnerability than non-migrants. Migrants were expected to have a reduced ability to cope relative to non-migrants. The content analysis, however, finds limited evidence of disparities in adaptive capacity, suggesting that migrants and non-migrants experience environmental vulnerability similarly. Evidence demonstrates that migrants were just as likely as non-migrants to emphasize flooding over chronic stressors faced by slum dwellers, such as poverty. Indicators of well-being suggests migrants are no worse off than non-migrants. Rather, content analysis highlights the influential role of the built environment in shaping the understanding of and responses to environmental threats. Neighborhood-level dynamics emerged as a central difference between respondents, as opposed to migrant status.

Two insights emerged from these findings. First, a high level of agreement exists between migrants and non-migrants in terms of how they understand their own vulnerability. There is a sense of shared concern among neighbors, regardless of migrant status. Second, while a similar understanding of vulnerability may not be sufficient to drive collective action, it does suggest the presence of necessary conditions for grassroots activism towards flood mitigation and potentially adaptation. Poor communities (and

migrants) may be effectively mobilized to tackle the day-to-day problems associated with environmental vulnerability without targeting migrants specifically.

3.5.1 Areas of Neighborhood Unity

Differences between migrants and non-migrants (e.g., homeownership) were eclipsed by concerns of the neighborhood as a whole. The pervasiveness of flood effects (i.e., mud, standing water) was so that the overwhelming majority of residents were impacted. Issues echoed amongst neighbors may have obscured associations between migrant status and flood vulnerability. Most respondents identified flooding as a profound disruption but in ways specific to the neighborhood in which they lived.

At the neighborhood-level, migrant and non-migrant perspectives aligned as they described immediate effects of flooding, and how effects linked to biophysical and social aspects of vulnerability. How flood effects manifested as challenges depended on the built environment and physical terrain. Praia Nova residents emphasized standing water as a threat to health, while Munhava-Matope residents emphasized water-logged soil and restricted mobility. The great difficulty in maneuvering through the neighborhood was a constant source of frustration, caused by Jindal's alteration of the landscape.

Consensus demonstrated at the neighborhood-level extended to who was viewed as responsible for flooding. Munhava-Matope residents demonstrated a deep-seated belief that Jindal violated social norms by building a railway that ultimately harmed residents. In Praia Nova, flooding was attributed to the government, not as a result of action but rather inaction: the failure to extend an existing seawall beyond the municipal offices to also protect Praia Nova.

At the neighborhood-level, migrants and non-migrants agreed that flood migration

could be achieve through engineering. Praia Nova respondents envisioned a protective seawall, whereas Munhava-Matope, characterized by marsh, could be made less flood-prone through drainage and sanitation from the perspective of residents.

Without assistance, respondents predicted large-scale community displacement. Praia Nova residents, near the sea, predicted the existential threat to be climate change, while Capitalism in the form of encroaching industry would make life in Munhava-Matope intolerable.

The built environment, however, does not sufficiently explain diverging perspectives towards community activism. The author can only speculate as to what accounts for the differing perspectives towards collective activism observed in the study neighborhoods. Neighborhood organizing may be influenced by community cohesion. Large proportion of migrants can contribute to anonymity and a less open and engaging environment (Danzer et al. 2014). The numerous non-migrants of Munhava-Matope arguably provide stability and continuity, facilitating cohesion and collective efforts. Additionally, more residents preferred to remain in Munhava-Matope, suggesting a greater degree of community cohesion when compared to Praia Nova.

Munhava-Matope may benefit from greater familiarity and a sense of obligation amongst neighbors when compared to Praia Nova due to its establishment at an earlier date. Residents of an older neighborhood, accounting for the cooperation and efforts at organizing observed in Munhava-Matope and absent in Praia Nova. Further, it is likely the influence of the memory of past historical political differences play a role in shaping attitudes to collectivism in an older neighborhood. Munhava is known beyond Beira for political protesting. In contrast, Praia Nova has been the recipient of aid and the focus of

international donors in partnership with the municipality. This could explain why residents attributed the flooding to the municipality. It is also possible aid had the unintended consequence of reducing the need to depend on neighbors for help, minimizing incentive for residents to act collectively.

The unintended effects of aid notwithstanding, whether a shared sense of concern, unity, and cohesion are enough to inspire collective action remains to be seen. In Munhava-Matope, efforts to organize and willingness to critique the government, combined with more residents expressing desire to remain suggests collective action may be more likely to take place in Munhava-Matope than in Praia Nova. Ideally, resentment could be harnessed to affect a change towards more open and transparent engagement with the municipality, dismantling the status quo of clientelist relations that characterize many cities of the Global South (Mitlin 2008).

3.6 Conclusion

Two years after data collection for this study took place, city-wide catastrophic flooding occurred. Praia Nova's vulnerability played out when storm surge and flooding caused by Cyclone Idai destroyed 90% of the city. In Munhava-Matope, flooding from Idai destroyed roads, severely impacting mobility. Both neighborhoods were extensively damaged and many respondents in this study were displaced due to subsequent flooding. In addition to accurately predicting *what* would happen, respondents predicted *when*. The sense of urgency communicated through common refrains such as "it's coming for us" and "it wasn't like this before" is telling. Residents' intuitive sense for the future, which could only be gained through the day-to-day experiences of living in these communities, was more self-reflection rather than uncanny weather forecasting. Specifically,

respondents recognized that they lacked the coping capacity to withstand the next disaster.

Results highlight that in trying to better understand how the poor manage risk, outsiders such as academics and development practitioners can gain much by simply asking. This research reinforces the growing recognition that knowledge and ways of knowing are not limited to academic circles or Western concepts of knowledge. Exclusive approaches to research and knowledge production can distract from issues that are central to those impacted. A large body of research finds that government-backed projects are often conceived and implemented without taking into account the views of the poor and that the poor are also more likely to face the negative consequences of poorly planned resilience and adaptation strategies (Henrique and Tschakert 2019). This means that many projects fail to benefit those who are most directly impacted and who have the most to gain from successful project completion. Recognizing the contribution to research by the poor is a necessary first step towards collaborative research and eventually more transparent, participatory governance. Taken together, participation by the poor contributes a unique and hard-to-access perspective grounded in active engagement with the day-to-day practicalities of service provision and urban governance more broadly. Participatory approaches that include the poor could result in solutions that are more cost-effective and potentially lead to more resilient outcomes.

Importantly, this study shows that migrants are not defined by a unique experience of environmental vulnerability. Migrant status may have little effect on the distribution of impacts from environmental hazards or the distribution of resources that facilitate adaptive capacity. Findings question the *a priori* assumption of migrants as a

vulnerable group that is often implicit in studies of urban environmental vulnerability. Rather, place characteristics such as the quality of the built environment and proximity to threats mediate access to resources as well as the sensitivity of certain groups (e.g., disability, infirmity, age). This paper concludes that place is the most significant factor in shaping risk and that studies of environmental vulnerability should begin with a clear understanding of the study area, informed by those who are at risk.

For research on slums more broadly, the implications are twofold: 1) know the local issues affecting communities, and 2) incorporate local issues to bring about community mobilization. Future research should be directed towards how to transform shared concerns related to environmental vulnerability into knowledge co-production and collective activism. In addition, respondents' intuition regarding their own coping capacity should be included in multidimensional indicators of well-being. The accuracy with which residents were able to predict future threats validates the voices of the poor who are often unheard or worse, ignored (see Chambers 1983).

Chapter 4: Decolonizing research methodologies: Reflections from fieldwork in two informal settlements of Beira, Mozambique

4.1 Introduction

Research often reinforces existing power structures in a way that privileges a narrow perspective of what ideas are important and which findings matter (Snow et al. 2016). A decolonizing approach to research then is not only cognizant of power asymmetries in the research design, but also proactively works to incorporate a plurality of views (Johnson-Jennings et al. 2019). Hidden and hard-to-reach populations are challenging to access and as a consequence their views are often misrepresented in or excluded from research. Populations can be difficult to access for many reasons, including transience, isolation, marginalization and incarceration, that often--but not always--suggest an inherent vulnerability of the social groupings that fall under this category (Lopez-i-Gelats et al. 2016, Tisdale 2008). For policymakers, accessing these populations is imperative to addressing challenging societal problems that stem from deprivation and social stigmatization faced by these groups.

Whether conducting ethnography or surveys, conventional approaches to accessing hidden populations typically involve an intermediary or research assistant who claims membership in the hidden population (Vershinina and Rodionova 2011). Sidestepping the issue of how membership is determined, the intermediary initiates a subsequent series of referrals (e.g., chain-referral or snowball) resulting in a sample of respondents selected ultimately on the basis of convenience to the researcher. This implies those individuals within the population who are proximal to the researcher are

more likely to be selected for study participation. Because research has traditionally centered on male, white, and Western notions of knowledge, research conducted by outsiders in developing country contexts can be problematic and even potentially harmful (Silva 2020, Tuck and Yang 2012, Smith 2012). While such methods of accessing hidden populations has enabled greater understanding individuals and groups facing extreme marginalization and historical exclusion (Atkinson and Flint 2001, Vershinina and Rodionova 2011), studies that use convenience methods often omit any discussion of asymmetries in power and privilege between the researcher and intermediaries or research assistants, the conditions under which the initial core of respondents were selected, and how steps were taken to enhance inclusivity of the final sample of respondents. It is surprising to see little explicit discussion and practical guidance in the scholarship on decolonizing research practices that specifically address how to access hidden populations from a decolonizing perspective.

The engagement of indigenous persons in research and data collection presents an opportunity to balance the influence of outsider biases by incorporating a plurality of views, which would more accurately reflect reality. As insiders, indigenous assistants take up a range of research responsibilities: (1) advise on site selection, access and security protocols of research design (Jenkins 2018, Deane and Stevano 2016); (2) leverage social capital to build trust and rapport with respondents (Middleton and Cons 2014, Mwambari 2019); (3) maneuver delicate topics and political and cultural contexts (Gupta 2014, Sukarieh and Tannock 2019); (4) manage practical and logistical challenges of fieldwork (Hoffman and Tarawalley 2014, Deane and Stevano 2016), (5) provide support for physical and emotional well-being (Jenkins 2018, Fertaly and Fluri 2019);

and (6) frame the cultural and historical context in which data are interpreted and analyzed (Gupta 2014, Mwambari 2019). Despite this, the small but growing literature on the role of indigenous assistants highlights a general lack of acknowledgment and even willful concealment of their contributions to research (Gupta 2014, Jenkins 2018, Fertaly and Fluri 2019, Sukarieh and Tannock 2019). Moreover, several scholars note the need for more practical guidance on assembling and collaborating with assistants in the field, a limitation of the literature that further obscures assistants' engagement in research (Deane and Stevano 2016, Radcliffe 2017).

These shortcomings in the literature are exacerbated by a historical trend described by Gupta (2014) in which the craft tradition of Western knowledge production has evolved into modern science characterized by an increasingly industrial model of production. Apprenticeships have been gradually replaced by commodified interactions bound by a hierarchy of relationships based on wage labor (Deane and Stevano 2016), with each level of the descent experiencing more exploitation than the last (Sukarieh and Tannock 2019). Sukarieh and Tannock (2019) describe a bifurcation of the academic workforce into the few who occupy a secure core and contract workers in the periphery, resulting in the erosion of social obligations and trust within researcher-research assistant relationships. Reports of unethical, dishonest, and exploitative behavior amongst principal investigators and other researchers has become more commonplace in the literature (Sukarieh and Tannock 2019).

While conceived as a response to Robert Chambers' call for research that is representative of the poor (Chambers 1995, 1983), I situate this research within the growing literature on decolonizing research methodologies. I argue that researchers

working in developing country contexts would do well to examine the quality of researcher-research assistant interactions as an important first step in producing transparent and inclusive research through the lens of decolonizing scholarship. The scholarship on decolonizing research practices emphasizes three key principles to guide collaborative and inclusive researcher-researched interactions, which I find are also applicable to researcher-research assistant relationships: (1) research should be centered on the needs of indigenous peoples (Smith 2012, Al-Hardan 2014), (2) there should be tangible, meaningful benefits to those involved in the research (Tuck and Yang 2012), and (3) research partnerships with indigenous peoples should empower indigenous researchers by building on what they already know (Snow et al. 2016). In reflecting on Chambers' goal for rural development studies, that is to promote approaches to data collection that allow all community members an equal probability of being heard and enable indigenous researchers "to use and build on their own skills, knowledge, and power" (Chambers 1983, p. 74), I find his goal aligns well with themes central to decolonization scholarship more broadly.

In this perspective essay, I share insights and practical guidance for advancing knowledge in partnership with indigenous research assistants. I focus on team building in multicultural settings and enhancing the rigor of data collection from hidden populations. I frame a discussion of the many ways in which indigenous research team members enabled and contributed to data collection on residents of informal settlements in Beira, Mozambique – both rural-to-urban migrants and the native population. I contrast my expectations conducting research in a culture that is not my own with what I actually encountered once in the field. Insights came about from a specific research context: a

minimal research budget common to much dissertation research; data collection distinct to social science survey methods conducted by a team; a multilingual and multicultural setting in which community participation was necessary. My own identity as an African American woman researcher cast me as a conspicuous outsider in Mozambique. Community stakeholders and respondents may have been more willing to participate in research on the assumption I could offer something in return, and yet I was a target in certain research settings due to my gender and foreignness. When I assembled the research team, I approached them as I would undergraduates in the university setting. I took for granted that I occupied a position of authority. I would soon discover, however, that in order to successfully navigate the uncertainties of research, I depended on team members for guidance and support in multiple ways.

4.2 Expectations

I arrived in Beira, Mozambique at 1:35 pm, November 2, 2016. My objective was to apply knowledge gained through coursework and literature reviews to the implementation of a household survey and semi-structured interviews. My focus was impoverished urban neighborhoods, where flooding threatened communities forgotten by the government. I was leading fieldwork for the first time and operating on a shoe-string budget ($15,000 US dollars). My dissertation research aimed to assess and understand the environmental vulnerability of rural-to urban migrants and I was in Beira to conduct a comparative case study.

