

DECENTRALIZATION, INSTITUTIONS, AND ACCESS TO POTABLE WATER IN MALAWI'S
URBAN AND PERI-URBAN INFORMAL SETTLEMENTS

By

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ABSTRACT

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In the peri-urban settlements of Sub-Saharan Africa, where over 70 percent of the current urban population lives, access to water is poor, and worsening due to rapid population growth and urbanization, and poverty, with dire consequences for health. Traditional state-led water policies have generally failed to address growing peri-urban water needs, creating scholarly interest in the efficacy of alternative water-delivery policies, including decentralized, community public-private partnerships (CPPPs). However, little is understood of the potential for CPPPs to improve water access in peri-urban settlements.

This dissertation study uses mixed research methods, including household surveys, key-informant interviews, focus groups, participant observation, and secondary data analysis, to examine whether and how a decentralized CPPP model based on Water User Associations (WUAs) can improve access to potable water in peri-urban settlements while promoting participation, empowerment, and community development. Using the case of two major cities in Malawi—Lilongwe and Blantyre—and insights from urban political ecology (UPE), common pool resources (CPR) theory and the community-based natural resources management (CBNRM) literature, this dissertation: (1) investigates underlying causes of poor water access in Malawi's peri-urban settlements; (2) explores the key water policies, actors, and institutional effectiveness of WUAs at delivering water and social benefits; and (3) examines whether and under what conditions WUAs improve water access compared to areas predominantly served by publicly-managed water kiosks.

Results demonstrate that although access to water in terms of quality (91 percent using improved sources) and quantity (per capita mean daily water use of 29 liters) were satisfactory based on Malawi and international standards, actual use was severely limited by availability and irregular supply. Empirical analysis under a multidimensional water-access framework encompassing *time burden*, *water adequacy*, *water availability*, and *affordability*, showed water insecurity is due to long waiting-times from erratic water supply, overcrowding, and high rates of water-kiosk non-functioning, suggesting the need to incorporate waiting time as a key determinant of peri-urban water access.

Results show that while broader social goals are still important to WUAs, the supply of reliable and safe water was more important, superseding participation, empowerment, and broader social benefits. Hence, although the business-based WUA model enhanced water access mainly through enhanced management, accountability and general professionalization, trade-offs ensued between water supply and social goals of ownership, participation, and community empowerment. This suggests flexibility in (CBNRM) expectations, including a rethink of the notion ‘participation’ in peri-urban contexts.

Multilevel linear regression analyses revealed WUAs enhanced affordability and reliability of water supply. However, the time burden on water fetchers (disadvantaging women and girls) was significantly higher in WUA areas. This suggests that although WUAs improved water access, deep-seated infrastructure problems need to be addressed.

I argue that although WUA-based decentralization can improve water-system management and efficiency, and ultimately peri-urban water access, socio-economic factors and biophysical conditions (weak infrastructure, low water pressure, and commodified nature of water) undermine success, and policies should target solving them.

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This dissertation is dedicated to Eden Adelaide Naana Adams! In the tempestuous year 2016, you arrived with abundance and hope, a doubtless testament of God's faithfulness.

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KEY TO ABBREVIATIONS

BWB	Blantyre Water Board
CBNRM	Community Based Natural Resources Management
CDP	Core Design Principles
CPR	Common Pool Resources
DHS	Demographic and Health Survey
FLOW	Field Level Operations Watch
GOM	Government of Malawi
GPS	Global Positioning Systems
IAD	Institutional Analysis and Development
JMP	Joint Monitoring Platform
LIA	Low Income Area
LWB	Lilongwe Water Board
MDGs	Millennium Development Goals
MWSISSP	Water, Sanitation and Irrigation Sector Strategic Plan
MWSPR	Water Sector Performance Report
NGO	Nongovernmental Organization
OR	Odds Ratios
PCA	Principal Component Analysis
PPCPs	Public Private Community Partnerships
SAGUAPAC	Cooperativa de Servicios Públicos Santa ruz Limitada
SSA	Sub-Saharan Africa
UN	United Nations

UN HABITAT	United Nations Settlements Program
UNHSP	United Nations Settlements Program
UNICEF	United Nations Children’s Emergency Fund
UPE	Urban Political Ecology
WUA	Water User Associations
W4P	Water for People
W.H.O	World Health Organization
WSP	Water and Sanitation Program

CHAPTER 1: INTRODUCTION

1.1 Overview

More than 8000 people, including 4500 children under age 5, die unnecessarily from lack of potable water in Malawi every year. This, especially in peri-urban areas, affects thousands of people who rely on inadequate communal water-kiosks or use water from unsafe sources. Women and children are the primary victims, spending up to six hours daily to search for water. Due to high population growth rates in Malawi, unplanned settlements just within and adjacent to city boundaries, as well as low-income neighborhoods within the city—together referred to as peri-urban areas in this dissertation—continue to grow. Between 1996 and 2008 alone, Malawi's population almost tripled, growing from 4.04 million to 13.1 million (GOM 2008).

Over 76 percent of Malawi's current urban population lives in peri-urban areas. Residents of such areas often cannot afford to install tapped household water supply or to live in rented houses that have water supply. Ironically, Malawi's abundant water resources cover 21 percent of its total area. The problem is neither technical nor due to absolute water scarcity; rather, it is mainly due to other challenges, including poor policies and institutions, and poverty. Centralized policies have largely failed for peri-urban areas, and many peri-urban and informal settlement residents are still without piped, potable water, forcing them to resort to unsafe, contaminated sources.

Partnerships between community-based associations and state utility companies have recently emerged as one possible solution, although their opportunities and constraints are not adequately understood. In 2006, the Malawi government attempted to improve potable water access in peri-urban areas by transferring water-supply roles from private operators and direct management by parastatal water boards to Water

User Associations (WUAs) as part of broad decentralization programs. Using Malawi's example, this dissertation examines whether and under what conditions decentralized community-public partnership arrangements, specifically Water User Associations (WUAs), can improve access to potable water in poor urban and peri-urban areas and promote social goals of participation, empowerment, and broader community development. For the purposes of this study and convenience, I use peri-urban, informal, low income and poor urban settlements interchangeably, and define them as mainly unplanned urban settlements within and along transitional areas and city peripheries characterized by poverty, overcrowding, insecure tenure and lack of basic services (Mbiba and Huchzermeyer 2002).

Specifically, this dissertation (1) investigates patterns of and underlying causes of water insecurity in Malawi's informal settlements; (2) explores the key water policies, actors, and institutional effectiveness of WUAs at delivering water and providing social benefits; and (3) examines the performance of WUAs to establish whether they significantly improved access to water, and under what conditions, by comparing access to water between WUA and non-WUA neighborhoods.

The dissertation research brings Urban Political Ecology (UPE) into dialogue with Common Pool Resources (CPR) theory. The choice of these two frameworks is consistent with recent conceptual shifts of water-access studies on developing countries, which emphasize socio-institutional dimensions instead of exclusively focusing on biophysical dimensions of water. The UPE framework provided an analytical lens to understand the role of social and power relations in a peri-urban partnership arrangement for water delivery. In particular, it extends the orthodox applications of UPE in urban areas to peri-urban settlements. Existing research within the urban geography domain has emphasized the utility of UPE to tease out social and

power relations among institutions, and underscored that such relations of power determine who has access, who is excluded from access, and who controls access (Swyngedouw 2004, Furlong and Bakker 2010, Bakker et al. 2008).

The CPR theory is invoked to examine broadly the institutional landscape within which water delivery in Malawi is embedded, specifically paying attention to organization of institutions, rules, and actors. CPR scholars have shown that effective collective institutions under common-property systems can underpin successful natural resource management in rural areas as effectively as, if not better than, private property systems, thereby avoiding the tragedy of the commons (Ostrom 1990). Both CPR and UPE have yet to be applied to peri-urban areas or to water access.

Studies within the UPE framework have mainly focused on cities without sufficiently engaging with phenomena in city-peripheries (peri-urban areas). In the same vein, research that employs CPR theory has tended to focus largely on rural areas (villages) and not on peri-urban areas. In addressing these gaps, the dissertation is situated under the broad banner of community-based natural resources management (CBNRM) in developing countries. It engages with the fundamental question of what happens when CBNRM approaches, with a relatively long, traditional history of use in rural areas, are prescribed for poor urban and peri-urban areas as a water-policy approach given the peri-urban context, commodified nature of water, and diversity of actors with varying interests and motivations.

1.2 Statement of the Problem

Access to safe, sustainable, reliable, affordable, and sufficient potable water is essential and critical for the normal functioning of the human body and for broader wellbeing. Yet, lack of access to this all-important resource remains one of the most challenging

public health concerns in the 21st century. Even though there has been significant progress in recent decades, nearly 700 million people across the globe are without access to improved water sources; approximately 2.4 billion lack access to improved sanitation (WHO/UNICEF 2015). As part of a global commitment to address poor access to water, the ambitious Millennium Development Goals (MDGs), set at the turn of the 20th century, aimed to reduce the world's population without potable water and basic sanitation by half.

Encouragingly, the global safe drinking water target was met well in advance of the 2015 MDG deadline, although the sanitation target was not met. According to the Joint Monitoring Program (JMP) of the United Nations, 91 percent of the global population now has access to potable water—a remarkable improvement over the 76 percent figure from 1990, even though over 2 billion people still do not have access to sanitation (WHO/UNICEF 2015). As the global community celebrates the successes of the MDGs on water, and transitions into the new Sustainable Development Goals (SDGs), concerns remain about whether stated water-access achievements are exaggerated, or the metrics for measuring access are sufficiently robust.

Even the JMP acknowledges that huge water-access disparities exist between many countries and regions. These disparities are often difficult to measure accurately due to instability and lack of nationally reliable and representative data, poverty, and rapid population growth (WHO/UNICEF Joint Monitoring Programme 2015). Further, although rural-urban disparities remain a core challenge, the continuing focus on the rural-urban dichotomy often obscures issues of access in informal settlements or peri-urban areas that do not fit neatly into either category. The adoption of the SDGs offered a new sense of hope; a renewed commitment by the global-policy community to forge lasting solutions to inadequate water access through concerted efforts. The SDGs,

adopted in September 2015 by the United Nations General Assembly, have elevated water and sanitation into a standalone goal (SDG 6: “ensure availability and sustainable management of water and sanitation for all by 2030”).

The gendered implications of poor water access are well documented. A tremendous body of literature points to the disproportionate impact of poor water access particularly on women (Crow and Sultana 2002, Truelove 2011). Such body of work has showed and broadened how the gendered implications of poor water access transcends a male-female divide and, instead, includes race, class, and ethnicity in all forms. Unfortunately, even the broad, and widely circulated global policies have often unfairly affected women, the ones at the forefront of water delivery. For example, in Malawi, Ferguson and Mulwafu (2005) looked at the gender implications of neoliberal water policies and argued that such reforms fostered water-access differentiation along social and gender lines.

Lack of access to clean, sufficient, and affordable drinking water remains particularly troubling in Sub-Saharan Africa (SSA), a region that failed to achieve its drinking water target for the MDGs. Despite a 20 percent increase in water-access coverage since 1990, many of the low income countries where less than 50 percent of the total population has access to improved water sources are in SSA. Only a third of Africa’s population has access to household piped-water connections (Seager 2010). Dependence on unimproved water sources is widespread in the region. Recent evidence suggests that even sources considered improved may often be contaminated due to poor storage practices and transportation (Gundry et al. 2006, Boateng et al. 2013). The public health consequences of lack of access to clean water are well documented, in particular outbreaks of cholera, diarrhea, and other water-related illnesses (Hunter et al. 2010). The worst victims are usually children under 5 years of age. Currently, diarrhea

remains one of the commonest causes of infant (under-5) mortality in developing countries (Priiss and Havelaar 2001). Among adults, too, diarrhea is a leading cause of disease burden in developing countries.

Sub-Saharan Africa's already pervasive drinking water scarcity is worsening due to unprecedented urbanization and rapid population growth along with growing climate variability and change. SSA currently has the second-fastest urbanization rate, a trend which is twice as fast as the global average (Brookings 2016). According to the United Nations Settlement Program, Africa's meteoric urbanization rate will inevitably continue, with a projected 80 percent of the total population growth projected to happen in urban areas in the next 50 years (UN Habitat 2014). The UN Habitat warns that in the next 40 years, the urban population in Africa will nearly triple. Africa's urban population is expected to hit 2 billion by 2040 and 3 billion by 2070 (UN Habitat 2014). A related trend which is even more concerning is that the region's urban population will continue to reside predominantly in informal urban and peri-urban settlements with slum conditions. Currently, over 70 percent of Africa's urban population lives in slums (Ramin 2009).

As a consequence of rapid population growth and urbanization, urban poverty is expected to escalate, informal settlements and slums to continue to proliferate and expand, and intra-urban inequalities to grow markedly, imposing intense pressure on water-supply infrastructure and posing serious challenges for institutions at the forefront of water delivery. Water-utility agencies are continuously faced with a quandary—meeting growing water demand with limited or weak infrastructure. In fact, Njoh and Akiwumi (2011) lament that Africa's water infrastructure has barely seen improvements dating from the era of colonialism. Others assert that population growth

and rapid urbanization often couple with weak institutions and insufficient capital to undermine attempts by governments to improve water access (Hunter et al. 2010).

1.3 Research Questions and Hypotheses

The research questions that shape this dissertation research are predicated on important scholarly gaps at the intersection of three core themes: access to water in urban and peri-urban areas, community-based natural resources management (CBNRM), and theoretical foundations of urban political ecology (UPE) and common pool resources (CPR) theory.

Access to water has long been a focus of scientific research (Esrey et al. 1988, Whittington, Mu and Roche 1990). The tremendous amount of literature on access to water that has developed over the years points to many dimensions or indicators of water access. Among the indicators of water access, quality of drinking water is a common one (Genthe et al. 1997, Wright, Gundry and Conroy 2004, Jagals 2006). Other important dimensions of access include *quantity*, *distance to water source*, and *cost of water* (Majuru, Jagals and Hunter 2012). In the context of developing countries, and typically for Sub-Saharan Africa, there has been a lot of interest in the role of household socio-economic factors as determinants of improved access to water (Adams, Boateng and Amoyaw 2015). Some studies have centered on either rural-water access (Majuru, Jagals and Hunter 2012) or urban-water access (Thompson et al. 2000). Peri-urban settlements have not received nearly as much attention although existing studies show that access to water is chronically inadequate in such spaces, often due to erratic water supply, poverty, and lack of incentive on the part of government to prioritize the peri-urban (Kyessi 2005, Allen, Dávila and Hofmann 2006). As population growth continues, with consequent formation and expansion of informal settlements, important questions

remain: what are the most important factors associated with poor water access in peri-urban and urban informal settlements, and how can we bolster access to water in informal peri-urban or low-income urban settlements?

Peri-urban settlements of Malawi have received even less scholarly attention. Existing studies have paid more attention to surface water resources and groundwater (particularly boreholes in rural areas), but not drinking-water access in peri-urban areas of Malawi (Mkandawire 2008). A huge research lacuna exists for understanding peri-urban water access in Malawi. I address this gap by exploring the most important, underlying causes of poor water access in Malawi's informal settlements.

From a theoretical standpoint, while urban geographers have recently studied cities through the lens of urban political ecology and attended to the institutional dimensions of urban water access (Bakker et al. 2008), the peri-urban context remains relatively unexplored despite its importance. On the institutional front, Ostrom and other common property scholars have used Common Pool Resources theory (CPR) to show how local institutions manage natural resources in rural areas through collective action (Ostrom 1990; Agrawal and Ostrom 2001). Nevertheless, much less attention has been paid to community-public partnerships, particularly how conditions in the peri-urban space might affect outcomes. To be clear, both UPE and CPR have not been sufficiently extended to peri-urban areas. Finally, in addressing these important gaps, this dissertation ultimately addresses the question of what happens when CBNRM approaches, whose traditional applications in rural areas have yielded mixed results at best, are implemented in urban and peri-urban contexts.

Through mixed methods (key-informant interviews, focus groups, secondary data, and household surveys) organized under an UPE framework and CPR theory, I answer the central question: Can decentralized community-based institutions improve

access to potable water in peri-urban areas and promote social goals of participation, empowerment, and broader community development? To address the central problem,

I pose and address three specific research questions:

RQ1: What are the patterns and key drivers of poor water access in peri-urban and informal settlements of Malawi?

RQ2: What are the institutional arrangements and modus operandi of Water User Associations, and to what extent have they met social goals of local participation, empowerment, and broader community development?

RQ3: Have the functions of Water User Associations and the institutional arrangements they have adopted led to improved potable water access in peri-urban settlements?

I defined institutional arrangements as policies, practices, and socio-cultural relations that Water User Associations (WUAs) use to plan, manage and coordinate their activities with diverse actors. I addressed RQ1 and RQ3 with data from Lilongwe, while for RQ2, I drew from both Lilongwe and Blantyre to explore the broader institutional landscape in Malawi's water sector since both cities have WUAs.

For RQ1, I hypothesized that *poor access to potable water in peri-urban settlements is due to a combination of bio-physical and socio-economic factors*. I addressed this hypothesis using 645 household surveys collected through a two-stage cluster sampling technique, ordinary least square and logistic regressions, and descriptive and thematic analyses to uncover key patterns behind poor water access in peri-urban settlements.

Under RQ2, I hypothesized that *existing institutional arrangements, including diverse actors and functions of the Water User Association (WUAs), combined with the historical context, result in tradeoffs between enhanced managerial efficiency and formalization, and (low) levels of community ownership, trust, and participation in decision-making*. I combined semi-structured and informal key-informant interviews,

focus-group discussions with WUAs and other actors and stakeholders in the private and public sector, and thematic analysis of secondary data from government policy documents and NGO reports to address this hypothesis.

Finally, for RQ3, I hypothesized that *the institutionalization of the adopted WUA model will lead to improved access to potable water in served peri-urban areas compared to areas predominantly served by publicly-managed water kiosks*. Under RQ3, I first used the 645 household surveys to establish whether there are significant differences in water access between neighborhoods with WUAs and those without, supplemented with key-informant interviews and focus group discussions with executives and board members of WUAs, and insights from Urban Political Ecology to disentangle the role of social, biophysical and historical/contextual factors.

1.4 Malawi Background and Study Context

Malawi's systemic potable-water accessibility, and institutional deficiencies and policy challenges to deliver water to peri-urban and informal settlements, reflect a known paradox in developing countries and SSA in particular: while freshwater resources abound, poor allocation, ineffective institutions, and other factors hamper sustainable access to drinking water. Recently, the Water and Sanitation Program in Malawi estimated that 8,800 adults and 4,500 children under age 5 died annually in Malawi due to contaminated drinking water, resulting in annual economic losses well over \$ 57 million (WSP 2010). Malawi exemplifies how rapid population growth and urbanization, and consequent formation and expansion of urban informal settlements, aggravate an already dire drinking-water access and quality situation. Malawi is currently urbanizing at a rate of 5.2% (GOMGOM 2013), a figure twice the average urbanization rate in Sub-Saharan Africa.