From having participated in previous fieldwork campaigns in Mozambique, I expected data collection challenges. Busy urban residents may be less inclined to participate in interviews. I worried about safety, that my conspicuous foreignness would

make me a target for petty theft believed to be common to urban low-income areas. Some aspects of the research design gave me pause. Would respondents speak openly about private matters such as income? Mozambican professors advising me on my project warned that spouses do not always openly discuss income. How well would respondents remember motivations and events 15 years past? Would I be able to sufficiently prompt respondents when they needed help answering a question? I knew I would need to overcome these and other potential challenges throughout the course of fieldwork.

However, in some ways, I was well-suited to the task. My research was limited to urban areas and I would avoid logistical challenges associated with rural fieldwork, such as long-distance drives, poor quality roads, irregularity of telecommunications coverage, run-ins with highway patrol, and expenses for transportation and lodging. I lived in Mozambique as a Peace Corps volunteer for two years prior to graduate school and spoke Portuguese. As part of my doctoral advisor's research project on illicit charcoal production, I supervised surveys in Tete, Mozambique, a rapidly expanding mid-size city. I considered my in-country research sponsor, a female professor at the Universidade Licungo a personal friend. I scouted case study sites in Beira one year prior to my data collection campaign and interviewed the Mayor of Beira. He granted authorization to conduct the study and advised Praia Nova and Munhava-Matope neighborhoods as the best suited case study sites for my research project. More recently, I participated in a six-month immersion program (funded by a Boren Fellowship) that consisted of coursework in Mozambican history and culture at the nation's premier Universidade Eduardo Mondlane. I conducted three months of archival research in Maputo, documenting by hand items of interest in the absence of electronic filing systems and copy machines. I

attended national urban planning conferences, met Mozambican scholars working in related fields, and networked with officials of national and local government agencies, including the *Instituto Nacional de Estatística* (National Institute of Statistics), *Ministério da Agricultura e Desenvolvimento Rural* (Ministry of Agriculture and Rural Development), and the *Conselho Municipal da Beira* (Beira City Council). I was anxious to apply these experiences and begin the practical challenges of fieldwork.

Initially I had anticipated that one week would be sufficient time to renew the research authorizations granted the previous year. Hiring and training a research team and mapping case study neighborhoods were conceptualized as preliminary steps ahead of surveying and interviewing a representative sample of the urban poor. In total, I budgeted four months of fieldwork: five weeks for renewing authorizations, assembling a research team, and mapping case study neighborhoods; two months for conducting a survey and open-ended interviews.

4.3 Reality

Reality, as is often the case, did not align well with expectations. I counted nine months from the beginning until the completion of fieldwork, three times what was originally allotted. The extension of time was made possible by my research sponsor's gracious offer to live in her spare room free of charge. And while conducting the actual surveys and interviews went more or less as expected, two aspects of the research design caused me to alter the approach to data collection from what was envisioned.

4.3.1 Research Permissions

First, gaining access to the pilot and case study communities, in addition to being

necessary, turned out to be perhaps one of the most difficult steps in the data collection process. The formal system of urban governance in Mozambique is multi-tiered: at the top is the mayor, followed by administrative post secretaries, then mid-level officials (e.g., neighborhood secretaries), and finally low-level officials (e.g., quarter secretaries, secretaries of ten houses) (Boyd et al. 2014). I expected one week would be sufficient to meet with officials and renew my research authorizations, a process that took roughly one week in the year prior.

On my return, my in-country sponsor informed me that the director of my sponsoring university changed and the letter of support I obtained from the previous director was no longer valid. I was to obtain a letter of support from the new director, and at the behest of my research sponsor, repeat the authorization process with the municipality—but this time, I would need to obtain approval from the low-level city officials. Obtaining the letter of support signed by the university director was manageable, as was the *credencial*, which listed the twelve members of the research team including myself and permitted us to carry out research in Beira. The challenge was locating and obtaining the stamps and signatures of nine low-level officials (quarter secretaries), in addition to administrative post and neighborhood secretaries.

I spent a combined three weeks pursuing appointments with officials, well in excess of the allotted week. Meeting with officials, I began to suspect the delay was in part because officials appeared out of the loop and uncoordinated, in contrast to previous experiences interacting with local leadership in rural areas of Mozambique. To illustrate, one neighborhood secretary I met during the initial round of authorizations had changed, however, when we went to speak to his quarter secretary (one level down in the

hierarchy), the quarter secretary was unaware of leadership changes and withheld permission to carry out research. I also observed the deference and respect customarily shown in rural areas to local leaders, was in urban areas more aptly described as a spectrum. While some residents knew their quarter secretaries, others were unfamiliar when we approached and asked after secretaries by name. As a result, I anticipated that my strategy of relying exclusively on local leadership to obtain community buy-in and motivate study participation would need modification in favor of a more direct and persuasive approach with residents.

4.3.2 Neighborhood Mapping

The goal of the neighborhood mapping was to collect data for a registry, documenting the migration status, duration of urban residency, gender, availability and interest in study participation of each household head. The mapping process began smoothly. I estimated two weeks to map, based on the number of houses estimated from satellite imagery at a rate of one house mapped every eight minutes, for the modest sum of $160, leaving plenty for incidental expenses and delays. In hindsight, my mistake was to view mapping as a precursory activity to surveying and interviewing.

Given the twisting, narrow, and flooded footpaths in our study community, it was clear we needed a modified mapping methodology. After calling the team together, I presented satellite-based imagery of the study neighborhoods to the team, including Google Earth depictions of terrain and a stylized reproduction from OpenCycleMap.org that indicated the number and delimitation of buildings. I proposed dividing the neighborhoods into small manageable areas, bounded by roads and key landmarks such as schools, markets, and fountains. I could not, however, estimate the time needed to

map, since the number of households was unknown. Interestingly, when I asked team members to estimate the number of families living in the study neighborhoods, one team member estimated 2000 families. If I had averaged her estimate (2000 households) with mine based on satellite imagery (400 households), I would have accurately predicted the household counts of each neighborhood (e.g., 1289 and 1271).

Why was my household count based on satellite imagery a gross underestimate of the true number of families living in the case study neighborhoods? I underestimated because I counted discrete structures, missing families who rented single rooms. Team members pointed this out, and we adapted our approach to counting doorways to include families renting rooms. Moreover, when we encountered structures that to me did not appear to be residences, team members pointed out my mistakes.

Mapping was beset by additional challenges. I lacked a detailed strategy for assigning unique identifiers to households. I knew from reviewing literature on slums that recording immutable unique physical characteristics of houses was necessary but challenging. Materials used by residents to construct homes tended to be similar, and thus served as inadequate identifiers. Observant team members indicated subtle differences among house, documenting nearby fruit trees (e.g., papaya, banana), livestock pens, fountains, septic tanks (that were, unfortunately, so few as to serve as a useful identifier), kiosks (e.g., selling fish, charcoal, bread), schools, houses of worship, soccer fields, partisan flags, and cellphone towers as ways to identify households. When combined with their elaborate maps of landmarks, their detailed descriptions proved effective in distinguishing houses.

Another challenge encountered during mapping relates to the term selected to

identify migrants. I selected a term (*migrante*) that was puzzling to respondents when we inquired after their migration status. Respondents appeared hesitant, even suspicious, of our intentions. After a week of negotiating terminology, team members modified our approach, settling on the term *vientes* (arrivals) to identify migrants.

Absent residents presented another challenge to mapping, and team members developed a strategy to meet with absent residents based on respondent occupations. For example, fishermen left early, but were available in the afternoon when bringing in the day's catch. Vendors were met as early as 5:30 a.m., because they often traveled by foot to the central market to buy the choicest goods and resell for a premium in the case study neighborhoods. The most challenging residents to meet were the dock workers and security guards who worked twelve-hour shifts. Team members of their own initiative set appointments to meet respondents during days off, collecting phone numbers of nearby neighbors if the respondent owned no cellphone. When team members informed me of this extraordinary effort, I modified the budget to include purchases of phone credit, correcting my earlier oversight.

A final challenge encountered during mapping concerns safety. Mozambican colleagues as well as key informants cautioned that the case study communities were known for occurrences of petty theft. I had put off touring Munhava-Matope on my own for several weeks because of my safety concerns, a fear further exacerbated by the lack of signed and stamped *credencial*. Team members also described conflicts among ethnic groups, for example, between the Sena and Chuabo peoples. The latter group made up the most recent wave of migrants to Beira and were often cast in dubious terms. The rivalry between Ndau and Sena people preexisted the arrival of Chuabos. Team members

described a television crew documenting Munhava-Matope history years earlier, which resulted in heated disputes between the Ndau and Sena peoples who lived there. Here too, team members demonstrated their knowledge and expertise in quickly engaging the trust of the communities, which I credit to personality and ability to speak multiple indigenous languages, including *chiNdau*, *chiSena*, and *eChuabo* (in addition to Portuguese and English).

My general expectations and allotted two weeks for mapping required adjustment. By the end of mapping, the research team had spent two months registering the location and migration status of households. However, by the time we reached the survey and interview research phase, the most challenging aspects of data collection were resolved. The mapping phase provided the critical space for trial and error, facilitating the next research phase of surveying and interviewing.

4.3.3 Conducting the Survey

Due to the detailed mapping and accurate household registry, the research team conducted a total of 179 interviews, resulting in 158 complete household surveys. The mapping exercise was beneficial to the survey and interview phase because mapping allowed a safe space for the entire research team to experiment with success and failure, adapt approaches, and build confidence to direct the day-to-day tasks of data collection. Several team members took on more responsibility than anticipated, for example, observing and documenting environmental threats, such as blocked drainage canals and the condition of home exteriors.

In addition to allowing time for practice, the mapping was beneficial to the survey and interview because it facilitated our sustained presence in the case study communities.

We had transformed from stare-worthy oddities to accepted albeit temporary features of the neighborhoods. Moreover, I felt safe in Munhava-Matope by the end of the survey, contrary to the warnings I received from colleagues and key informants. In fact, I spent most of my time alone in the communities as a runner for the team. I awaited requests by phone to deliver supplies, receive completed surveys, answer any lingering questions, or be included in interviews with talkative respondents who shared unique and interesting life histories.

4.4 Insights

The insights I share in this section were gained through necessity, a result of limited time and finances while in the field. Yet if given the opportunity to repeat research with ample resources, there are certain things I would not change or do differently. Time and financial constraints provided the opportunity for Mozambican team members to direct a large share of the data collection activities. Indeed, without the Mozambican team members, the research would not have been possible. The generosity shown to me by Mozambican colleagues as a consequence of a limited budget allowed me to eschew the hierarchy, authority, and superiority that often perpetuates the ignorance of outsiders. I am indebted to them, and so share with the reader three key insights into how foreigners can enable and enhance research through inclusive data collection practices: (1) Assembling the in-country research team, (2) building and maintaining credibility with team members, and (3) sharing control over the data collection process.

4.4.1 Assembling the Mozambican research team

In the interest of time, I anticipated selecting team members based on their professors'

recommendations, work histories, relevant qualifications, and research experience. The delay in gaining research permission, however, was fortunate because it allowed time to reconsider my approach to assembling a research team.

While waiting for research permission, I interviewed more candidates at a greater level of detail than anticipated. I developed interview activities that highlighted personality traits essential to participant recruitment and collaboration with an outsider. I looked for candidates who had migrated from rural areas and shared similar experiences and backgrounds with respondents. Through impromptu role play, I gauged affability and the likelihood she or he would ease strangers and encourage rich responses. Comfortability in correcting me would also be valuable in team members, so I intentionally misspoke or used poorly translated Portuguese during the interview. How they went about communicating the error and guiding my interpretation towards mutual understanding was important, as it was the foundation on which they would be able to bring to bear their rich knowledge as insiders to the data collection process.

Delays in gaining research positions enabled detailed interviews with 34 candidates over two weeks. With the eleven-person research team assembled, my attention turned to building and maintaining trust with the research team.

4.4.2 Building and maintaining credibility with the team

While I always intended to compensate team members well, I offer it as an insight because the reason for the team's success was not limited to selecting the right people. Money is not only necessary, but also a symbol of respect for the expertise team members contribute to research. Money also demonstrates the power of team members in the relationship. What factors do you consider, though, when trying to settle on an

appropriate level of compensation? Mozambican scholars discouraged the amounts I proposed as being excessive. I decided to err on the side of excess not only for ethical reasons, but due to several unanticipated and compelling reasons discussed in this section.

Compensating team members well demonstrates the value of their unique abilities, skill sets, and experiences to the research. For example, a representative sample of residents would not have been possible without fluency in several indigenous languages. Team members' ability to communicate linguistic nuance was in and of itself valuable and contributed to richer data and analysis. In addition, I asked team members to arrive punctually and prepared, so compensating at a level to enable catching a taxi when running late facilitated timely data collection.

Team members communicated and sought other forms of compensation, in addition to money. Experience conducting research can support educational and professional goals of team members. Mozambican students often conduct capstone projects to fulfill graduation requirements. In conversations with team members, part of their motivation in joining the research team was to practice and solicit guidance on conducting surveys and interviews, which they hoped to apply to their capstone projects. In another example, one team member maintained our mentoring relationship, requested references, and leveraged his experience to compete successfully for a prestigious Fulbright award.

In addition to compensating team members well, caring for one another's safety and health is fundamental for establishing and maintaining credibility. This is especially true in the context of the challenging working conditions we encountered in low-income

urban neighborhoods. Precarious housing construction, lack of sanitation and waste facilities, and a great density of people threatened residents and the research team alike. During inclement weather, for example, team members pressed on and suggested we take precautions against flooding and dust. Outfitted in new industrial-style rubber boots and disposable respirators, we now looked like a professional team and our uniforms boosted morale. There were other aspects of fieldwork that represented risks, but that team members minimized. Because respondents were often difficult to reach as they left early in the day for work or returned late, I often walked during the early morning to access public transportation to reach the case study neighborhoods. Team members advised where to walk safely and planned where and when to meet *en route* so that we could safely travel together to the case study neighborhoods.

Maintaining credibility depends fundamentally on treating others as you want to be treated, and by extension, modeling behavior you would like to see. Initially, I approached team data collection with a problem-oriented mindset. I mistakenly assumed data collection would be challenging and laborious and team members would be tempted to take shortcuts as they filled out survey after survey in challenging work conditions. I assumed if I did not inspire curiosity and interest in the research questions, team members would not feel ownership over data collection and, for example, may not ask respondents the right follow up questions. It was partly for these reasons that I was forthcoming and honest with team members at all times, took responsibility and apologized for my mistakes, made a point of embracing failures as opportunities to learn, sought collective input, and recognized initiative.

In the end, I was the one who ended up being inspired. Team members were

dedicated to reaching all respondents, not just the convenient or accessible, wading through waist-deep water to reach the most isolated. Team members persisted in determining the function of every structure we came across, and when I attempted to make data collection more manageable by limiting return visits to absent occupants, team members continued to return in an effort to catch the respondent at home. By the end of data collection, the Mozambican members of the team had become the experts, knew the residents, were invited into homes, and greeted by name when we walked through the case study neighborhoods.

While I had intended to model behavior for team members, it is fair to say I learned more from the Mozambican team members than they from me. For example, team members were adept at delicately managing officials who requested to be paid or hired out, by reminding officials of the provisions contained in the informed consent document. How team members contextualized the bureaucratic language of the consent form was impressive because they motivated participation, by emphasizing their roles as students and the educational value of the research study. I learned from team members how to maneuver conversation around difficult topics that emerged as respondents recounted their migration histories, such as death of a family member, issues of sanitation, criminal activity, conflicts with family, and the stigma associated with divorce and witchcraft. Team members were courteous and sympathetic while guiding the conversation back to the central research questions, employing euphemisms, apologizing when appropriate, and thanking the respondent for her or his time. Finally, team members modeled good humor, patience, and effective communication, for example, as they taught me simple words in indigenous languages and sign language to greet respondents.

4.5 Conclusion

Recognizing the ways in which indigenous assistants enable research is often relegated to the acknowledgments section of published articles in scholarly journals as an afterthought, if not altogether missing. We cannot assume that their contributions and the insights I offer above are obvious to everyone, nor that their contributions are routinely taught in graduate curricula. For those readers versed in the challenges of fieldwork and know well the contributions of indigenous collaborators, I think they would agree that these insights are worth repeating, boldly and loudly. We really cannot say thank you enough.

Following Smith's (2012) seminal work on indigenous research methodologies, I acknowledge that the research is essentially mine. I own it, and at best it serves the interest of my academic career, and hopefully, influences policies to reduce environmental vulnerability among the poor, marginalized, and excluded communities. I designed the research questions that framed the scope of the investigation. I wrote up its findings and to date, what has been written has been published or submitted to academic journals. I disseminated electronic copies to English-speaking team members and am in the process of creating Portuguese translations to share with the rest of the research team and with my sponsoring university in Beira. Once on file with the university, scholars and students will be able to access publications generated by the research study. Despite all of this, it is undeniable that I disproportionately benefit from the research.

The insights discussed in this article relate to outsider-insider (i.e., colonizer-colonized) research collaborations in the context of data collection on hard-to-reach populations. The first insight, that limited financial resources and time in the field can be

reframed as opportunities when research is egalitarian in its approach, underscores the centrality of human relationships and the value of openness in research. The second and final insight, however, cautions an exception to being flexible. Researchers should be unyielding in the dismantling of colonizing ideology and practices, such as exploitative wages and hypocritical behavior, that threaten to compromise trust among members of the research team.

Sharing control—essential for research in developing countries—is not an act of charity or beneficence. Rather research is only possible because researchers relinquish some control to trusted team members. Team members are instrumental in data collection and determine subsequent research phases and ultimately the quality of the research findings. Indeed, this research reinforces the finding that research assistants "fundamentally configure the process and results of data collection, and our notion of 'the field' itself" (Gupta 2014, p. 397). While in the past there may have been vested interest among scholars in preserving the notion that they are uniquely abled to solve pressing societal challenges, increasingly academia has come to recognize that not only does expertise exist beyond the university setting, but that they may indeed be part of the problem (Stefanoudis et al. 2021).

The breadth of contributions by research assistants raises a number of questions regarding what is considered to be appropriate compensation. Power differentials can be almost palpable during negotiations of authorship and pay, and yet these alone do not constitute the totality of what can be considered compensation. While scholars debate on the one hand norms governing academia's narrow attribution of authorship (Gupta 2014, Sukarieh and Tannock 2019), others point out the negative impact tokenism can have on

an indigenous researcher's career (Gewin 2021). The present study extends this debate by highlighting that authorship may not be as valuable as mentorship to indigenous co-producers, and that the decision as to what constitutes compensation or value should be made in partnership.

Being intentional about recognizing the spaces in which I should relinquish control to team members was an essential first step toward supporting not only their agency, but also rigorous and inclusive research. There are limits to what can be anticipated and planned for, hence building-in autonomy for team members can safeguard the success of research implementation. Moreover, taking a staunch approach to controlling every aspect of fieldwork is not ethical or feasible. Such an approach reduces team members to automatons, foregoes their valuable contributions, and discourages the potential of research to enhance the capacity of indigenous researchers to carry out their own fieldwork. Working with undergraduates who are novice researchers, involving team members in multiple phases of research as stakeholders, creating space for unsupervised work so that indigenous team members can practice their own sound judgement, seeking critical feedback in the development of data collection instruments, and building in the habit of conducting quality checks to hold each other accountable are just a few examples of how research can be used to enhance local research capacity in places where research infrastructure and support are inadequate.

This perspective piece demonstrates a broader commitment to a decolonial agenda, in sharing and disseminating lessons learned grounded in every-day interactions of researcher-research assistant collaborations. Finally, in articulating the links between research abstractions and the practicalities of fieldwork, it advances a shift from the

necessary but insufficient step of conscientization to the realization of anticolonial behaviors and techniques, discourse that is often lacking if not altogether absent in graduate curricula.

Chapter 5: Conclusion

This study explored and characterized migration drivers in rural settings, examined differential vulnerability according to migrant status in the urban context, and engaged reflexively with the implications of inclusive research conducted in a collaborative and multicultural team setting. The research used a mixed-methods approach to engage critically with vulnerability, employing community maps, surveys, interviews, and visual assessments and imagery to characterize how people experience, understand, and respond to economic and environmental vulnerability. The most significant portion of the dissertation is the extent to which it elevates perspectives of migrants, the poor, and indigenous communities, groups who are often rendered invisible by dominant groups, including elites and academia. Insights resulting from the study are likely to contribute to future work and integration of research practices that support the mitigation of adverse weather impacts for vulnerable groups facing the deleterious effects of climate change.

5.1 Summary of Major Findings

Successful adaptation to climate change vulnerability will ultimately depend on empowering those who experience the severest forms of deprivation and face a disproportionate share of destructive climate change impacts. While migration may be a potential path forward for reducing climate change vulnerability, it may also represent a trend towards increasingly dense occupation of coastal settlements in contexts of intensifying storms and inadequate governance. The overall purpose of this dissertation research was to empirically test claims of the relationship between climate change vulnerability and migration, and contribute generalizable insights regarding decolonial

methodologies carried out in multicultural and linguistically diverse team research settings.

The dissertation was guided by three research questions. Two were conceived during the nascent stages of research, while the third and remaining question emerged at a later stage as a result of methodological challenges encountered during fieldwork. All three, however, were designed in response to knowledge gaps identified in existing research. The first chapter of the dissertation provided details and context for the research questions addressed in subsequent chapters. The second chapter investigated respondents' motivations for migrating, and the extent to which these motivations reflected direct, indirect, or no effect of extreme weather events and erratic rainfall, using content analysis of interview data and descriptive statistics of household survey data. Environmental factors were found to influence migration through mostly indirect channels. People rarely attributed migration directly to extreme weather, except in instances of rapid-onset events such as flooding and cyclones. Rather, respondents tended to frame migration as an economic necessity, while acknowledging the impoverishing effects of extreme weather and erratic rainfall. Economic push factors, such as reduced income and loss of livelihood, were the primary channels through which extreme and erratic weather influenced migration. This comports with broader findings in the literature that environmental factors drive migration through indirect channels (Gray and Mueller 2012, Call et al. 2017).

The third chapter continues the examination of the relationship between climate change vulnerability and migration but shifts in focus from the rural to the urban setting. The third chapter is grounded in the assumption of differential vulnerability, meaning

some groups will experience increased levels of vulnerability relative to others. It was hypothesized that climate change vulnerability would be particularly severe among migrants, due to an increased likelihood that migrants inhabit marginal land and have access to fewer resources relative to non-migrants. As such, the third chapter set out to examine the extent to which migrants living in urban informal settlements of Beira are more vulnerable to climate change impacts relative to non-migrants. Content analysis of semi-structured interviews revealed limited evidence of disparities in exposure, sensitivity, and adaptive capacity between migrants and non-migrants, and statistical tests of well-being among the two groups revealed migrants to be generally no worse off. While migrant status was not found to be a determinant of vulnerability, place characteristics emerged as a significant influence in how people experienced and responded to environmental threats. For example, water-logged conditions were problematic across the sample but for different reasons at the neighborhood-level (maneuverability in the one case study, health concerns in the second). While findings revealed on the one hand the pervasiveness of flooding and magnitude of suffering, on the other they suggested the presence of conditions necessary for collective activism. In this context, impacts from extreme weather events and flooding could be used to mobilize and organize communities that have been historically excluded from mitigation and adaptation planning.

The fourth chapter, a perspective essay, challenges academic norms and advances a critique of the dominant system of knowledge production as a past, present, and potentially future threat to indigenous communities. The stimulus for the fourth chapter arose from methodological challenges encountered during collection of primary data to

support the analyses presented in the second and third chapters of this dissertation. Specifically, conventional sampling methods (e.g., convenience sampling) were found to be unnecessarily exclusionary and potentially harmful to study participants. This led to a modification of the data collection procedures and necessitated an expanded role for indigenous stakeholders who were also members of the research team. The goal of the fourth chapter is to highlight the ways in which indigenous co-producers are central to research, and to engage reflexively on how research practices and procedures could be improved to better recognize and integrate the contributions of indigenous co-producers. Two key insights emerged. The first insight was that inclusive and participatory data collection is challenging and often requires considerable resources. And yet, it is the process of negotiating these challenges that enable the opportunity to create robust, quality data (that is, representative and accurate data). A second insight relates to the ethical obligation of researchers to build and maintain credibility with co-producers and stakeholders. By modelling ethical research practices, for example, encouraging an inclusive interpretation of what constitutes appropriate compensation for research work, academics initiate a dismantling of colonizing ideology and practices. The fourth chapter ends with a discussion of best practices for assembling research teams framed within recent debates in the decolonial literature.

5.2 Synthesis of Contributions

This dissertation examined the migration of rural dwellers threatened by climate change to two informal settlements of Beira, Mozambique. The comparative case study research theorized migration as an adaptation in response to changing environmental conditions, and that migration to urban areas opens up new possibilities but also previously

unexpected challenges. In order to interrogate the relationship between climate change vulnerability and migration, this dissertation focused on environmental drivers of migration from rural areas (discussed in the second chapter) and the relationship between climate change vulnerability and migrant status once relocated to urban areas (discussed in the third chapter). Each of these themes provides a unique entry point for conceptualizing how migration relates to vulnerability and can be better supported to affect inclusive adaptation. This section highlights four key contributions of this dissertation research to existing research debates. These debates relate to: an interrogation of environmental migrant narratives, specifically whether and to what extent environmental factors drive out-migration; the relevance of migrant status as a determinant of climate change vulnerability in urban settings, including how and under what conditions migration contributes to uneven vulnerability and; the nature and importance of ethical compensation in co-producer relationships, including what constitutes value and who makes these normative decisions.

First, this study helps to address knowledge gaps in the research on environmental drivers of migration by contributing original qualitative and quantitative data derived from 79 semi-structured interviews conducted in a data quality poor region of the world. As discussed in the second chapter, some authors argue for the existence of environmental-migration linkages (Black et al., 2011), while others argue environmental factors suppress migration (Adams 2016, Morrissey 2013, Warner and Afifi 2014). Among those who do promote environmental explanations for migration (Koubi et al. 2016), they have been criticized for being overly simplistic (Boas et al., 2019). In many ways, migration theory-building is undermined by limited empirical evidence (Lilleor

and Van den Broeck 2011). The findings of this dissertation research support the existence of both direct and indirect relationships between environmental factors and migration and establish a clear pattern between rapid-onset extreme weather events and higher and lower levels of migration attribution to adverse weather.

Second, this study provides to my knowledge the first accurate registry of all residents living in two informal settlements in Beira, Mozambique (Praia Nova and Munhava-Matope). Over 2,500 individual households were surveyed resulting in a census of birthplace, duration of urban residency, languages spoken, and other demographic data. This database provided the sampling framework for a random sample of 158 semi-structured household interviews, resulting in primary qualitative and quantitative data in a context where community-level data is often unavailable. Beyond this, the data capture perspectives of slum dwellers that are largely unheard or ignored. Notably, findings from the data capture the experiences and household well-being of two informal urban communities two years before Cyclone Idai destroyed much of Beira in 2019. This research thus contributes empirical evidence relating to hard-to-access perspectives that are much needed in Western academic settings (Pelling and Garschagen 2019).

Third, this study introduces a novel methodological approach to classifying migration. The decision tree diagram (as discussed in the second chapter) employs qualitative data in a systematic categorization of attribution levels to classify the weather's relative influence on migration decision making within broader socio-economic and political contexts. While there are existing migration taxonomies (Renaud et al. 2011, Morrissey 2013), the present one is unique in that it incorporates affective coding of emotions, beliefs, and worldviews that permeate migration motivations,

experiences and perceptions. It thus provides a humanized perspective rarely found in migration studies and the environmental literature more broadly, and in so doing responds to calls in the literature for a more nuanced understanding of migration (Black et al. 2011, Boas et al. 2019). This research constitutes an initial step towards determining the magnitude of the environment's influence on migration, a prerequisite to broader research efforts aimed at predicting the level and location of future environmental migration.