Malawi also has its urban population predominantly residing in slums. Over 76% (3 in 4) of Malawi's urban population lives in peri-urban areas, and nearly half are without regular access to potable water (UN Habitat 2011). Strikingly, residents in peri-urban and low income settlements, who are often very poor, have a dire need for clean water. Yet, access to water in all forms is severely limited in these peri-urban areas. Evidence from work done by Water Aid NGO and other researchers has shown that poor people in peri-urban areas who rely on communal water kiosks pay almost twice as much for water compared to high-income neighborhoods in the city (Water Aid n.d, Manda 2009, Rusca et al. 2015). The fact that these peri-urban residents predominantly depend on communal-water kiosks and have to pay more per unit of water than better-off residents with piped-water connection to their homesteads makes water supply in these areas a major problem which requires more attention, considering the direct impact of poor water access on sanitation and consequences of water-borne diseases such as diarrhea and cholera.

Adult and childhood mortalities in Malawi attributed to diarrhea are among the highest in the world. What complicates this grim picture is that poverty remains widespread in Malawi; the country's current GDP per capita is approximately 272 US Dollars, leading to their recent classification by the World Bank as the poorest country by Gross National Income Per Capita (World Bank 2015).

Water User Associations were introduced to manage water delivery to peri-urban areas, with an ultimate aim to address the deep-seated and chronic poor water access in peri-urban settlements. Before their introduction, water supply to peri-urban communities was primarily through communal water kiosks, but the kiosks were relatively few in number and were managed either directly by the Lilongwe Water Board or by private operators. Unfortunately, these former management models were

plagued by corruption, financial mismanagement, and political interference (Adams and Zulu 2015). In addition, these former systems were afflicted with a lack of transparency and accountability, and inefficient billing and revenue collection that resulted in widespread debts, despite communities being charged more for water by private operators (Adams and Zulu 2015). Ultimately, the water boards disconnected communal-water kiosks due to lack of revenue; poor communities were the hardest hit.

WUAs were adopted to address these issues and improve water access in poor low-income settlements. In their search for solutions, Malawi adopted WUAs as part of a National Decentralization Policy (1998) and Local Government Act (1998), emphasizing community management and participation, empowerment, and improved service delivery (GOM 2010). Prior to these policies, The 1969 Water Resources Act (revised in 2013) emphasized water ownership and allocation while The Water Works Act of 1995 under the control of Malawi's Ministry of Water Resources and Irrigation focused on water supply and sanitation, and management under different but related agencies. The introduction of Water User Associations is enshrined in the 1995 Water Works Act provisionally through an emphasis on community-based management. Under this act, Blantyre and Lilongwe Water Boards were instituted as parastatal organizations, and mandated to supply water to the cities of Blantyre and Lilongwe. The 2013 Water Resources Act more explicitly emphasizes a people-centered management of water supply, providing a legal foundation for WUAs to work in partnership mainly with the water boards but also other actors.

A WUA is a community-elected body charged with managing communal water kiosks, collecting water-user fees, and supplying water to peri-urban communities in partnership with a government water-utility company. WUAs purchase water from the utility company paid as a monthly bill, and are mandated to use surplus proceeds for

community development. A WUA is made up of a board of about 3-5 appointed trustees at the top, a secretariat made up of several employees, and about 5-7 elected executive committee members who serve as a liaising body between the board and the secretariat. The engagement of multiple core stakeholders, mainly NGOs, the water boards, and city councils and the communities via WUAs make this model a community public-private partnership.

1.5 Theoretical Framework

The dissertation research primarily draws from two bodies of literature—Urban Political Ecology (UPE) framework and Common Pool Resources (CPR) theory. Related to and along with CPR theory, the dissertation engages with the community-based natural resource management (CBNRM) literature and Elinor Ostrom's concept of institutions, the commons and collective action, with supplementary insights from the Institutional Analysis and Development (IAD) framework (Ostrom 1990) to explore the institutional dimensions of water supply and management through community-based WUAs, organization of WUAs and their interactions with diverse actors, and WUA performance including their role in providing social benefits to communities. UPE informed my analysis of power relations among WUAs and other actors engaged in peri-urban water supply and use. In this case, power relations are the ways in which different actors seek to influence the distribution and access to natural resources at different scales (Bryant 1998).

The cross-fertilization of UPE with CPR literature enabled me to go beyond the biophysical and technical dimensions of water supply and to situate findings within broader social, economic, political and institutional contexts that are increasingly

recognized to shape both water-supply and access challenges as well as the search for appropriate, lasting solutions.

Urban political ecology research has historically focused predominantly on cities (Heynen, Kaika and Swyngedouw 2006). Within the UPE framework, different studies have paid attention to environmental change in urban areas, with particular interest in the interactions between environmental sustainability and politics (Keil 2005, Otero et al. 2011). The extant scholarship on UPE by urban geographers, and institutional and policy analysts, reveals that uneven resource access in cities is an artifact of social and power relations (Tiefenbacher 2005, Otero et al. 2011). As the sub-field of UPE continues to develop, its application to diverse phenomena in cities is expanding. For example, urban geographers have applied insights from UPE to urban solid waste (Njeru 2006), urban green space (Heynen, Perkins and Roy 2006), housing tenure (Perkins, Heynen and Wilson 2004), air pollution (Véron 2006) and land reform (Myers 2008).

Despite the broad applications of UPE to diverse phenomena as cited above, the advancement of the framework has largely happened in the domain of water access in cities as urban political ecologists increasingly used water as a lens to understand socio-natural relationships in cities (Keil 2005). A notable example of work in the UPE of water is *"Social Power and the Urbanization of Water: Flows of Power"* (Swyngedouw 2004). Swyngedouw used Guayaquil, Ecuador, to show the inextricable linkages between the politics of urban water and uneven socio-natural processes surrounding urbanization. With strides in urban political ecology of water scholarship, discussions on drinking-water access among urban geographers have shifted from the modernist, solely biophysical emphasis to studies that pay attention to socio-political dimensions. This has made UPE a particularly important framework for teasing out the myriad factors that influence access to water in cities.

Research in UPE continues to emphasize the role of policy, institutions, and social dynamics rather than a narrow singular focus on techno-centric solutions to uneven-water access in cities of the Global South (Bakker et al. 2008, Otero et al. 2011). The central contention has been that social and power relations often mediate water access in urban areas (Swyngedouw 2005, Budds and Sultana 2013). Urban political ecologists argue that social and power relations and socio-political factors operate in combination to create uneven water access (Johnston 2003, Loftus 2009).

While urban geographers continue to extend the frontiers of the UPE, three major gaps remain, which this dissertation addresses and makes important contributions. First of all, most UPE of water studies have focused on actual urban areas or cities (Smith 2001, Swyngedouw 2005, Loftus 2009). They have not paid sufficient attention to peri-urban spaces and informal settlements, despite these areas being critical in the context of rapid population growth and urbanization. Second, although UPE is well suited and has been used to disentangle power relations, it has generally failed to shed light on collective action and the role of local institutions. Finally, UPE studies are mostly qualitative and rarely draw on quantitative methods. This dissertation addresses these gaps in UPE by using mixed rather than solely qualitative methods, and brings into dialogue the UPE theoretical framework and insights from CPR, for a more nuanced discussion of results.

My primary focus on institutions is premised on CPR theory's fundamental notion that local communities, given adequate incentives, can self-organize and create effective institutions to sustainably use and manage *open access resources*, and thereby avert the *tragedy of the commons* (Hardin 1968), and that common property systems are as effective as, if not better than, private or public property systems in providing solutions (Ostrom 1990, 2009). The theoretical appeal of the CBNRM approach rests on

arguments of efficiency, participation, productivity, community empowerment, inclusivity and equity from the participatory development literature, and more recent ‘good governance’ arguments built on political representation, empowerment or capacity building, and transparency and accountability from the decentralization literature (Blaikie 2006; Zulu 2008).

While Ostrom and other CPR scholars’ work focused on understanding how institutions function; the importance of formal rules and local participation in their formulation, monitoring and enforcement; and identifying factors that enhance institutional success (Ostrom 1990, Agrawal and Gupta 2005), a major gap in their work is the inadequate emphasis on the role of power hierarchies among and within institutions. This dissertation makes advancements in scholarship by combining UPE with CPR to explore both the institutional dimensions of decentralized, community-public partnerships (via WUAs) and how social and power relations shape water-access outcomes and create winners and losers.

1.6 Organization of the Study

This dissertation is organized into five chapters. It adopts a three-manuscript format plus an introduction that outlines the core issues and problems associated with access to water, and a conclusion that synthesizes the key results and findings into one cohesive body of knowledge. Each of the three stand-alone manuscripts addresses one aspect of the dissertation’s central theme—water access. Each of chapters 2 and 4 constitutes a complete peer-reviewed journal article manuscript. Chapter 3 had already been published in *Geoforum* at the time of finalizing the dissertation. There is therefore considerable overlap and redundancy especially of background material given that each

manuscript is tied to the same problem statement, and designed to be a standalone, complete, and publishable piece.

The first chapter introduces the study with a broad overview, problematizes access to water from a broad (global) perspective to a regional (SSA) one, and then narrows down further to contextualize some of the key concerns surrounding poor access to water in Malawi, emphasizing the scale of the problem in peri-urban and informal settlements. Chapter 1 also contextualizes the significance of this dissertation research as a call to understand decentralized, alternative, and largely non-state water policy options as potential modes of water delivery to poor urban and peri-urban settlements. The chapter concludes with the central objective of the study, research questions to be answered and hypotheses tested, and a brief introduction of the theoretical frameworks used—urban political ecology and common pool resources theory that inform the broader community-based natural resources management approach within which WUAs operate.