Finally, the research makes a practical contribution to academia by disseminating lessons learned through research collaborations with indigenous team members. The insights identify examples of the kinds of assumptions and interactions that cultivate the conditions necessary for mutual learning, exchange, and the co-production of robust, quality data, while also highlighting behavior that can lead to the erosion of trust and validity of findings. This practical guidance can assist junior as well as seasoned researchers who aspire to decolonize research practices and enhance research inclusivity.

5.3 Policy and Other Practical Implications

There are a number of policy and practical implications of this research. From a policy perspective, this research supports two specific forms of potential local and national level recommendations. First, the participating urban settlements of Praia Nova and Munhava-Matope could use research findings to bolster existing petitions to the municipality for assistance in mitigating flood impacts. It is my hope that at a minimum, publications resulting from this research will provide residents with greater visibility, and perhaps be used to affect greater transparency and inclusion of similarly affected communities in city-wide adaptation efforts. Existing adaptation efforts have received international

recognition, yet conspicuously exclude any mention of these two vital neighborhoods in a widely publicized climate change adaptation masterplan backed in part by World Bank financing (Shannon et al. 2020). Whether or not increased visibility promotes greater engagement between these two communities and the municipality remains to be seen. Mozambican Law requires municipalities to conduct impact assessments of large-scale infrastructure (e.g., canals, embankments, reservoirs) when construction results in the displacement of residents, regardless of whether projects support commercial industry or public flood mitigation. In the past, Beira municipality has been known to neglect public services as required by planning law when it concerns large-scale development projects and planned evictions (Shannon et al. 2018, Shannon et al. 2020).

Second, research findings suggest the state could support adaptation through policy that protects the efficacy of traditional coping mechanisms (e.g., agricultural pest monitoring) as part of a broader rural economic development initiative. Infrastructure that facilitates movement between rural and urban areas such as roads and electricity may bolster economic development by linking rural producers to urban markets, stimulating local demand and opportunities for off-farm employment. Infrastructure would further support the development of anticipatory and rapid response planning to extreme weather events by minimizing logistical challenges associated with aid and disaster relief distribution. Perhaps most significantly, economic investment in rural areas could enhance individual capacity to decide when and under what conditions migrating or remaining in place is appropriate.

Finally, the study suggests a number of ways in which a decolonizing perspective could improve upon research practices, most immediately at the graduate institutional

level. Graduate curricula across disciplines but in particular geography could require coursework that explores equality, colonialism, and ethics in research, themes that are standard in anthropology and sociology disciplines. University IRBs could require explicit discussion of positionality as a part of the IRB approval process, or at a minimum, move beyond framing research exploitation solely in terms of Nazi abuses of human research subjects to include information on Western academia's relationship to colonialism, as well as instances of present-day ethical violations. Funders could require a portion of grant monies be applied to the dissemination of research findings beyond academic conferences, to include forums and settings where participating communities and stakeholders are included in the vetting and dissemination of research findings. These practical implications of the present study communicate the importance of inclusivity and equity to research efforts and establish the expectation that integrity should form the basis of research collaborations and cultural norms within academia.

5.4 Recommendations and Future Research

There are a number of limitations to the present study that suggest opportunities for future research. First, from a vulnerability perspective, resources to mitigate and respond to disasters matter in contexts of disaster. A limitation of the present study is the focus on the urban setting and the weather's influence on migration, without considering fully adaptive capacity in rural areas, including of those who chose to remain and not migrate. Future research could improve upon the present studying by extending the research setting and capturing indicators of well-being among rural households prior to migrating. Such research could account for varying adaptive capacity as a factor among those affected by climate change impacts and migrate with those who are similarly affected but

choose to remain and rebuild their lives.

Second, in understanding differential vulnerability experienced among migrants and non-migrants, the duration of residency in urban settings as a determinant of adaptive capacity among migrants has received insufficient attention in the literature. A limitation of the present study is the treatment of migrants as a homogenous group, despite a range of 16 years living in Beira across the sample of migrants. Future research could address this limitation by exploring the relationship of duration of urban residency and vulnerability, considering measures of integration within the surrounding community, such as the number of contacts and quality of interaction with other households, breadth of participation in civic organizations, proficiency in the lingua franca, and the ability to access shared resources. Such research could facilitate the development of urban residency thresholds associated with integration to contribute to finding a workable and consistent definition of migrant that is relevant to the scholars of migration and environmental vulnerability more broadly.

Finally, there is scant information on the experiences and perceptions of co-production in developing countries from the perspective of indigenous collaborators themselves (Mwambari 2019). A limitation of the present study is the emphasis on a Western academic's experience and the failure to systematically document indigenous team members' perspectives in their own voice more generally, and in particular regarding the implementation of research and what could be improved. An opportunity for future work is to develop a voluntary practice or assessment tool that documents indigenous interpretations of the research process and procedure. Such information could improve the quality of data but also ensure, for example, the safety of those involved in

the co-production of research (Jenkins 2018). This would complement preceding discussion of positionality of co-producers amongst each other and relative to respondents.

5.5 Concluding Remarks

This study explores experiences of the rural and urban poor facing the destructive impacts of tropical cyclones, flooding, drought, and unpredictable rain. Findings show that despite the amenities of urban lifestyles, uprooting oneself and leaving behind family to pursue an unfamiliar way of living is a costly and potentially risky form of adaptation. In both rural and urban settings, individuals will undertake unknown risk when viable livelihoods and employment can no longer be sustained. Supporting policies that enhance their ability to practice migration when necessary may be a viable path forward for reducing climate change vulnerability. In the absence of parallel efforts to improve the capacity of urban planning, migration as adaptation, however, may accelerate densely occupied coastal urban centers increasingly threatened by more frequent and intensifying storms and flooding.

Rural development initiatives that emphasize the creation of livelihoods and employment in economic sectors less vulnerable to the impacts of climate change is one way to support *in situ* adaptation for those who choose to remain. This would allow more rural dwellers to remain in place even as climate change impacts threaten the viability of agricultural livelihoods. Rural development initiatives would also benefit those who seek to relocate from urban areas.

For those who live in urban areas and are vulnerable to climate change impacts, place-based experiences of extreme weather may be employed to advocate for

government services and amenities. Such experiences may be used to unite urban communities and promote grassroots organizing for government accountability.

Successful adaptation to climate change vulnerability will ultimately depend on empowering those who face a disproportionate share of climate change impacts. Empowering those most affected, however, will require asking and listening to groups who historically have been silenced and rendered invisible by academia. Insights into decolonizing research methodologies could produce more findings that better enable marginalized and vulnerable communities facing the future challenges of climate change.

Appendix A: Data Collection Instruments and IRB Approval

I used a variety of instruments throughout the data collection process:

- Household Survey (Migrant and non-migrant modules)
- Interview Protocol (Migrant and non-migrant modules)
- Observation of Housing and Neighborhood Characteristics
- Key Informant Interview Protocol
- International Review Board Approval Letter
- Oral Consent Forms

PART ONE: SURVEY	
INTERVIEWEE CONSENT	
[***ENUM**: Read the oral consent. Have you received oral consent from the interviewee?]*	
YES	*[**ENUM:** Continue the interview.]*
NO	*[**ENUM:** Terminate the interview.]*
Interviewer Name:	_____
Interview date:	Day:_____ Month:_____ Year: 2017
Start time:	
End time:	

SECTION 1: IDENTIFICATION OF THE HOUSEHOLD		
Neighborhood:	**PRAIA NOVA**	**MUNHAVA -MATOPE**
Area:	House code:	

SECTION 2: INFORMATION OF THE HOUSEHOLD **IN BEIRA**		
1. Are you the head of household?	**Yes**	**No**
2. Where were you born?	[***ENUM**: Answer below.*]	
2a. Administrative Post/Beira:		
2b. District:		
2c. If you were born outside of Beira, what year did you begin to live in Beira?		
2d. Was it before or after the great floods (of 2000)?		
3. Where were your parents born?	Father:	
	Mother:	
4. Are you an active member of a religious community?		
5. What local languages are spoken in the household?		
6. For the house, the household:	[***ENUM**: Choose <u>one.</u>*]:	
i)	The household owns the house	
ii)	Pays rent	
iii)	Does not pay rent and is not homeowner	
5a. If the family pays rent, how much monthly?		
5b. If the family owns the house, does the family have the title of ownership?	**Yes**	**No**
5c. If the family owns the house and does NOT have the title, why?		

1. What is the principal source of water for the household?				[***ENUM**: Choose <u>one.</u>*]:	
i) Piped water	iii) River/lake/lagoon	v) Mineral water			
ii) Well	iv) Rainwater	vi) Other, describe:_____			
6a. How much is spent on water monthly?					
6b. Does the household always have access to sufficient potable water when necessary?				**Yes**	**No**
6c. If the household does not always have access, why? Explain.					
2. Does the household have any of the following sanitary facilities:				[***ENUM**: Choose <u>all</u> that apply.*]:	
i) Hand washing station	iv) Bathroom area				
ii) Sink	v) Toilet				
iii) Pit latrine	vi) None of the above				
7a. If the household has none of the above sanitary facilities, where does the family pass waste?					
7b. [***ENUM**: Estimate distance to closest house in <u>meters</u>.*]					
3. Does the household have any of the following energy sources :				[***ENUM**: Choose <u>all</u> that apply.*]:	
i) Electricity	v) Candles				
ii) Solar energy	vi) Firewood				
iii) Gas	vii) Charcoal				
iv) Petroleum/paraffin/kerosene	viii) Other, describe:_____				
8a. What is the principal energy source of the household?					
8b. How much per month is spent on the principal energy source?					
8c. What is the principal energy source to cook?					
8d. How much per month is spent on principal energy for cooking?					
4. In the previous 12 months, has the household lost crops, animals or other assets because of ...				[***ENUM**: Choose <u>all</u> that apply.*]:	
i) Drought	iii) Cyclone	v) Other, describe:			
ii) Flooding	iv) Wild animals	vi) Did not lose			
5. Does the household have a farm?		[***ENUM**: If "no," skip to Q11.*]		**Yes**	**No**
10a. Where is the farm located?					

10b.	Do any household members belong to a farmer's association?	**Yes**	**No**
10c.	Will the household participate in the next agricultural season?	**Yes**	**No**
6.	Does the household raise animals? [***ENUM**: If "no," skip to Q12.*]	**Yes**	**No**
11a.	Where does the household raise animals?	**Yes**	**No**

11b. What types of animals and **how many** of each?

i) Goats: _____ iii) Chickens: _____ v) Cows/Bulls: _____

ii) Pigs: _____ iv) Ducks: _____ vi) Sheep/Rams: _____

7.	Do all school-age children attend school? [***ENUM**:If "yes," skip to Q13.*]	**Yes**	**No**
12a.	If not, how many school-age children attend school?		

12b. Why do school-age children not attend school?

1.	Does the household receive assets or financial help from neighbors?	**Yes**	**No**
14a.	If yes, how much does the household receive monthly?		
14b.	Does the household provide assets or financial help to neighbors?	**Yes**	**No**
14c.	If yes, how much does the household provide monthly?		
2.	In your opinion is the household in improved, equal, or worse economic conditions when compared to 3 years ago?	[***ENUM**: Choose **one**.*]:	

i) Better now than 3 years ago iii) Worse off than 3 years ago

ii) Equal to 3 years ago

3.	In your opinion is the household in improved, equal, or worse environmental conditions when compared to 3 years ago?	[***ENUM**: Choose **one**.*]:

i) Better now than 3 years ago iii) Worse off than 3 years ago

ii) Equal to 3 years ago

4.	How many days in the previous 30 days has a household member experienced illness?		
5.	Has the family lost any children (age 5 or younger) due to death?	**Yes**	**No**
15 a.	If yes, what year(s) did the death(s) occur?		
15 b.	What was cause(s) of death?		

TABLE 1: HOUSEHOLD MEMBERS IN **BEIRA**									
N°	**Name**	Relation to household 1–Self 2–Spouse 3–Son/ daughter 4–Brother/ sister 5–Father/ Mother 6–Nephew/ Niece 7–Grandson/ daughter 8–Other family 9–Norelation	Sex 1–M 2–F	Age	Civil status 1–Single 2–Married 3–Marital union 4–Polygamous 5– Divorced 6–Separated 7–Widowed	Schooling level? **0**–No formal schooling **1** to **12** **13**–Superior	Performs salaried work? 1–Yes 2–No	Self-employed ? 1–Yes 2–No	Speaks Portuguese? 1–Yes 2–No
					ANSWER FOR MEMBERS WITH 10 OR MORE YEARS				
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

TABEL 2: HOUSEHOLD SALARIED WORK **IN BEIRA**

ENUM: "In the previous 12 months has a family member worked as..."

1A. Agricultural worker or animal keeper **1 Yes 2 No |____|**
1B. International Worker **1 Yes 2 No |____|**
1C. Professor, health services **1 Yes 2 No |____|**
1D. Mechanic or construction **1 Yes 2 No |____|**
1E. Manager, accountant, secretary **1 Yes 2 No |____|**
1F. Domestic worker (cook, garderner, etc) **1 Yes 2 No |____|**
1G. Forest/animal ranger **1 Yes 2 No |____|**

1H. Other type of salaried work, describe _____ **1 Yes 2 No |____|**

Who performs the work (name of household member)?	Identification number *[**ENUM**: Consult table 1.]*	Type of work? *[**ENUM**: Consult codes.]*	Where is the work performed in relation to the household?		Monthly salary in meticais ?
			Location	Transport Mode	

Work Type Code

1. Farmer
2. Animal keeper
3. forest/animal ranger
4. farm technician
5. government worker
6. professor/health services
7. manager/accountant/secretary
8. mechanic/construction
9. miner
10. motorist
11. domestic worker
12. specialized/skilled handy work, describe:_____
13. non-skilled handy work, describe:_____

TABLE 3: HOUSEHOLD SELF-EMPLOYMENT WORK IN **BEIRA**								
1. Activity	2. Any household member performed in the last 12 months? 1–Yes 2–No -> *next activity*	3. Who performs? *[**Enum**: Insert family member code.]*	4. Sales from products/serives from this activity? 1–Yes 2–No -> *next activity*	5. Monthly income in meticais?	6. What is the value of a **high** month of income in meticais?	7. What is the value of a **low** month of income in meticais?	8. Where is the work performed in relation to the household? **MM** – Munhava Matope **PN** – Praia Nova **B** – Beira City	
							Location	Transport mode
Gathering firewood?								
Charcoal production?								
Cutting grass, reeds, leaves, palm fronds?								
Cutting construction poles?								
Harvesting wild honey/plants/fruits/eggs?								
Hunting?								
Fishing?								
Wood production?								
Capturing wild birds/reptiles?								
Trade in food products?								
Trade in non-food products?								
Trade in animals/fish?								
Artisanal trade: goldsmith, carpenter, tailor?								
Repairing bicycle/radio?								
Cement/brick production, smith/mason work?								
Milling operation or agro-process activity?								
Other, describe:								
Other, describe:								
Other, describe:								
Other, describe:								

PART ONE: SURVEY - MIGRANT MODULE						
SECTION 3: INFORMATION OF THE **RURAL** HOUSEHOLD						
1. In the district where you were born, is there a public secondary school where the 12th grade can be completed?					**Yes**	**No**
1a. Departed before or after the great floods (of 2000)?					**Before**	**After**
2. Please describe your rural home:					[***ENUM**: Describe below.*]:	
2a. Principal wall material:						
i) Cement blocks	iv) Clay blocks			vii) Reeds/bamboo/poles/palms		
ii) Bricks	v) Pau pic			vii) Other, describe:		
iii) Wood/zinc	vi) Can/cardboard/paper/bark					
2b. Principal roofing material:					[***ENUM**: Describe below.*]:	
i) Concrete slab	iii) Lusalite			v) Grass/straw/palms		
ii) Tile	iv) Zinc			vi) Other, describe:		
2c. Principal flooring material:						
i) Wood	iv) Cement			vii) Other, describe:		
ii) Marble/granite	v) Clay					
iii) Mosaic/tile	vi) Nothing					
3. What was the principal source of water for the rural household?					[***ENUM**: Choose **<u>one.</u>***]:	
i) Piped water	iii) River/lake/lagoon		v) Mineral water			
ii) Well	iv) Rainwater		vi) Other, describe: _____			
4. What was the principal energy source for cooking before leaving the rural area?						
5. What was the principal energy source before leaving the rural area?						
6. During the 12 months before leaving the rural area, did the household lose crops, animals or others assets because of...					[***ENUM**: Choose **<u>all</u>** that apply*]:	
i) Drought	iii) Cyclone		v) Other, describe:			
ii) Flooding	iv) Wild animals		vi) No losses			
7. In your opinion is the household in improved, equal, or worse economic conditions when compared life in the rural area?					[***ENUM**: Choose **<u>one.</u>***]:	
i) Better now than in the rural area		iii) Worse off than in the rural area				
ii) Equal to the rural area						
8. In your opinion is the household in improved, equal, or worse environmental conditions when compared life in the rural area?					[***ENUM**: Choose **<u>one.</u>***]:	
i) Better now than in the rural area		iii) Worse off than in the rural area				
ii) Equal to the rural area						

TABLE 4: HOUSEHOLD MEMBERS **BEFORE LEAVING THE RURAL AREA**									
N°	**Name**	Relation to household 1–Self 2–Spouse 3–Son/ daughter 4–Brother/ sister 5–Father/ Mother 6–Nephew/ Niece 7–Grandson/ daughter 8–Other family 9–Norelation	Sex 1–M 2–F	Age	Civil status 1–Single 2–Married 3–Marital union 4–Polygamous 5– Divorced 6–Separated 7–Widowed	Schooling level? **0**–No formal schooling **1** to **12** **13**–Superior	Performs salaried work? 1–Yes 2–No	Self-employed? 1–Yes 2–No	Speaks Portuguese? 1–Yes 2–No
					ANSWER FOR MEMBERS WITH 10 OR MORE YEARS				
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

TABEL 5: HOUSEHOLD SALARIED WORK **BEFORE LEAVING THE RURAL AREA** **ENUM**: "In the previous 12 months has a family member worked as..."					
Who performs the work (name of household member)?	Identification number *[**ENUM**: Consult table 1.]*	Type of work? *[**ENUM**: Consult codes.]*	Where is the work performed in relation to the household?		Monthly salary in meticais?
			Location	Transport Mode	

1. Activity	2. Any household member performed in the last 12 months? 1–Yes 2–No -> *next activity*	3. Who performs? *[**Enum**: Insert family member code.]*	4. Sales from producs/services from this activity? 1–Yes 2–No -> *next activity*	5. For all activities that apply, rank the importance of these activities for the family before leaving the rural area: 1-most important 2, 3, 4, 5, 6, ...	8. Where is the work performed in relation to the household? **MM** – Munhava Matope **PN** – Praia Nova **B** – Beira City	
					Location	Transport mode
Gathering firewood?						
Charcoal production?						
Cutting grass, reeds, leaves, palm fronds?						
Cutting construction poles?						
Harvesting wild honey/plants/fruits/eggs?						
Hunting?						
Fishing?						
Wood production?						
Capturing wild birds/reptiles?						
Trade in food products?						
Trade in non-food products?						
Trade in animals/fish?						
Artisanal trade: goldsmith, carpenter, tailor?						
Repairing bicycle/radio?						
Cement/brick production, smith/mason work?						
Milling operation or agro-process activity?						
Other, describe:						
Other, describe:						

PART TWO: INTERVIEW

SECTION 1: NEIGHBORHOOD CHARACTERISTICS

1. **What about [MUNHAVA MATOPE/PRAIA NOVA] facilitates or improves life for you and your family?**

2. **What about [MUNHAVA MATOPE/PRAIA NOVA] complicates or worsens life for you and your family?**

3. **Would you like to live here forever or move somewhere else?**
    a. **If somewhere else, where and why?**

SECTION 2: URBAN VULNERABILITY AND RESPONSES

1. **What environmental threats, if any, have you or your family experienced here in Beira (for example, drought, heat, floods, cyclones, strong winds and intense rains)?**

2. **In your opinion, what influences vulnerability in Beira to the aforementioned environmental threats?**

3. **What resources or assests, if any, were at risk of being affected because of these threats?**

4. **What can be done to minimize suffering from these threats?**

5. **What plans do you or your family have to protect your resources and assets in the event of future threats?**

SECTION 3: PERCEPTIONS

1. **During your time in Beira, have you observed changes in the rain, wind, sea-level, heat, or climate? Explain.**

2. **During your time IN BEIRA, have you observed changes to your environment, for example, in the land, plants and trees, animals, your household and your neighborhood?**

    i. **Land:**
    ii. **Plants/trees:**
    iii. **Animals:**
    iv. **Household:**
    v. **Neighborhood:**

PART TWO: INTERVIEW - MIGRANT MODULE

SECTION 4: THE JOURNEY

1. **When you left your home in [ORIGIN NAME] for Beira, did you come directly? If no, where did you stop and for how long?**

2. **How many times have you visited your family in [ORIGIN NAME] in the previous 12 months?**
   a. **Did you give or receive help when you visited? If so, describe:**

SECTION 5: DECISION-MAKING

1. **Why did you decide to leave [ORIGIN NAME]?**

2. **Was your reason associated with a change in the community or the environment?**

3. **What do other families do in order to survive and not leave [ORIGIN NAME]?**

4. **Why did you choose Beira, and not another city or district?**

SECTION 6: RURAL VULNERABILITY

1. **Before living in Beira, what environmental threats, if any, did you or your family experience (for example, drought, heat, floods, cyclones, strong winds and intense rains)?**

2. **In your opinion, in your land of origin, what influences vulnerability to the aforementioned environmental threats?**

3. **What resources or assets, if any, were at risk of being affects because of these threats?**

SECTION 7: PERCEPTIONS

1. **During your time in [ORIGIN NAME], had you observed changes in the rain, wind, sea-level, heat or climate? Explain.**

2. **During your time in [ORIGIN NAME], have you observed changes to your environment, for example, in the land, plants and trees, animals, your household and your neighborhood)? If yes, can you describe?**

   vi. **Land:**
   vii. **Plants/trees:**
   viii. **Animals:**
   ix. **Household:**
   x. **Neighborhood:**

OBSERVATION OF HOUSING AND NEIGHBORHOOD CHARACTERISTICS	
Observer Name:	_____
Observation date:	Day:_____ Month:_____ Year: 2017
Start time:	
End time:	

SECTION 1: IDENTIFICATION OF THE HOUSEHOLD		
Neighborhood:	**PRAIA NOVA**	**MUNHAVA-MATOPE**
Area:		House code:
GPS:		

SECTION 2: Housing		
2a. **Walls**:		
i) Cement blocks	v) Caniço/poles/bamboo/palmeira	
ii) Bricks	vi) Pau-pic	
iii) Wood/zinc	vii) Cans/boxes/paper/sacks/bark	
iv) Clay blocks	viii) Other:	
2b. **Roofing**:		
i) Concrete slab	iv) Zinco	
ii) Tile	v) Reeds/straw/palm fronds	
iii) Lusalite	vi) Other	
2c. **Flooring**:		
i) Wood	v) Adobe	
ii) Marble/granulite	vi) Nothing	
iii) Cement	vii) Other:	
iv) Mosaic/tile		
2d. **Windows:**		
2e. **Area** (dimensions in feet)**:**		
2f. **Year of construction:**		

2g. **Upgrades** (Roof anchors, security features, leisure areas, etc.)**:**

2h. **Issues:**

2i. **Type:**

i) Improvised
ii) Hut
iii) Traditional
iv) Part of a commercial building
v) Multifamily unit
vi) Single room in one of the above
vii) Other:

SECTION 2: Additional

a. Pond/large stagnant water
b. Trash/refuse collection point
c. Discarded water, stagnated
d. Waterline
e. Open Field
f. Tree/vegetation
g. Ditch
h. Water access point
i. Accessibility/Path characteristics
j. Abandoned homes
k. Homes under construction
l. Commercial buildings/stalls
m. Industrial buildings
n. Civic buildings
o. Other:

SECTION 3: Miscellaneous Notes

Key Informant Interview Protocol

Date: _____

Interview Section Used:

_____ Section One: Interviewee Background
_____ Section Two: Beira
_____ Section Three: Migration
_____ Section Four: Vulnerability
_____ Section Five: Survey Feedback
_____ Section Six: Migrant Recommendations

Other Topics Discussed:

_____
_____
_____
_____

Documents Obtained:

_____
_____
_____
_____

Post Interview Comments or Leads:

_____
_____
_____
_____

Section One: Interviewee Background

1. How long have you been living in Beira?

2. Tell me a little about your work.

   Probes:
   a. How long have you been working in this role?
   b. Where does your work take place?
   c. Describe the people you interact with or come into contact with through your work.
   d. What makes your work easier and what are the main challenges?
   e. Please share anything about your work as it relates to migration and the environment (if appropriate).

Section Two: Beira

1. How did Beira expand and grow over time?

   Probes:
   a. What events can you remember that led to Beira's expansion?
   b. Do you know of any people who came to Beira specifically after the 2000 floods?

2. How have neighborhoods evolved demographically and socioeconomically over time?

   Probes:
   a. What historic or recent events have increased or decreased expansion of neighborhoods?
   b. What kind of characteristics do neighboring households typically share with each other?

3. What has been the history of resettled communities or families in Beira?

   Probes:
   a. What about recent resettlements?

4. How easy is it for people to get from one place to another in Beira?

   Probes:
   a. What parts of the city are more accessible than others?
   b. What is the transportation network like?

Section Three: Migration

1. What are your perceptions or what do you think about migrants?

   Probes:
   a. Are they the same or different from people of Beira? In what ways?

2. How many migrants do you know in Beira?

   Probes:
   a. Where are migrants from generally?
   b. Do you think migrants come to stay permanently and have families, or do they stay for a short while and then leave to raise families in the village?
   c. Which would you prefer to do?

3. Where do migrants settle in Beira?
    a. Do they tend to settle with neighbors who are from the same geographic area or are neighborhoods generally mixed?
    b. Are some geographic origins more prevalent in Beira than others? Which ones?
    c. What is the ethnicity of people from these lands? What language do they speak? What other languages are similar or they might have familiarity with?
    d. Are there any advantages to settling near people with shared origins?

4. What causes people to leave rural areas to come to live in Beira?

    Probes:
    a. Considering these causes, please rank by which you believe are the most likely motivations causing people to migrate from rural areas to Beira.

5. If people are coming to Beira looking for economic opportunities, where do they settle?

6. When people come to Beira to settle, how do they obtain land?

    Probes:
    a. What are the legal procedures?
    b. What kinds of restrictions exist in Beira regarding where people can live?
    c. Does it differ if you have money? What do people do if they do not have money?

7. What kind of employment or work do migrants do here in Beira?

    Probes:
    a. What are the reasons in your opinion natives or permanent residents do/do not engage in the same type of work?

<u>Section Four: Vulnerability</u>

1. What factors in your opinion contribute to household vulnerability?

    Probes:
    a. What factors alleviate vulnerability?

2. How should the term "vulnerability" be defined?

    Probes:
    a. What would be the best way to express this concept for the purposes of this study, especially as relates to environmental vulnerability?

3. Are their areas of Beira that tend to have more difficulty with flooding or cyclones? What parts of the city are most severely affected by flooding/drought/cyclone? What parts of the city are not as affected?