The second chapter focuses on the water access problem in Malawi's informal settlements, and uses the case of Lilongwe to examine patterns and key determinants of poor water access. It draws mainly from household surveys and quantitative analyses (ordinary least square and logistic regressions) to establish the most important dimensions of access in a peri-urban context. Results from chapter 2 demonstrate that poor water access in Malawi's peri-urban settlements is due to extremely long waiting-times that arise from a combination of erratic water supply, overcrowding, high water kiosk non-function, and general socio-economic wellbeing of households. It also revisits the issue of appropriate indicators for water access and proposes a multidimensional combination of indicators that include waiting time at communal water points – one of the factors that emerged important but is often neglected in official international and

national measures of water access. Overall, the results has important implications for the gender and development literature as it points out how women in particular suffer daily not only to wait for water, but to engage in multiple trips to meet household water demands, sometimes for large (6 or more) household members.

The third chapter, published in the journal *Geoforum* under the title “*Participants or Customers in Governance: Community-Public Partnerships for Peri-Urban Water Delivery*,” explores the broader institutional landscape of WUAs, examines the functions of WUAs in meeting both water supply and social goals of empowerment, participation, and community development and social-benefit delivery, and draws from the CBNRM praxis and IAD framework to highlight the opportunities, potential, and pitfalls of CBNRM approaches in peri-urban settlements, as well as trade-offs. The results from chapter 3 demonstrate that community-based water governance approaches can work in peri-urban areas, but trade-offs ensue between water supply and broader social goals, including participation and empowerment. The findings imply that evaluation of CBNRM approaches in peri-urban areas, their performance, and explanation of outcomes require flexibility. The findings also underscore a need to rethink what “participation” means in a peri-urban context, given the complexity of factors including limited social cohesion from a largely heterogeneous make-up. Water users participated (contentedly) as customers and voting of officers rather than as active members.

Chapter 4 addresses the core research question of the dissertation: Do community-based Water User Associations improve access to potable water in peri-urban settlements? It examines whether and under what conditions decentralized, community-public partnerships through Water User Associations improve access to drinking water. It draws from mixed quantitative and qualitative methods: household surveys, key-informant interviews, and secondary data (mainly policy documents),

multilevel regression analysis and descriptive and thematic-qualitative analysis, and insights from urban political ecology (UPE). It pays attention to how physical characteristics and social-relations of power interact to create uneven peri-urban waterscapes.

Findings from chapter 4 show that WUAs improved affordability and reliability dimensions of water access, but time burden on water fetchers (mostly women and girls) remain significantly higher in their operational areas as well as low water-use per capita. The findings highlight broadly that even though decentralization reforms can lead to improvements in management and efficiency in the long term, dire infrastructural challenges (e.g. low water pressure), low capacity of local, peri-urban communities, and uneven relations of power can undermine short-term successes.

The final and concluding chapter summarizes the three core papers of the dissertation, synthesizes the most important results, and highlights the scholarly contributions and key-policy implications of the findings, and finally discusses the limitations of the research and the steps taken to ameliorate their potential impact.

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CHAPTER 2: WATER ACCESS

SO CLOSE TO THE CITY, SO FAR FROM THE TAPS: POTABLE WATER INSECURITY IN MALAWI'S URBAN AND PERI-URBAN INFORMAL SETTLEMENTS

Abstract:

Inadequate access to potable water remains one of the most challenging problems in Sub-Saharan Africa, and increasingly so for urban informal settlements where a vast majority of the urban population currently resides. In Malawi, over 76 percent of the urban population lives in urban informal settlements where residents regularly grapple with potable water scarcity among many challenges. Through mainly household surveys (N=645), this paper examines the underlying determinants and causes of poor drinking-water access in the informal settlements of Lilongwe, Malawi's capital city. The findings show that for urban informal settlements where a majority of the population depends on publicly-shared standpipes (*water kiosks*), household water insecurity arises from a combination of long waiting times, multiple trips necessary to meet daily water needs, and socio-economic status of households. Yet global discussions of urban and peri-urban access to water have not paid sufficient attention to waiting time and number of trips as important metrics. We demonstrate that a multidimensional approach to measuring water access, with careful use of contextually appropriate indicators, is necessary for effective water-policy reforms and interventions.

Keywords: Malawi; potable water access; sub-Saharan Africa; water insecurity; peri-urban; informal Settlements; water kiosks

2.1 Introduction

Recent decades have witnessed efforts to increase access to potable water globally. Despite remarkable improvements, however, millions are still without potable water. Rapid population growth and urbanization have led to a disproportionate concentration of people in poor urban and peri-urban informal settlements, further compounding household water insecurity. The continuing growth of urban populations and inevitable formation and expansion of informal settlements pose a daunting challenge: ensuring access to safe and affordable drinking water. In Sub-Saharan Africa, where one of the largest proportions of the urban population globally reside in slums—over 71 percent—poor sanitation, overcrowding, poverty, and insecure tenure, among many other challenges, complicate an already dire situation of potable water scarcity (UNHSP 2003; Ramin 2009). As a consequence, water related illnesses are common, especially among children (Neelim 2011, Bartram et al. 2014).

Malawi typifies a sub-Saharan African country with chronic water access problems exacerbated by a growing population, rapid urbanization, and formation and expansion of urban informal settlements. According to Malawi's most recent Demographic and Health Survey (DHS), only 10 percent of the population have household taps, although 80 percent have access to other improved water sources (GOM 2010). According to the 2015 Joint Monitoring Program for water supply and sanitation by the World Health Organization, 96 percent of Malawi's urban and 86 percent of the rural population have access to improved water sources (WHO/ UNICEF 2015). These statistics, based frequently on average coverage, tend to overstate access, for example without accounting for functionality of sources. Besides, they focus on rural-urban differences in access with few specific details on urban and peri-urban informal settlements.

Out of the nearly 3 million urban dwellers in Malawi, the majority (76 percent) lives in peri-urban and informal settlements. The population in Lilongwe, the capital city, has undergone a meteoric rise from 19,000 in 1966 to approximately 700,000 in 2008 (GOM 2008), and is projected to continue faster than the current 4 percent annual growth rate. As a result, urban water access in particular has stagnated since 2000 (Fig 2.1), creating a unique problem where marginal improvements in access are barely able to keep up with urban population influx. According to a government report, Malawi's failure to achieve its Millennium Development Goals on water for urban areas is mainly due to high population growth and inadequate and weak infrastructure (GOM 2012).

Through household surveys (N=645), this paper examines the key underlying causes of poor water access in the informal settlements of Lilongwe City, Malawi. The findings show that for urban informal settlements, household water insecurity arises from a combination of factors including waiting time, multiple trips necessary to meet daily water needs, and household socioeconomic status. The rest of the paper is organized as follows: First a conceptual discussion of water access, followed by a description of the methods used, and finally a presentation of results, discussion, limitations, and policy implications.

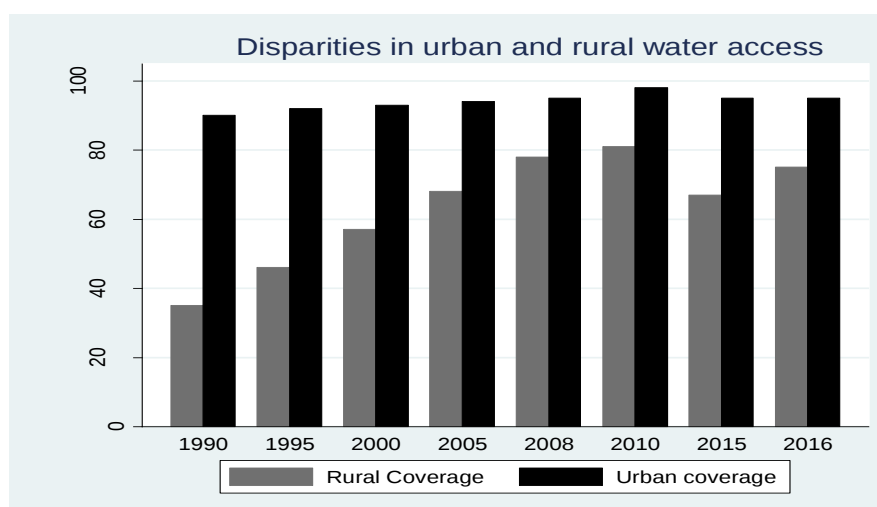


Figure 2. 1: Trends in urban and rural access to improved water sources in Malawi
Data Sources: (NSO, 2011; WHO/UNICEF 2015)

2.2 Conceptualizing “Access to Water”

The Oxford English Dictionary defines ‘access’ as “The right or opportunity to use or benefit from something”; the Merriam-Webster dictionary defines it as “the permission or right to make use of something.” The word *access* has been used frequently in the natural resources management literature yet without consensus on a single definition. Access is embedded in the ownership of and right to property (Ginger et al. 2012). In their piece on theory of access, Ribot and Peluso (2003), described access as a broad array of factors that shape the “the ability to derive benefits from things”, emphasizing that access is often mediated by social relations and institutions. In the health sciences, access connotes a set of factors that influence service utilization (Andersen and Newman 2005). For example, Penchansky and Thomas’s (1981) framework for access, adapted later by Margai (2013) to examine water access, views access from 5 dimensions: availability, accessibility, accommodation, affordability, and acceptability.