    Probes:
    a. Where are they?
    b. What do you attribute to the cause of these differences and/or similarities?

4. How do floods in Beira affect people?

    Probes:
    a. How has the land changed over time because of flooding?
    b. If someone new is coming to Beira to settle, how can they know if the land they want is affected by flood?
    c. Does the municipality restrict certain areas due to flooding?
    d. Do people continue to settle there? Why do you think that is the case?

5. How are people in Beira affected by drought?

    Probes:
    a. In your opinion, what would be useful information for people in Beira to know that could help them?

6. If people are seeking shelter and protection from flooding or cyclones, where do they go?

7. To what degree is it easy for people to travel from one location to another in Beira?

    Probes:
    a. Are parts of the city more accessible in relation to others?
    b. How is the transportation network?

8. What kind of actions have you seen taken in response to these environmental threats, either by individual residents, communities, or government representatives?

    Probes:
    a. What has historically been done to reduce vulnerability to these threats?

9. Do extreme weather events affect the ability of health centers to give care/for families to receive care?

    Probes:

a. What other municipal or public services may be or have been affected by extreme weather events or rainfall variability?

10. Has the municipal or national government taken any steps to worsen or improve environmental vulnerability for residents?

    Probes:
    a. What is the Rio Chiveve Rehabilitation Project?
    b. Describe your knowledge of recent resettlement of families in Beira that is related to environmental vulnerability.

11. What can you tell me about the Rio Chiveve rehabilitation?

    Probes:
    a. What is the reason for it, who are the beneficiaries, and how have families been affected by it?
    b. To what extent are communities involved in the planning and implementation of this project?

Section Five: Survey Feedback

1. Would it be possible for you to look over a draft survey instrument and give feedback on the suitability and appropriateness of questions?

Section Six: Migrant Recommendations

1. Can you recommend 4-5 individuals who came from rural areas and are now living in Beira who may be willing to participate in an interview related to this research?

1204 Marie Mount Hall
College Park, MD 20742-5125
TEL 301.405.4212
FAX 301.314.1475

irb@umd.edu
www.umresearch.umd.edu/IRB

UNIVERSITY OF MARYLAND

INSTITUTIONAL REVIEW BOARD

DATE:	June 19, 2017
TO:	Kelly Anderson
FROM:	University of Maryland College Park (UMCP) IRB
PROJECT TITLE:	[968383-3] Contextualizing Drivers and Outcomes of Rural-to-Urban Migration: Lessons from Mozambique
REFERENCE #:	
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVED
APPROVAL DATE:	June 19, 2017
EXPIRATION DATE:	March 5, 2018
REVIEW TYPE:	Expedited Review
REVIEW CATEGORY:	Expedited review category # *7*

Thank you for your submission of Amendment/Modification materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of March 5, 2018.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Unless a consent waiver or alteration has been approved, Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

University of Maryland College Park

Oral Consent Form – English Version *Enum Initials _____*

Date _____

Project Title	Contextualizing Drivers and Outcomes of Rural-to-Urban Migration: Lessons from Mozambique
Purpose of the Study	This research is part of a dissertation project being conducted by Kelly Anderson, a geography graduate student at the University of Maryland, College Park in the United States of America. We are inviting you to participate in this research project because you are a resident of Beira city. The purpose of this research project is to identify drivers of migration to cities and to understand how global changes influence household vulnerability.
Procedures	The procedures involve participating in an interview that should take about 45 minutes for non-migrants and 60 minutes for migrants. The interview includes questions about your perceptions of climate change, experiences with migration, and other economic activities and demographic features of your household. Approximately 400 interviews will take place with migrants and natives of Beira, 50 interviews, 40 oral history interviews and another 30 pilot study interviews will take place with residents of Beira. A total of 520 individuals are expected to participate in the study. If you consent, the interview will be audio recorded. Following your responses to the interview questions, we will ask to take photographs of aspects of your home that you feel contribute to vulnerability. If you do not want us to take photographs of your home, please say so now. At the end of this interview, if you are still interested, we will ask to meet for one more interview.
Potential Risks and Discomforts	There are no known risks associated with participating in this research project, however you may skip any questions that you do not feel comfortable answering.
Potential Benefits	There are no direct benefits from participating in this research. However, your participation will contribute information regarding perceptions and experiences of migrants and nonmigrants in an understudied area of the world. It is hoped that, in the future, findings from this study will further research in other impoverished and urbanizing areas of the world affected by economic and environmental change.
Confidentiality	Any potential loss of confidentiality will be minimized by the following: (1) only the researcher will have access to the interview data that includes your name; (2) a code will be placed in the interview database rather than your name; (3) through the use of an identification key, the researcher will be able to link your interview responses to your identity; and (4) only the researcher will have access to the identification key. This research involves audio recordings of you. All paper and electronic information, including audio recordings, will be kept in a secure location in the Department of Geographical Sciences at the University of Maryland and destroyed 3 years after the completion of the study. Only the researcher will have access to these data. All identifiable information, including names, will be removed from the interview data before they are analyzed. If we write a report or article about this research, names and identities will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are

	required to do so by law.
Right to Withdraw and Questions	Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator, Kelly Anderson, 2181 LeFrak Hall at +1 941-544-6181 or via e-mail to kellykja@umd.edu.
Participant Rights	If you have questions about your rights as a research participant or wish to report a research-related injury, please contact: **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.
Statement of Consent	Your willingness to participate in this survey indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study.
Oral Consent	**Do you agree to be interviewed?** **Do you agree to be audio recorded during your participation in this study?**

University of Maryland College Park

Oral Consent Form for Key Informants – English Version *Enum Initials* _____

Date _____

Project Title	Contextualizing Drivers and Outcomes of Rural-to-Urban Migration: Lessons from Mozambique – Key Informant Group
Purpose of the Study	This research is part of a dissertation project being conducted by Kelly Anderson, a geography graduate student at the University of Maryland, College Park in the United States of America. We are inviting you to participate in this research project because you have first-hand intimate knowledge of Beira. The purpose of this research project is to identify drivers of migration to cities and to understand how global changes influence household vulnerability.
Procedures	The procedures involve participating in an interview that should take about 60 minutes. The interview includes questions about your occupation and time of residency in Beira, the demographic composition of local neighborhoods, factors influencing climate change vulnerability, and any experience with or knowledge you have of migration. At the end of the interview, we will ask you to recommend migrants who would be willing to be interviewed for this study. Approximately 400 interviews will take place with migrants and natives of Beira, 50 interviews, 40 oral history interviews and another 30 pilot study interviews will take place with residents of Beira. A total of 520 individuals are expected to participate in the study. If you consent, the interview will be audio recorded.
Potential Risks and Discomforts	There are no known risks associated with participating in this research project, however you may skip any questions that you do not feel comfortable answering.
Potential Benefits	There are no direct benefits from participating in this research. However, your participation will contribute information regarding perceptions and experiences of migrants and non-migrants in an understudied area of the world. It is hoped that, in the future, findings from this study will further research in other impoverished and urbanizing areas of the world affected by economic and environmental change.
Confidentiality	Any potential loss of confidentiality will be minimized by the following: (1) we will not ask or record your name or any other identifying information; (2) only the researcher will have access to your interview responses (both paper questionnaire and audio recording); and (3) results will be stored in secure and electronic databases. If you agree, this research involves audio recordings of you. All paper and electronic information, including audio recordings, will be kept in a secure location in the Department of Geographical Sciences at the University of Maryland and destroyed 3 years after the completion of the study. Only the researcher will have access to these data. All identifiable information, including names, will be removed from the interview data before they are analyzed. If we write a report or article about this research, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are

	required to do so by law.
Right to Withdraw and Questions	Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator, Kelly Anderson, 2181 LeFrak Hall at +1 941-544-6181 or via e-mail to kellykja@umd.edu.
Participant Rights	If you have questions about your rights as a research participant or wish to report a research-related injury, please contact: **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.
Statement of Consent	Your willingness to participate in this survey indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study.
Oral Consent	**Do you agree to be interviewed?** **Do you agree to be audio recorded during your participation in this study?**

Bibliography

Adams, H. (2016). Why populations persist: Mobility, place attachment and climate change. *Population and Environment*, 37(4), 429–448.

Adger, W.N., N.W. Arnell, R. Black, S. Dercon, A. Geddes and D. S. Thomas. (2015). Focus on environmental risks and migration: causes and consequences. *Environmental Research Letters*, 10(6), 060201.

Adger, W.N., R.S. de Campos, T. Siddiqui and L. Szaboova. (2020). Commentary: Inequality, precarity and sustainable ecosystems as elements of urban resilience. *Urban Studies*, 57(7), 1588–95.

Adri, N. and D. Simon. (2018). A tale of two groups: Focusing on the differential vulnerability of 'Climate-Induced' and 'Non-Climate-Induced' migrants in Dhaka City. *Climate and Development*, 10(4), 321-36.

Afifi, T. (2011). Economic or Environmental Migration? The Push Factors in Niger: Economic or environmental migration. *International Migration*, 49, e95–e124.

Ajibade, I. (2017). Can a future city enhance urban resilience and sustainability? A political ecology analysis of Eko Atlantic city, Nigeria. *International Journal of Disaster Risk Reduction*, 26, 85-92.

Ajibade, I. and G. McBean. (2014). Climate extremes and housing rights: a political ecology of impacts, early warning and adaptation constraints in Lagos slum communities. *Geoforum*, 55, 76–86.

Al-Hardan, A. (2014). Decolonizing Research on Palestinians: Towards Critical Epistemologies and Research Practices. *Qualitative Inquiry*, 20(1), 61–71.

Anderson, K.J. and J.A. Silva. (2020). Weather-related influences on rural-to-urban

migration: A spectrum of attribution in Beira, Mozambique. *Global Environmental Change*, 65, 102193.

Arnall, A. (2014). A climate of control: Flooding, displacement and planned resettlement in the Lower Zambezi River valley, Mozambique: A climate of control. *The Geographical Journal*, 180(2), 141–150.

Artur, L. (2013). The political history of disaster management in Mozambique. *Disaster, Conflict and Society in Crises–Everyday politics of crisis response*. London and New York: Routledge Humanitarian Studies, 38-57.

Artur, L. and D. Hilhorst. (2012). Everyday realities of climate change adaptation in Mozambique. *Global Environmental Change*, 22(2), 529–536.

Aßheuer, T., I. Thiele-Eich and B. Braun. (2013). Coping with the impacts of severe flood events in Dhaka's slums – the role of social capital. *Erdkunde*, 67(1), 21–35.

Atkinson, R. and J. Flint. (2001). Accessing Hidden and Hard-to-Reach Populations: Snowball Research Strategies. *Social Research Update*, 33, 1. Guilford: University of Surrey, Department of Sociology.

Ayeb-Karlsson, S., K. van der Geest, I. Ahmed, S. Huq and K. Warner. (2016). A people-centered perspective on climate change, environmental stress and livelihood resilience in Bangladesh. *Sustainability Science*, 11(4), 679–94.

Baldwin, J. and R. Kenan. (2010). *The cross of redemption: uncollected writings* (1st ed.). Pantheon Books.

Barnett, J. (2019). Global environmental change I: Climate resilient peace? *Progress in Human Geography*, 43(5), 927–936.

Beguy, D., P. Bocquier and E.M. Zulu. (2010). Circular migration patterns and determinants in Nairobi slum settlements. *Demographic Research*, 23, 549–86.

Beine, M. and C. Parsons. (2015). Climatic Factors as Determinants of International Migration: Climatic factors as determinants of international migration. *The Scandinavian Journal of Economics*, 117(2), 723–767.

Benjaminsen, T. A. (2016). Does Climate Change Lead to Conflicts in the Sahel? In *The End of Desertification?* (pp. 99-116). Springer, Berlin, Heidelberg.

Benjaminsen, T. A., K. Alinon, H. Buhaug and J. T. Buseth. (2012). Does climate change drive land-use conflicts in the Sahel? *Journal of Peace Research*, 49(1), 97–111.

Bila, J., A. Mondjana, B. Samils and N. Högberg. (2015). High diversity, expanding populations and purifying selection in phytoplasmas causing coconut lethal yellowing in Mozambique. *Plant Pathology*, 64(3), 597–604.

Birkenholtz, T. (2012). Network political ecology: Method and theory in climate change vulnerability and adaptation research. *Progress in Human Geography*, 36(3), 295-315.

Birkmann, J., O.D. Cardona, M.L. Carreño, A.H. Barbat, M. Pelling, S. Schneiderbauer, S. Kienberger, M. Keiler, D. Alexander, P. Zeil and T. Welle. (2013). Framing vulnerability, risk and societal responses: the MOVE framework. *Natural Hazards*, 67, 19.

Black, R., W. N. Adger, N. W Arnell, S. Dercon, A. Geddes and D. Thomas. (2011). The effect of environmental change on human migration. *Global Environmental Change*, 21, S3–S11.

Black, R., S.R. Bennett, Thomas, S.M. and J.R. Beddington. (2011). Migration as

adaptation. *Nature*, 478(7370), 447-49.

Boas, I., C. Farbotko, H. Adams, H. Sterly, S. Bush, K. van der Geest, H. Wiegel, H. Ashraf, A. Baldwin, G. Bettini, S. Blondin, M. de Bruijin, D. Durand-Delacre, C. Fröhlich, G. Gioli, L. Guaita, E. Hut, F. X. Jarawura, M. Lamers, S. Lietaer, S. L. Nash, E. Piguette, D. Rothe, P. Sakdapolrak, L. Smith, B. T. Furlong, E. Turhan, J. Warner, C. Zickgraf, R. Black and M. Hulme. (2019). Climate migration myths. *Nature Climate Change*, 9(12), 901–903.

Bogardi, J. and K. Warner. (2009). Here comes the flood. *Nature Climate Change*, 1(901), 9-11.

Boyd, E., J. Ensor, V.C. Broto and S. Juhola. (2014. Environmentalities of urban climate governance in Maputo, Mozambique. *Global Environmental Change*, 26, 140–51.