The United Nations (UN) and World Health Organization (WHO) frame access to water as a human right. In 2010, the UN recognized that “access to water and sanitation are essential to the realization of human rights,” specifying that every human deserves access to sufficient (*minimum of 20 liters*), safe (*free of microorganisms*), acceptable (*culturally appropriate*), physically accessible (*minimum collection time of 30 minutes/a distance of 100 meters*), and affordable (*cost less than 3% of household income*) access to water (*UN General Assembly 2010*). Even so, considerable uncertainty exists among scholars on how exactly to conceptualize access to water at different scales, including for urban informal settlements. Prior to 2010 and in 2000 specifically, the Millennium Development Goal (MDG 7c) aimed to halve the world’s population without water access by 2015. A notable challenge of the MDGs is how to measure progress and what metrics are useful (Attaran 2005).

National governments have often adapted or used minimum thresholds set by the UN or WHO for policy, monitoring, and evaluation purposes. For example, the Malawi government in its 2012 Water Sector Performance Report (MWSPR) defined sustainable access to water as “a minimum of 27L of water per person per day, and a maximum round-trip time of less than 30 minutes” (GOM 2012), whereas according to their Water, Sanitation and Irrigation Sector Strategic Plan (MWSISSP), access is defined as an improved source within 500m (rural) or 200m (peri-urban), return trip of less than 30 minutes, and a daily per capita consumption of at least 36 liters (GOM 2013). These diverse, often unclear metrics of access present a puzzle: what should scholars use to define or study access to water at different scales? What are the most important determinants? And how should they be measured?

Water-access scholars have used one or more indicators/dimensions of water access (Devi and Bostoen 2009, Majuru, Jagals and Hunter 2012). Jagals (2006) measured access by water quality (*absence of Escherichia coli*), quantity (*at least 25 liters per person per day*), and distance (*source within 200 meters of household*). In Nicaragua, Flores, Jiménez and Pérez-Foguet (2013) incorporated non-discrimination and participation as important measures of access. Nganyanyuka et al. (2014) examined water access in Dar es Salaam from four dimensions: *quantity, quality, affordability* and *reliability*, while Majuru et al. (2012) used three access indicators—*distance, water consumption*, and *water quality*. Obeng-Odoom (2012) proposed “deep access” to water based on: *affordability, quality, distribution, and reliability*. In a cross sectional study of changes in urban water use in East Africa, authors explored access based on *use, reliability*, and *cost* (Thompson et al. 2000).

A significant body of work has also sought to establish whether or not there is a significant relationship between water access and household socio-economic status

(Dungumaro 2007, Adams, Boateng and Amoyaw 2015). Most of the work reveals education, age, income, gender, marital status and asset ownership as significant predictors of water access (Larson, Minten and Razafindralambo 2006, Adams et al. 2015). Atipoka (2009) showed that income is a major determinant of water access. Related evidence shows that education and income in combination influence improved access to water (Larson et al. 2006, Rahut, Behera and Ali 2015) while household size often has an inverse relationship with improved access (Dungumaro 2007). Recent work has highlighted distance as an important determinant of access (Ako et al. 2010).

From the foregoing discussion, important gaps exist for which this study makes unique contributions. Fewer studies have attempted to measure and explain access through multiple indicators (Mahama et al. 2014). While considerable attention has been devoted to understanding the relationships between access and socio-economic variables, rarely have any studies done so specifically for urban and peri-urban informal settlements, even less so for Malawi. This paper goes further to establish whether socio-economic characteristics can explain access to water based on WHO and Malawi government's minimum thresholds.

2.3 Methods

2.3.1 Study Area and Sampling

The study was conducted in three peri-urban informal settlements (Fig 2.2) in Lilongwe, Malawi's capital city. The informal settlements share common characteristics which made them uniquely suitable for our study: 1) they exhibit very high population densities, 2) access to potable water is grossly inadequate, 3) poverty rates are very high, and 4) residents mostly rely on public water kiosks with varying opening hours between 6 am and 6 pm, but averaging about 8 hours of supply daily. We sampled 645

households through a two-stage randomized sampling technique (as in Larson et al. 2006) operationalized as follows: Six out of twenty-two peri-urban areas (also locally known as low income areas/LIA) were identified as suitable for our research after satisfying pre-determined criteria: 1) areas where decentralized water reforms had been implemented and 2) areas where people predominantly rely on water kiosks under the management of Water User Associations to later address the objectives of a larger project which seeks to examine whether decentralized water reforms lead to improved access to water in urban and peri-urban spaces.

The number of households in the six LIAs ranges from 6000 to 9000, approximately. In the first step of the two-stage randomized cluster sampling, we randomly selected three peri-urban areas (two test LIAs and one set as a control). The three LIAs selected were Area 41 (Kauma), Area 56 (Mtandire), and Area 36 (Tsabango), with approximately 6000, 9800, and 9000 households respectively (based on figures from the Lilongwe Water Board). In the second step, households to be interviewed were selected in proportion to the total number of households in the respective areas. To estimate the right sample size, we divided total population of each neighborhood by 5 (the average household size in Malawi according to the 2008 census). At 5 percent error margin and a 99 percent confidence interval, we arrived at a total sample size of 645, spread proportionally across the three study areas as 155, 258, and 232 respectively. In the second stage, we relied on multiple transects beginning from a central location and going in the east, west, north, and south directions to select households at regular intervals as accurately as the haphazard arrangement of the settlements will allow.

Lilongwe Areas (Study Areas Highlighted)

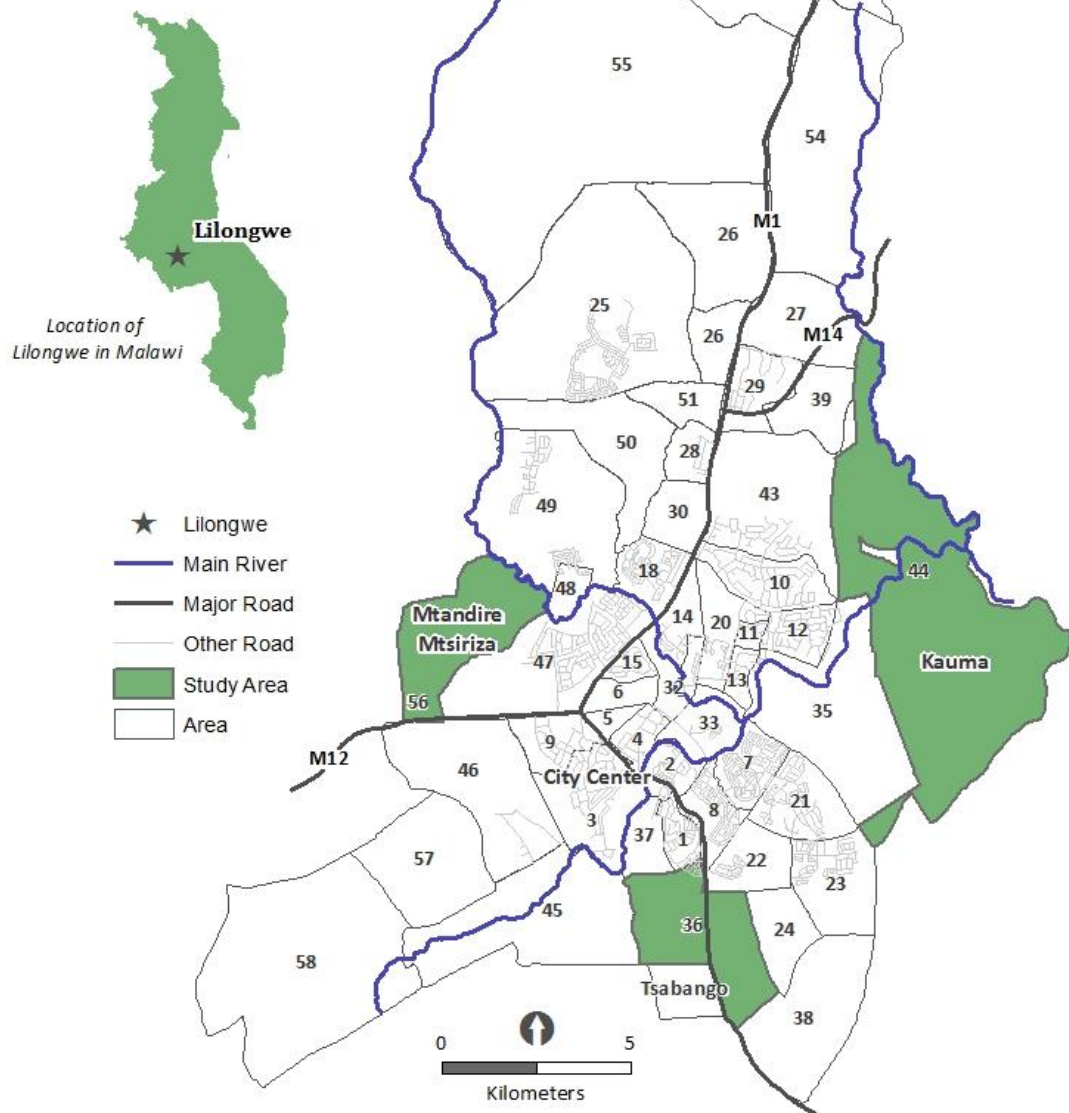


Figure 2. 2: Map of Lilongwe showing study sites: areas 56, 44, and 36

2.3.2 Data Collection Procedure

Data were mainly collected from a structured household survey although we gleaned additional information from focus groups, policy documents, and participant observations for the background section. Target respondents for each household were household heads in whose absence we talked to a spouse or any household member above 18 years. Surveys were administered face-to-face and in the Chichewa (Malawi's commonest language) for ease of interaction. The questionnaire comprised several sections: location and identification information, demographic and socio-economic information, drinking water sources and access, average quantity of water collected, water user and storage behavior, perceptions about water access, sanitation and toilet facilities, assets ownership, and perceptions about water user associations (not specifically analyzed for this paper).