Buhaug, H. (2010). Climate not to blame for African civil wars. *Proceedings of the National Academy of Sciences*, 107(38), 16477–16482.

Braimoh, A.K. and T. Onishi. (2007). Spatial determinants of urban land use change in Lagos, Nigeria. *Land Use Policy*, 24(2), 502–15.

Brouwer, R., S. Akter, L. Brander and E. Haque. (2007). Socioeconomic vulnerability and adaptation to environmental risk: a case study of climate change and flooding in Bangladesh. *Risk Analysis*, 27(2), 313–26.

Call, M. A. (Personal communication). The Gender Dynamics of Climate Migration in Indonesia. Seminar presented at the National Socio-Environmental Synthesis Center, Annapolis, MD.

Call, M. A., C. Gray, M. Yunus and M. Emch. (2017). Disruption, not displacement: Environmental variability and temporary migration in Bangladesh. *Global*

Environmental Change, 46, 157–165.

Caporaso, J. A. and D. P. Levine. (1992). *Theories of political economy*. Cambridge University Press.

Capron, A. M. (2018). Where did informed consent for research come from? *The Journal of Law, Medicine & Ethics*, 46(1), 12-29.

Carr, E. R. (2005). Placing the Environment in Migration: Environment, Economy and Power in Ghana's Central Region. *Environment and Planning A: Economy and Space*, 37(5), 925–946.

Cau, B. (2016). Female Migration, Local Context and Contraception Use in Urban Mozambique. *African Journal of Reproductive Health*, 20(1), 52–61.

Celhay, P.A. and D. Gil. (2020). The function and credibility of urban slums: Evidence on informal settlements and affordable housing in Chile. *Cities*, 99, 102605.

Chambers, R. (1983). *Rural development: Putting the last first*. England: British Library.

Chambers, R. (1995). Poverty and livelihoods: Whose reality counts? Environment and *Urbanization*, 7(1), 32.

Chenal, J. (2016). Capitalizing on Urbanization. *Foresight Africa: top priorities for the continent in 2016*, 59-72.

Chu, E. and K. Michael. (2019). Recognition in urban climate justice: marginality and exclusion of migrants in Indian cities. *Environment and Urbanization*, 31(1), 139-56.

CIA (Central Intelligence Agency). (2020). Mozambique. World Factbook. Retrieved from: https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html

CIA (Central Intelligence Agency). (2021). Ethiopia. In The World Factbook. Retrieved

from https://www.cia.gov/the-world-factbook/countries/ethiopia/#communications.

Corbin, J.M. and A. Strauss. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13(1), 3-21.

Cunguara, B. and J. Hanlon. (2012). Whose Wealth Is It Anyway? Mozambique's Outstanding Economic Growth with Worsening Rural Poverty: Economic Growth and Worsening Rural Poverty in Mozambique. *Development and Change*, 43(3), 623–647.

Cunguara, B., A. Langyintuo and I. Darnhofer. (2011). The role of nonfarm income in coping with the effects of drought in southern Mozambique. *Agricultural Economics*, 42(6), 701–713.

Cutter, S.L., B. J. Boruff and W. L. Shirley. (2003). Social vulnerability to environmental hazards*. *Social Science Quarterly*, 84(2), 242-61.

Cutter, S.L., L. Barnes, M. Berry, C. Burton, E. Evans, E. Tate and J. Webb. (2008). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change*, 18(4), 598–606.

Danzer, A.M., B. Dietz, K. Gatskova and A. Schmillen. (2014). Showing off to the new neighbors? income, socioeconomic status and consumption patterns of internal migrants. *Journal of Comparative Economics*, 42(1), 230–45.

Davis, M. (2017). *Planet of Slums*. London: Verso.

de Araujo, M. (1990). *MIGRAÇÕES INTERNAS E O PROCESSO DE URBANIZAÇÃO*. 16.

Deane, K. and S. Stevano. (2016). Towards a political economy of the use of research

assistants: Reflections from fieldwork in Tanzania and Mozambique. Qualitative Research, 16(2), 213–228.

Dercon, S. (2002). Income Risk, Coping Strategies and Safety Nets. 26.

Devereux, S. and J. Hoddinott. (1992). *Fieldwork in Developing Countries*. Hemel Hempstead: Harvester Wheatsheaf.

Dodman, D., D. Archer and D. Satterthwaite. (2019). Editorial: Responding to climate change in contexts of urban poverty and informality. *Environment and Urbanization*, 31(1), 3–12.

dos Muchangos, A. (1989). Aspectos geográficos da cidade da Beira. In *Boletim Semestral do Arquivo Histórico de Moçambique*, 6, 239-296.

Dun, O. (2011). Migration and Displacement Triggered by Floods in the Mekong Delta: Migration and displacement in the Mekong Delta. *International Migration*, 49, e200–e223.

EM-DAT. (2021). EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium.

Eriksen, S. and J. A. Silva. (2009). The vulnerability context of a savanna area in Mozambique: Household drought coping strategies and responses to economic change. *Environmental Science & Policy*, 12(1), 33–52.

FAO (Food and Agriculture Organization). (2005). *Irrigation in Africa in figures: AQUASTAT survey, 2005*. Food and Agriculture Organization of the United Nations.

Farouk, B.R. and M. Owusu. (2012). 'If in Doubt, Count': The role of community-driven enumerations in blocking eviction in Old Fadama, Accra. *Environment and*

Urbanization, 24(1), 47–57.

Fertaly, K. and J. L. Fluri. (2019). Research Associates and the Production of Knowledge in the Field. *The Professional Geographer*, 71(1), 75–82.

Fishback, P. V., W. C. Horrace and S. Kantor. (2006). The impact of New Deal expenditures on mobility during the Great Depression. *Explorations in Economic History*, 43(2), 179-222.

Frick-Trzebitzky, F., R. Baghel and A. Bruns. (2017). Institutional bricolage and the production of vulnerability to floods in an urbanising delta in Accra. *International Journal of Disaster Risk Reduction*, 26, 57–68.

Fussell, E. (2006). Leaving New Orleans: social stratification, networks, and hurricane evacuation. In *Understanding Katrina: perspectives from the social sciences*. Accessed December 31, 2020. https://items.ssrc.org/understanding-katrina/leaving-new-orleans-social-stratification-networks-and-hurricane-evacuation/

Gemenne, F. (2010). What's in a name: social vulnerabilities and the refugee controversy in the wake of hurricane Katrina. In *Environment, forced migration and social vulnerability*, 29-40. New York: Springer.

Gewin, V. (2021). Respect and Representation. *Nature*, 589, 315-317.

Goleman, D. (1995). *Emotional intelligence*. New York, NY, England.

Grant, R. (2015). *Africa: Geographies of change*. Oxford University Press.

Gray, C. L. and V. Mueller. (2012). Natural disasters and population mobility in Bangladesh. *Proceedings of the National Academy of Sciences*, 109(16), 6000-6005.

Gröger, A. and Y. Zylberberg. (2016). Internal Labor Migration as a Shock Coping Strategy: Evidence from a Typhoon. *American Economic Journal: Applied Economics*, 8(2), 123–153.

Gupta, A. (2014). Authorship, research assistants and the ethnographic field. *Ethnography*, 15(3), 394–400.

Hanlon, J. (1991). *Mozambique: Who calls the shots?* J. Currey; Indiana University Press.

Hanlon, J. and T. Smart. (2008). *Do bicycles equal development in Mozambique?* James Currey Publisher.

Hardoy, J. and G. Pandiella. (2009). Urban poverty and vulnerability to climate change in Latin America. *Environment and Urbanization*, 21(1), (203–24.

Hartmann, B. (2010). Rethinking climate refugees and climate conflict: Rhetoric, reality and the politics of policy discourse. *Journal of International Development*, 22(2), 233–246.

Henrique, K.P. and P. Tschakert. (2019). Taming São Paulo's floods: dominant discourses, exclusionary practices, and the complicity of the media. *Global Environmental Change*, 58, 101940.

Hoffman, D. and M. Tarawalley, Jr. (2014). Frontline collaborations: The research relationship in unstable places. *Ethnography*, 15(3), 291-310.

Human Rights Watch. (1992). *Conspicuous destruction: War, famine, and the reform process in Mozambique*.

INE (Instituto Nacional de Statistical). (2007*). III Censo Geral da População e Habitação*. Maputo, Mozambique. Accessed October 28, 2016. www.ine.gov.mz

INE (Instituto Nacional de Estatística). (2010). *III Recenseamento Geral da População e Habitação 2007: Indicadores Socio-Demográficos Distritais – Província de Sofala*. Maputo, Mozambique. Accessed October 28, 2016. www.ine.gov.mz

INE (Instituto Nacional de Estatística). (2017). *III Censo Geral da População e Habitação. Resultados preliminares*. Maputo, Mozambique Accessed October 28, 2016. https://www.ine.gov.mz.

IPCC (Intergovernmental Panel on Climate Change). (2007). Climate Change 2007: Synthesis Report. *Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Pachauri, R.K and A. Reisinger (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

IPCC (Intergovernmental Panel on Climate Change). (2014a). Summary for Policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability, Part A: Global and Sectoral Aspects. *Contribution of Working Group II to the 5th Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1–32.

IPCC (Intergovernmental Panel on Climate Change). (2014b). Africa. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. *Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1199–1265.

Jenkins, S. A. (2018). Assistants, Guides, Collaborators, Friends: The Concealed Figures of Conflict Research. *Journal of Contemporary Ethnography*, 47(2), 143–170.

Johnson-Jennings, M. D., D. R. Jennings and M. M. Little. (2019). Indigenous data sovereignty in action: The Food Wisdom Repository. *Journal of Indigenous Wellbeing: Te Mauri — Pimatisiwin*, 4(1), 26-38.

Jokisch, B.D., C. Radel, L. Carte and B. Schmook. (2019). Migration matters: how migration is critical to contemporary human–environment geography. *Geography Compass*, 13(8), e12460.

Jonkman, S.N., B. Maaskant, E. Boyd and M.L. Levitan. (2009). Loss of life caused by the flooding of New Orleans after Hurricane Katrina: analysis of the relationship between flood characteristics and mortality. *Risk Analysis*, 29(5), 676–98.

Kamel, N. (2012). Social marginalisation, federal assistance and repopulation patterns in the New Orleans metropolitan area following Hurricane Katrina. *Urban Studies*, 49(14), 3211-31.

Kates, R. W., C.E. Colten, S. Laska and S.P. Leatherman. (2006). Reconstruction of New Orleans after Hurricane Katrina: a research perspective. *Proceedings of the National Academy of Sciences*, 103(40), 14653–60.

Koubi, V., G. Spilker, L. Schaffer and T. Bernauer. (2016). Environmental Stressors and Migration: Evidence from Vietnam. *World Development*, 79, 197–210.

Kovacic, Z. and M. Atia. (2020). Spaces of informality and the governing of slums. *Cities*, 102810.

Latulippe, N. and N. Klenk. (2020). Making room and moving over: knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, 42, 7-14.

Leck, H., M. Pelling, I. Adelekan, D. Dodman, H. Issaka, C. Johnson, M. Manda, D. Mberu, E. Nwokocha, E. Osuteye, et al. (2018). Towards risk-sensitive and transformative urban development in sub Saharan Africa. *Sustainability*, 10(8), 2645.

Leichenko, R. and J. A. Silva. (2014). Climate change and poverty: vulnerability, impacts, and alleviation strategies. *Wiley Interdisciplinary Reviews: Climate Change*, 5(4), 539-556.

Lilleør, H. B. and K. Van den Broeck. (2011). Economic drivers of migration and climate change in LDCs. *Global Environmental Change*, 21, S70-S81.

Linke, A.M., F.D. Witmer, J. O'Loughlin, J.T. McCabe and J. Tir. (2018). The consequences of relocating in response to drought: human mobility and conflict in contemporary Kenya. *Environmental Research Letters*, 13(9), 094014.

Liu, Z. and D. Balk. (2020). Urbanisation and differential vulnerability to coastal flooding among migrants and nonmigrants in Bangladesh. *Population, Space and Place*, 26(7), e2334.

López-i-Gelats, F., E. D. Fraser, J. F. Morton and M. G. Rivera-Ferre. (2016). What drives the vulnerability of pastoralists to global environmental change? A qualitative meta-analysis. *Global Environmental Change*, 39, 258-274.

López-Marrero, T. (2010). An integrative approach to study and promote natural hazards adaptive capacity: a case study of two flood-prone communities in Puerto Rico: An integrative approach to study and promote natural hazards adaptive capacity. *Geographical Journal*, 176(2), 150–63.

Lucci, P., D. Mansour-Ille, E. Easton-Calabria and C. Cummings. (2016). *Sustainable*

cities-internal migration, jobs and the 2030 Agenda for Sustainable Development. Overseas Development Institute, Swiss Agency for Development and Cooperation SDC.

Lwasa, S., K. Buyana, P. Kasaija and J. Mutyaba. (2018). Scenarios for adaptation and mitigation in urban Africa under 1.5 °C global warming. *Current Opinion in Environmental Sustainability*, 30, 52–58.

Mahdi, S., F. Massarongo and A. C. A. Massingue. (2019). *Mind the Rural Investment Gap: Disparities in Access to Basic Infrastructure and Directions for Mozambique's Public Investment Program (No. 139107, pp. 1-58)*. The World Bank.

Marchiori, L., J.-F. Maystadt and I. Schumacher. (2012). The impact of weather anomalies on migration in sub-Saharan Africa. *Journal of Environmental Economics and Management*, 63(3), 355–374.

MASA (Mozambique Ministry of Agriculture and Food Security/World Bank). (2018). *Mozambique - Smallholder Irrigated Agriculture and Market Access Project: environmental assessment: Environmental and social management framework* (English). Mozambique. Retrieved from: http://documents.worldbank.org/curated/en/413321526547985938/Environmental-and-social-management-framework

Matyas, C. J. and J. A. Silva. (2013). Extreme weather and economic well-being in rural Mozambique. *Natural Hazards*, 66(1), 31–49.