Six research assistants facilitated the translation, pretesting and corrections of the questionnaire, and final collection of survey data. While space limitations do not allow a detailed discussion of the protocols involved in the measurement of all variables, income in particular is worth discussing because of the limitations, and therefore implications, of how it was measured. As will be discussed in the results section, the respondents were predominantly women (87.91%) who estimated family income with limited, somewhat uncertain idea about family finances, as is the case in Malawi and other traditional African societies where financial matters are generally handled by men. This makes self-reporting incomes very rough estimates at best.

2.3.3 Data Analysis

The analytical procedures employed combined both descriptive and inferential statistics using multiple ordinary least square (OLS) and logistic regressions. First, multiple regression analysis was used to test for associations between household socio-

economic variables normally found in the literature and potable water access measured by *volume per capita, total time/day, and affordability*. Volume per capita was a measure of the ratio between total volume of water consumed by a household and number of people. Total time/day was computed as a product of total time used in one round trip and number of daily trips to the main water source. Affordability was measured as the percentage of a households monthly income spent on water. To justify the use of OLS regression, we used bivariate regressions and post-estimation tolerance values to test for and eliminate collinearity. The equation below specifies the relationship between predictor and outcome variables in the OLS:

$$\text{Access (Y) (dimension)} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon \text{ where } \beta_0 = Y \text{ intercept, } \beta_1 \dots \beta_n = \text{coefficients of predictor variables, and } \varepsilon, \text{ the error term.}$$

Multiple logistic regression analysis was employed to test for whether and how household socio-economic characteristics differentiated households based on who has access to WHO and Malawi's minimum water access standards. Four access dimensions were dichotomized and a logistic regression model (specified below) used to test for significant relationships.

$$\text{Log} \left[\frac{P}{1-P} \right] = \sum \beta_n X_n + \varepsilon$$

Y= a binary variable that takes values 0 or 1 and E(Y) =P.

Source (Y=1: improved source; Y=0: unimproved source)
Quantity (Y=1: volume ≥27L/capita; Y=0: volume <27L/capita)
Time (Y=1: takes ≤30 minutes for a round trip; Y=0: takes > 30minutes)
Affordability (Y=1: spends ≤3% of income on water; Y=0: spends >3% of)

The probability of meeting water access thresholds is modeled as log odds of a linear function of predictor/socio-economic variables. Both the multiple OLS and logistic regression analyses were performed using the Stata 14/SE statistical software.

2.4 Results

Table 2.1 summarizes key household socio-economic and demographic characteristics of the study population. Most (approximately 70%) were between 20-40 years. Largely because wives were more available than husbands and responsible for household water-related tasks, respondents were overwhelmingly female (87.9%). Our sample had 84% non-natives who had migrated to the peri-urban settlements. About 62% of these had lived in the location for less than 10 years although some have lived for more than 30 years. Mean monthly household income was 57058 MWK (approximately \$143.00 USD).

Table 2. 1: Selected socio-economic profile of respondents and households

Variable	Frequency	Percentage
Age		
<20	65	10
20-29	250	39
30-39	200	31
40-49	67	10.4
50-59	31	4.8
60-max	32	5.0
Gender		
Male	567	88
Female	78	12
Education		
No education	70	10.5
Primary education	362	56.12
Secondary education	199	30.82
College or higher	14	2.17
Marital Status		
Married	524	81.24
Single/Never married	48	7.44
Widowed	45	6.88
Divorced	28	4.34
Ethnic Status		
Native	104	16.12
Non-native	541	83.88
Household size		
1-3	121	18.76
4-6	382	59.22
7-9	118	18.24
>9	24	3.72
Number of bedrooms		
One	214	33.28
Two	240	37.33
Three	149	23.17

Table 2.1 (cont'd)

Four	33	5.13
Five	7	1.09
Household taps		
Tap in house	8	1.24
Tap in compound	60	9.30
No tap	577	89.50
Primary water source		
Improved	590	91.47
Non-improved	55	8.53
Secondary water source		
Improved	242	37.52
Non-improved	403	62.48
Treats drinking water		
Yes	122	18.91
No	523	81.92
Stores drinking water		
Yes	580	90
No	65	10

2.4.1 Water Sources, Use, and Access Patterns

Households obtained water mainly from water kiosks (60%) and privately owned household taps, boreholes, protected and unprotected wells, and rainwater harvesting. Although 91% of the households used improved primary water sources, the percentage drops precipitously to 37% for secondary and alternative sources. Water kiosks could either be in their immediate neighborhoods, or in some cases, households walked to other communities to use kiosks. The second commonest primary water source was private or neighbors' taps (11%). Only 9.3% of households have access to either a household tap or a shared compound tap yet willingness to connect household taps were generally low. Two reasons accounted for the unwillingness. First, many respondents (32.87%) noted that they were tenants and thus not responsible for paying for household taps. The second most cited reason was the high upfront costs involved in connecting household taps (12.6%).

The commonest secondary sources used were protected and unprotected wells, both classified as unimproved by Malawi standards. During the rainy season, use of

rainwater as a supplementary source increases although kiosks remain the commonest primary source. Approximately 90 percent of households, including those who have access to compound or in-house taps, practice water storage (Table 2.1) while water treatment practices were rather uncommon (18.91%). The two perceived most serious water problems were irregular supply (57.52%) and long waiting times (17%).

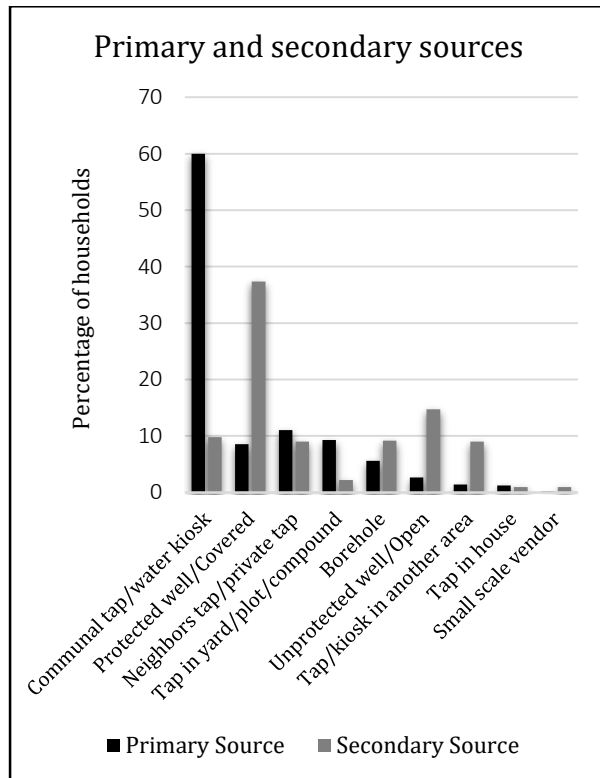


Figure 2.3: Primary and secondary water sources

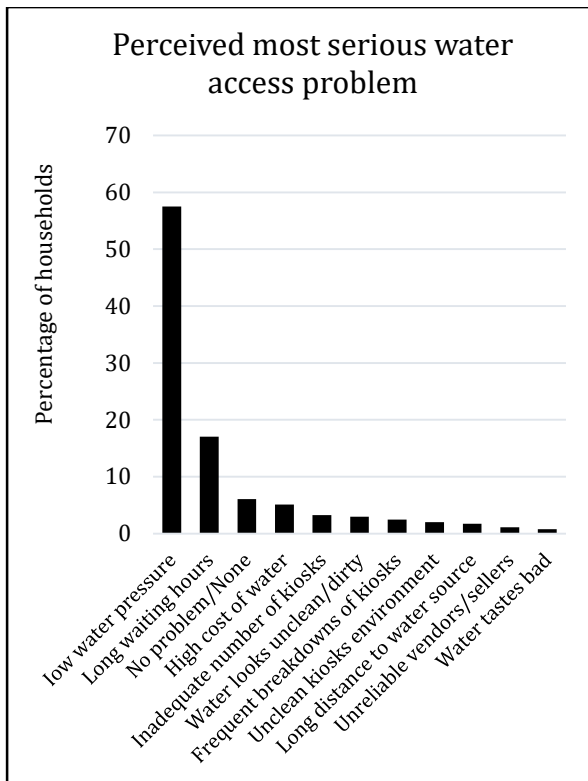


Figure 2. 4: Perceived most serious water problem

Water use (Fig 2.5) by volume was significantly higher in the wet season due to higher availability of rainwater as a supplementary source. In both dry and wet seasons, households used significantly more water for bathing and laundry than for other household purposes. Rainwater was the commonest source for general cleaning, laundry, and cleaning dishes, while for drinking and cooking, households relied mostly on water kiosks. Walking time to the nearest primary water source averaged 3.8 minutes , return time to homesteads averaged 4.5 minutes, while waiting time, rarely considered in research studies as access indicators, averaged 37.5 minutes. Some households waited for as long as 3 hours on each trip to their primary water source. Coupled with average number of trips to primary source, the study showed a significant time burden on households (Figs 2.6 and 2.7).

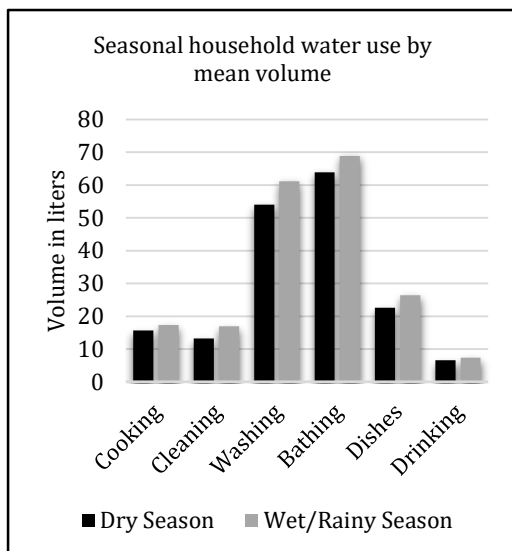


Figure 2. 5: Mean volume by season

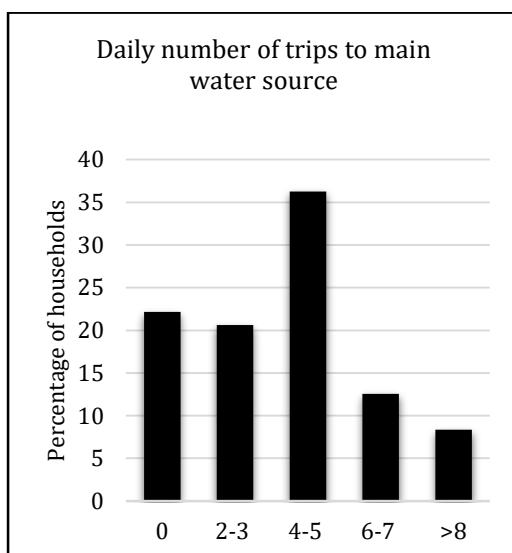


Figure 2. 6: Daily number of trips for water

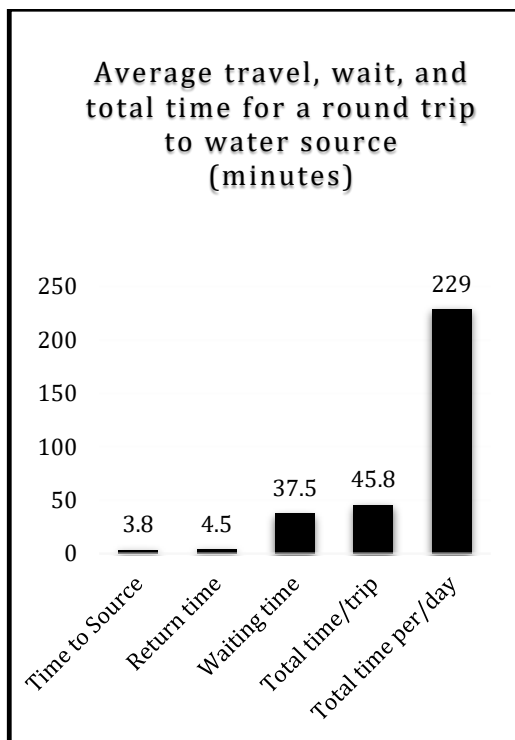


Figure 2. 7: Average travel and wait times per day

2.4.2 Household Socio-economic Characteristics and Water Access

Employment status, household size, household income, amount of money paid as rent, number of rooms in household, water storage capacity, and number of trips were significantly associated with volume of water per capita. Specifically, households with employed heads had access to significantly higher volumes of water per capita ($P<0.001$) while household size ($P<0.001$) showed a negatively significant association with volume of water per capita, an indication that larger households have access to significantly less water per capita. Income ($P<0.05$) emerged significant but negatively correlated with volume of water per capita. Rent paid ($P<0.05$) and number of rooms ($P<0.05$) showed a significantly positive association with volume of water per capita, as did storage capacity ($P<0.001$) and number of trips ($P<0.001$). Although not significant, education of the household head showed a negative association with volume of water per capita, while being native significantly correlated negatively with volume of water per capita. Among the significant socio-economic predictors, standardized regression coefficients demonstrated that household size ($\beta=0.44$), number of trips ($\beta=0.24$) and storage capacity ($\beta=0.18$), in descending order, had the most potent influence on volume of water per capita.

Education of household head ($P<0.05$) showed a negative association with total time spent per day fetching water. In contrast, employment status (being employed) of household head ($P<0.05$) showed a significantly positive association with total time per day. As expected, increasing number of trips ($P<0.001$) to main water source meant a significant time burden per day, while storage capacity ($P<0.05$) significantly correlated positively with total time per day. The most influential significant predictors of total time spent per day were a household head's employment status ($\beta=0.098$), number of trips ($\beta=0.05$), and storage capacity ($\beta=0.003$).

Age of household head ($P<0.001$) correlated significantly negatively with affordability. Consistent with the hypothesized direction, households whose heads were employed ($P<0.001$) were better able to afford the cost of water. Also congruent with this direction is the positive but insignificant relationship between income and affordability. The presence of a household toilet ($P<0.001$) correlates positively significantly with affordability in the same manner as number of assets owned by a household. Number of assets owned by a household ($\beta=0.16$) was the most influential significant predictor of affordability followed by whether or not a household head is employed ($\beta=0.12$). Table 2.2 outlines the OLS multiple regression results in detail.

Table 2. 2: Association between water access and household socio-economic characteristics

Predictor variables	Volume per capita <i>B(SE)Sig</i>	Total time/day <i>B(SE)Sig</i>	Affordability <i>B(SE)Sig</i>
Age	-0.0384 (0.0488)	-1.168 (0.789)	-0.231*** (0.0335)
Education	-0.614 (0.873)	-23.58* (14.12)	-0.624 (0.600)
Employed	3.113** (1.076)	33.46* (17.40)	2.118** (0.739)
Native	-0.187 (1.424)	27.35 (23.03)	-0.359 (0.980)
Household size	-3.275*** (0.290)	-3.076 (4.678)	0.267 (0.199)
Income	-0.0117* (0.00479)	0.0668 (0.0775)	0.00501 (0.00328)
Rent	0.0003* (0.0002)	-0.00122 (0.00270)	0.000104 (0.000115)
Toilet in house	-1.433 (4.192)	82.76 (67.83)	16.74*** (2.872)
Number of rooms	1.273* (0.671)	9.935 (10.85)	0.229 (0.460)
Number of assets	0.600* (0.287)	2.475 (4.642)	0.645** (0.197)
Storage capacity	0.0146*** (0.00252)	0.0693* (0.0404)	0.00200 (0.00173)
Treats water	-0.216 (1.316)	-23.33 (21.25)	0.541 (0.908)
Number of trips	1.502*** (0.195)	52.82*** (3.145)	0.191 (0.133)
_cons	35.59*** (5.237)	-55.69 (84.62)	18.59*** (3.587)
<i>N</i>	641	643	636

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.4.3 Socio-Economic Determinants of Water Access Thresholds

Household size, monthly rent, storage capacity, and water treatment significantly predicted the log odds of a household's primary water source being improved. Larger households surprisingly had greater odds (Odds Ratio, OR=1.174) of using an improved primary water source; however, the log odds (0.92) of using an improved secondary suggest a negative relationship with increasing household size. Rent amount (OR=1.00)

was positively associated with increased log odds of using an improved primary water source. Surprisingly, even though insignificantly, being native increases the log odds of using an improved primary source. Household size, rent, and storage capacity were the most influential predictors of primary water source in comparison with other significant predictors.

Employment status, household size, number of rooms, water-storage capacity, water treatment, and number of trips were all significantly associated with the log odds of meeting Malawi's minimum access standard by volume per capita (*27 liters*). A household whose head is employed (OR=1.65) is significantly more likely to have access to the minimum acceptable volume per capita. Conversely, household size correlates significantly negatively with the log odds of meeting the minimum volume standards, implying that larger households are less likely to meet the minimum acceptable threshold. A unit increase in the number of rooms in a household (OR=1.27), storage capacity (OR=1.02), and number of daily trips to water source (OR=1.23) significantly increase the log odds of a household satisfying minimum volume thresholds by 27%, 2%, and 23%, respectively. Employment status of household head, number of trips to primary source, and storage capacity had the strongest influence on minimum volume thresholds relative to other significant predictors.

Only the presence of a toilet facility in household, the number of assets, and the number of water-fetching trips emerged as significant predictors of minimum time threshold (*30 minutes or less*). Having a toilet (OR=0.22) significantly increases the log odds of meeting the time threshold. A unit increase in number of assets significantly increases the log odds of meeting the acceptable time threshold by 9%. Number of daily trips surprisingly correlated negatively with the minimum acceptable threshold for time, demonstrating that households that spend more than 30 minutes for each trip to

and from their main water source also engage in multiple trips. Rent, storage capacity, income, and water treatment showed a positive, albeit insignificant relationship with the log odds of meeting minimum time thresholds. Among the significant predictors of minimum time thresholds, number of assets owned by a household and number of trips to water source were more influential.

Age of household head, household size, being native, household income, and number of rooms in household are significantly associated with the affordability threshold of not spending more than 3% of income on water. Older household heads as predicted had significantly reduced log odds of satisfying the minimum affordability threshold (OR=0.98). Natives, (OR=0.44) consistent with our hypothesis, had reduced log odds of meeting minimum affordability thresholds. As expected, larger households had significantly reduced odds of meeting the affordability standard while number of rooms (OR=1.006) in a household significantly correlated with increased log odds of meeting the affordability threshold. Number of trips by a household (OR=1.158), congruent with the hypothesized direction, significantly correlates positively with affordability. Comparatively across the significant predictors of minimum affordability thresholds, income, number of trips, and number of rooms in a household were the strongest. Detailed results of the logistic regression are presented in Table 2.3.