McGranahan, G., D. Balk and B. Anderson. (2007). The rising tide: Assessing the risks of climate change and human settlements in low elevation coastal zones.

Environment and Urbanization, 19(1), 17–37.

McLeman, R. (2019). International migration and climate adaptation in an era of hardening borders. *Nature Climate Change*, 9(12), 911–918.

McNamara, K.E., L.L. Olson and Md. A. Rahman. (2015). Insecure hope: The challenges faced by urban slum dwellers in Bhola Slum, Bangladesh. *Migration and Development*, 5(1), 1–15.

McCubbin, S., B. Smit and T. Pearce. (2015). Where does climate fit? Vulnerability to climate change in the context of multiple stressors in Funafuti, Tuvalu. *Global Environmental Change*, 30, 43–55.

Meerow, S. J.P. Newell, M. Stults. (2016). Defining urban resilience: a review. *Landscape and Urban Planning*, 147, 38-49.

Meerow, S. and J.P. Newell. (2019). Urban resilience for whom, what, when, where, and why? *Urban Geography*, 40(3), 309–29.

MEF/DEEF (Ministry of Economics and Finance/Directorate of Economic and Financial Studies). (2016). *Poverty and Well-being in Mozambique: Fourth national Poverty Assessment*. Maputo: Ministry of Economics and Finance/DEEF. Retrieve from: https://www.wider.unu.edu/news/good-news-poverty-and-well-being-mozambique-fourth-national-poverty-assessment-published

Middleton, T. and J. Cons. (2014). Coming to terms: Reinserting research assistant into ethnography's past and present. *Ethnography*, 15(3), 279-290.

Mitlin, D. (2008). With and beyond the State — Co-production as a route to political influence, power and transformation for grassroots organizations. *Environment and Urbanization*, 20(2), 339–60.

Mittleman, J. (2000). *The globalization syndrome: Transformation and resistance*. Princeton, NJ: Princeton.

Morrissey, J. W. (2013). Understanding the relationship between environmental change and migration: The development of an effects framework based on the case of northern Ethiopia. *Global Environmental Change*, 23(6), 1501-1510.

Mortreux, C. and J. Barnett. (2009). Climate change, migration and adaptation in Funafuti, Tuvalu. *Global Environmental Change*, 19(1), 105–112.

Mwambari, D. (2019). Local positionality in the production of knowledge in Northern Uganda. *International Journal of Qualitative Methods*, 18, 1609406919864845.

Nakashima, D., K. G. McLean, H. D. Thulstrup, A. R. Castillo and J. T. Rubis. (2012). *Weathering uncertainty: traditional knowledge for climate change assessment and adaptation*.

Neumann, K., D. Sietz, H. Hilderink, P. Janssen, M. Kok and H. van Dijk. (2015). Environmental drivers of human migration in drylands–A spatial picture. *Applied Geography* 56, 116–126.

Newell, P., S. Srivastava, L. O. Naess, G. A. T. Contreras and R. Price. (2020). *Towards Transformative Climate Justice: Key Challenges and Future Directions for Research*. 2020(540), 151.

Newitt, M. (2002). Mozambique. In *A History of Postcolonial Lusophone Africa* [Edited by: P. Chabal]. 185–235. London: Hurst.

Newitt, M. (2017). *A short history of Mozambique*. Oxford University Press, London.

Newitt, M. and C. Tornimbeni. (2008). Transnational Networks and Internal Divisions in Central Mozambique: An Historical Perspective from the Colonial Period.

Cahiers d'études Africaines, 48(192), 707–740.

Norman, L. M., M.L. Villarreal, F. Lara-Valencia, Y. Yuan, W. Nie, S. Wilson, G. Amaya and R. Sleeter. (2012). Mapping socio-environmentally vulnerable populations access and exposure to ecosystem services at the U.S.–Mexico Borderlands. *Applied Geography*, 34, 413–24.

Obeng-Odoom, F. (2013). Arrival City: How the Largest Migration in History is Reshaping our World: Book Review. *African Review of Economics and Finance*, 5(1), 76-78.

Patrício, M. (2014). A Fronteira Moçambique-Zimbabué e os ndau: Práticas e representações transfronteiriças no distrito moçambicano de Mossurize (de 1975 à actualidade). *Cadernos de Estudos Africanos*, 27, 79–102.

Patrício, G. (2016). Moçambique: Compulsando as Migrações Internas e Internacionais. *InterEspaço: Revista de Geografia e Interdisciplinaridade*, 2(5), 78–101.

Pelling, M. (2003). *The Vulnerability of Cities: Natural Disasters and Social Resilience*. London: Earthscan Publications.

Pelling, M. and M. Garschagen. (2019). Put equity first in climate adaptation. *Nature*, 569, 327-329.

Polsky, C., R. Neff, and B. Yarnal. (2007). Building comparable global change vulnerability assessments: The vulnerability scoping diagram. *Global Environmental Change*, 17(3-4), 472-485.

Porio, E. (2014). Climate change vulnerability and adaptation in metro Manila. *Asian Journal of Social Science*, 42(1–2), 75–102.

Potts, D.H. (2010). *Circular migration in Zimbabwe & contemporary sub-Saharan*

Africa. Woodbridge, Suffolk: James Curry.

Radcliffe, S. A. (2017). Decolonising geographical knowledges. *Transactions of the Institute of British Geographers*, 42(3), 329–333.

Rain, D., R. Engstrom, C. Ludlow and S. Antos. (2011). Accra Ghana: A city vulnerable to flooding and drought-induced migration. Case study prepared for Cities and Climate Change: Global report on human settlements 2011. Accessed December 31, 2020. https://mirror.unhabitat.org/downloads/docs/GRHS2011/GRHS2011CaseStudyChapter04Accra.pdf

Ransan-Cooper, H., C. Farbotko, K. E. McNamara, F. Thornton and E. Chevalier. (2015). Being(s) framed: The means and ends of framing environmental migrants. *Global Environmental Change*, 35, 106–115.

Renaud, F. G., O. Dun, K. Warner and J. Bogardi. (2011). A decision framework for environmentally induced migration. *International Migration*, 49, e5-e29.

Rosenzweig, M. R. and O. Stark. (1989). Consumption Smoothing, Migration, and Marriage: Evidence from Rural India. *Journal of Political Economy*, 97(4), 905–926.

Rufat, S., E. Tate, C.G. Burton and A.S. Maroof. (2015). Social vulnerability to floods: review of case studies and implications for measurement. *International Journal of Disaster Risk Reduction*, 14, 470–86.

Saldaña, J., 2016. *The coding manual for qualitative researchers*. 3rd, SAGE, California, Los Angeles.

Satterthwaite, D., D. Archer, S. Colenbrander, D. Dodman, J. Hardoy, S. Patel. (2018).

Responding to climate change in cities and in their informal settlements and economies. International Institute for Environment and Development, Edmonton, Canada, 61.

Saunders, D. (2011). *Arrival city: How the largest migration in history is reshaping our world*. Vintage.

Selby, J., O. S. Dahi, C. Fröhlich and M. Hulme. (2017). Climate change and the Syrian civil war revisited. *Political Geography*, 60, 232–244.

Shannon, M., K. Otsuki, A. Zoomers and M. Kaag. (2018). Sustainable Urbanization on Occupied Land? The politics of infrastructure development and resettlement in Beira city, Mozambique. *Sustainability*, 10(9), 3123.

Shannon, M., K. Otsuki, A. Zoomers and M. Kaag. (2020). On whose land is the city to be built? Farmers, donors and the urban land question in Beira city, Mozambique. *Urban Studies*, 58(4), 733-749.

Sheldon, K. E. (1999). Machambas in the City: Urban Women and Agricultural Work in Mozambique. *Lusotopie*, 6(1), 121-140.

Sidaway, J. D. (1993). Urban and Regional Planning in Post-independence Mozambique. *International Journal of Urban and Regional Research*, 17(2), 241–259.

Sidaway, J. D. and M. Power. (1995). Sociospatial transformations in the 'postsocialist' periphery: The case of Maputo, Mozambique. *Environment and Planning A*, 27(9), 1463-91.

Silva, J. A. (2007). Trade and Income Inequality in a Less Developed Country: The Case of Mozambique. *Economic Geography*, 83(2), 111–136.

Silva, J. A. (2013). Rural Income Inequality in Mozambique: National Dynamics and

Local Experiences. *The Review of Regional Studies*, 28.

Silva, J. A. (2020). Barriers to decolonizing economic geography: The inconvenient case of rhino horns in rural African futures. *Geoforum*, 1-2.

Silva, J. A., C. J. Matyas and B. Cunguara. (2015). Regional inequality and polarization in the context of concurrent extreme weather and economic shocks. *Applied Geography*, 61, 105–116.

Smart, T. and J. Hanlon. (2014). *Chickens and beer: recipe for agricultural growth in Mozambique*.

Smith, L. T. (2012). *Decolonizing methodologies: Research and indigenous peoples* (Second). Zed Books Ltd..

Snow, K. C., D. G. Hays, G. Caliwagan, D. J. Ford, Jr., D. Mariotti, J. M. Mwendwa and W. E. Scott. (2016). Guiding principles for indigenous research practices. *Action Research*, 14(4), 357-375.

Stefanoudis, P. V., W. Y. Licuanan, T. H. Morrison, S. Talma, J. Veitayaki and L. C. Woodall. (2021). Turning the tide of parachute science. *Current Biology*, 31(4), R184-R185.

Suckall, N., E. Fraser and P. Forster. (2017). Reduced migration under climate change: evidence from Malawi using an aspirations and capabilities framework. *Climate and Development*, 9(4), 298-312.

Sukarieh, M. and S. Tannock. (2019). Subcontracting Academia: Alienation, Exploitation and Disillusionment in the UK Overseas Syrian Refugee Research Industry. *Antipode*, 51(2), 664–680.

Sutherland, P.D. (2013). Migration is development: how migration matters to the post-

2015 debate. *Migration and Development*, 2(2), 151–56.

Tisdale, K. (2008). Being vulnerable and being ethical with/in research. In De Marrais, K.B. , & Lapan, S.D., *Foundations for research: Method of inquiry in education and the social sciences (inquiry and pedagogy across diverse contexts series)*. London: Lawrence Erlbaum Associates.

Tompkins, E.L., L. Hurlston and W. Poortinga. (2009). Foreignness as a constraint on learning: the impact of migrants on disaster resilience in small islands. *Environmental Hazards*, 8(4), 263–77.

Tuck, E. and K. W. Yang. (2012). Decolonization is not a metaphor. *Decolonization: Indigeneity, education & society*, 1(1), 40.

UN DESA/PD (United Nations Department of Economic and Social Affairs/Population Division iii). (2010). *World Urbanization Prospects, The 2009 Revision: Highlights*. United Nations.

UN DESA/PD (United Nations Department of Economic and Social Affairs/Population Division iii). (2014). *World Urbanization Prospects: The 2014 Revision*. United Nations Department of Economics and Social Affairs. New York: Population Division.

UN-Habitat (United Nations: Human Settlements Programme). (2004). The challenge of slums: global report on human settlements 2003. *Management of Environmental Quality: An International Journal*, 15(3), 337-338.

UN-Habitat (United Nations: Human Settlements Programme). (2014). *The State of African Cities 2014: Re-Imagining sustainable urban transitions*. UN-Habitat.

UN-Habitat (United Nations: Human Settlements Programme). (2016). *World Cities*

Report: Urbanization and Development—Emerging Future. UN-Habitat.

UNDP (United Nations Development Programme). (2019). *Human Development Report, Mozambique*. United Nations.

Versey, H. S. (2021). Missing Pieces in the Discussion on Climate Change and Risk: Intersectionality and Compounded Vulnerability. *Policy Insights from the Behavioral and Brain Sciences*, 8(1), 67–75.

Vershinina, N. and Y. Rodionova. (2011). Methodological issues in studying hidden populations operating in informal economy. *International Journal of Sociology and Social Policy*, 31(11), 697-716.

Vines, A. (1998). Disarmament in Mozambique. *Journal of Southern African Studies*, 24(1), 191–205.

Vines, A. (2013). Renamo's Rise and Decline: The Politics of Reintegration in Mozambique. *International Peacekeeping*, 20(3), 375–393.

Walker, G. (2012). *Environmental Justice: Concepts, evidence and politics*. Routledge.

Ward, C.D. and C.M. Shackleton. (2016). Natural resource use, incomes, and poverty along the rural–urban continuum of two medium-sized, South African towns. *World Development*, 78, 80-93.

Warner, K. (2010). Global environmental change and migration: Governance challenges. *Global Environmental Change*, 20(3), 402–413.

Warner, K. and T. Afifi. (2014). Where the rain falls: Evidence from 8 countries on how vulnerable households use migration to manage the risk of rainfall variability and food insecurity. *Climate and Development*, 6(1), 1–17.

Wiegel, H., I. Boas and J. Warner. (2019). A mobilities perspective on migration in the

context of environmental change. *Wiley Interdisciplinary Reviews: Climate Change*, 10(6).

Wisner, B., P. Blaikie, P. M. Blaikie, T. Cannon, and I. Davis. (2004). *At risk: natural hazards, people's vulnerability and disasters*. Psychology Press.

World Bank. (2015). *Kenya Toward a National Crop and Livestock Insurance Program: Summary of Policy Suggestions*. World Bank, Washington, DC. Retrieved from https://openknowledge.worldbank.org/handle/10986/24443 License: CC BY 3.0 IGO.

World Bank. (2018). *Strong but Not Broadly Shared Growth: Mozambique Poverty Assessment*. Retrieved from https://documents.worldbank.org/en/publication/documents-reports/documentdetail/377881540320229995/overview

World Bank. (2021). World Development Indicators. Population living in slums (% of urban population). Retrieved from https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS.

Wynn, L. L., and M. Israel. (2018). The fetishes of consent: Signatures, paper, and writing in research ethics review. *American Anthropologist*, 120(4), 795-806.