Table 2. 3: Logistic regression results showing the association between household socio-economic characteristics and minimum water access thresholds

Predictor variables	Primary source (improved=1) <i>OR(SE)Sig</i>	Volume/capita (=>27=1) <i>OR(SE)Sig</i>	Time (=<30=1) <i>OR(SE)Sig</i>	Affordability (<3% of income=1) <i>OR(SE)Sig</i>
Age	1.012 (0.0122)	0.987 (0.00836)	1.011 (0.00876)	0.968* (0.0138)
Education	1.271 (0.298)	1.058 (0.161)	1.245 (0.187)	0.920 (0.203)
Employed	1.072 (0.305)	1.652** (0.308)	0.980 (0.178)	1.002 (0.258)
Native	1.073 (0.391)	0.920 (0.224)	1.172 (0.284)	0.449* (0.183)
Household size	1.174** (0.0910)	0.631*** (0.0368)	0.983 (0.0496)	0.136* (0.0857)
Income	1.008 (0.00477)	0.998 (0.00137)	1.000 (0.00899)	1.142*** (0.0134)
Rent	1.000*** (0.0009)	1.000 (0.00003)	1.000 (0.00319)	1.000 (0.0000435)
Toilet in house	1.800 (1.567)	0.569 (0.431)	0.224* (0.187)	2.059 (2.950)
Rooms	0.806 (0.133)	1.270* (0.150)	1.229 (0.143)	1.0064* (0.108)
Assets	1.029 (0.0873)	1.072 (0.0554)	1.091* (0.0552)	1.089 (0.0762)
Storage	0.999* (0.00054)	1.002*** (0.000482)	1.000 (0.000441)	1.001 (0.000597)
Treats water	0.182*** (0.0516)	0.652* (0.148)	1.311 (0.299)	0.735 (0.254)
Trips	1.066 (0.0549)	1.233*** (0.0451)	0.738*** (0.0278)	1.158** (0.0577)
<i>N</i>	643	641	643	636

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.5 Discussion

We investigated the key factors associated with poor water access in urban and peri-urban informal settlements of Lilongwe, Malawi's capital city, using mainly household surveys. We used a multidimensional approach to explore access to water under four dimensions: time burden, adequacy, availability, and affordability. The results broadly reflect some of the key complexities associated with water insecurity in urban and peri-urban informal settlements of Sub-Saharan Africa which seldom receive sufficient scholarly and policy attention.

Our findings show waiting time as the key limiting factor of water access for peri-urban settlements, manifesting from a combination of erratic water supply from low water pressure, high water-kiosk nonfunctional rates, and overcrowding. Waiting time (*38 minutes on average*) undermined water access much more than average walking and return times to primary sources (*3.8 minutes*). These limitations imposed by waiting time on water access are consistent with evidence from a cross-sectional study in urban East Africa where despite no significant changes in distance to primary water sources, time taken to get water nearly tripled from 1967 to 1997 due to waiting (Thompson et al. 2000).

Carefully measuring access to water by separating total time into travel, wait, and return times was necessary to highlight how waiting time couples with number of trips to create a time burden on households (Fig 2.6 and Fig 2.7). However, waiting time is seldom incorporated into global discussions of access, including UN/WHO's reports where emphasis hitherto has been on round-trip travel time. The Malawi case illustrates that not only is disaggregation of time necessary but the inclusion of number of trips is critical to show fully the time burdens and associated water-access burden on peri-urban households.

According to the respondents, the most worrying water-access problems were irregular water supply and prolonged waiting times. Their perception corroborates our empirical findings that poor water access is largely a function of waiting time and number of trips. While time constraints to water access have been widely covered in the WASH literature, mostly pointing to long distances to water sources as one key culprit (Ako et al. 2010), our findings demonstrate the contrary, showing that distance and time effects on water access may differ between rural and urban areas. While studies have shown that distance is an important metric for rural water access (Majuru et al. 2012; Ho, Russel and Davis 2014), understandably so because rural households are often more dispersed, our study shows the relevance of including waiting time in the context of densely populated urban and peri-urban informal settlements where distances to water sources tend to be shorter.

The general unwillingness of respondents to connect homesteads to the water network implies that while household taps may be a good policy target in the long term, it is impractical in the short term for peri-urban areas. Approximately 90 percent of the study households are without access to household taps and yet mostly unwilling to pay for home tap connections. While existing literature has documented cost and insecure land tenure as the main reasons accounting for such unwillingness (See Whittington et al. 2002, Connors 2005), our study shows that where a majority of peri-urban residents rent houses rather occupy illegally, this unwillingness is due to a perception that landlords should be responsible for providing household taps.

The study also shows the importance of including alternative or secondary sources of water in access measurements and discussions. For example, 97% of households have access to primary water sources which are considered improved but this access to improved sources declines precipitously to 37% when considering

alternative sources, which emphasizes the need to pay attention to alternative sources in our global discussions of water access. In discussing access to water particularly for urban areas, an important question then is how much emphasis to place on alternative sources, which in the absence of primary sources play a significant role. In the Lake Victoria region of Kenya, Nzengya and Aggarwal (2013) reported that access to water by minimum quality standards dropped from 50% for primary sources to 21% when sources were secondary. The implication of overemphasizing primary sources without sufficient attention to alternative sources will produce statistics on access that obscure an actual water access situation, especially as unreliability of and interruptions in primary water supply is a common feature. Furthermore, while private taps emerged as an important alternative source of water, cost per bucket was significantly higher; this phenomenon of private taps sold illegally at prohibitive prices has been documented by other researchers (Nganyanyuka et al. 2014).

General indicators of socio-economic wellbeing correlated significantly with better access to potable water. Income, corroborated by other measures such as assets, toilet in household, number of rooms, and storage capacity, significantly influenced access. The positively significant association between volume of water per capita and household income, rent paid, number of rooms, and water storage capacity reinforces what many studies have documented that wealth is often a predictor of water access (Adams et al. 2015). A plausible explanation for the negative correlation between household size and volume per capita is that larger households tend to be poorer, and generally have low access to water (Dungumaro 2007). A bivariate correlation of household size and income showed a negative relationship, corroborating that larger households are relatively poorer. This is also reflected in the logistic regression analysis where increasing household size showed significantly decreasing odds of a household's

ability to meet minimum volume requirements. The positive significant correlation between employment status of household head and time as opposed to the predicted negative relationship buttresses the problem of time burden. Relatively wealthier households without home taps also spend considerable time at the public-water kiosks.

2.5.1 Limitations

While the study has advanced our understanding of access to water in urban informal settlements, the results and interpretations should be viewed cautiously in light of the following assumptions and limitations. First are on the limitations on the reliability of household income which we use to draw associations between socio-economic wellbeing and access to water. In most African societies, financial issues are handled by men. In our sample, 87 percent were women, and had to estimate household income with little knowledge about husbands' incomes, not to mention that families may have multiple sources of income from non-salary jobs.

To enhance the reliability of the income data, we used multiple sources of income common to peri-urban residents to estimate as accurately as possible a monthly income. In addition, we used alternative measures of general socio-economic status—assets, rooms, and monthly rent—as proxies for income for cross validation. The study is based mainly on household surveys; values are mostly self-reported, and therefore subject to biases and validity concerns (Buor 2004). As Ho et al. (2014) point out, self-reported estimates of distance and or travel time can be unreliable. To minimize self-reported bias, certain questions were asked multiple times to arrive at the most closely accurate response.

2.6 Conclusion

This chapter has argued that for urban and peri-urban informal settlements in Sub-Saharan Africa where a majority of the population depends on public standpipes (water *kiosks*), poor access to potable water arises from a combination of long waiting times and multiple trips needed to satisfy daily water needs by households. Even when round-trip time may be within acceptable standards, the number of trips needed to meet daily water needs complicates access and imposes a significant physical burden on households, especially women and girls. Therefore, monitoring access for growing informal settlements calls for adequate attention especially waiting time and inclusion of the number of trips.

The longer waiting times demonstrate that poor access to water is a direct function of weak or limited infrastructure. Hitherto, attempts to solve the problem of poor access to water in Malawi's peri-urban context have prioritized and focused on shortening walking distances to water sources by increasing the number of public water kiosks. Even though this is a commendable approach, building more water kiosks without addressing fundamental issues with weak infrastructure, to enhance water treatment and water pressure, may actually escalate long waiting times as the density of peri-urban neighborhoods grows and demand for water increases.

The generally high dependence on water kiosks as primary water source in the context of increasing unreliability of supply, limited existence of alternative improved water sources, and unwillingness or inability of households to invest in household water connections demonstrates that water kiosks will remain the most important water sources for Malawi's informal settlements into the foreseeable future and priority should be placed on enhancing their density and promoting their effective

management rather than on increasing the focus on household taps, which despite being the most improved forms of water remain infeasible in the short term.

Finally, we have demonstrated that a multi-dimensional approach to measuring water access across multiple indicators or dimensions is necessary for effective policy reforms and interventions. By so doing, we have contributed to the understanding of how water access and insecurity can be framed and examined, particularly in the context of growing and expanding urban informal settlements. Even among low income settlements where most, if not all, are relatively poor, subtle differences in socio-economic status were sufficient to differentiate households based on ease of access to water. Taken together, these findings show that studying access to potable water by considering multiple dimensions of the concept provides a more holistic picture and highlights areas most critical for policy attention.

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CHAPTER 3: THE INSTITUTIONAL LANDSCAPE

PARTICIPANTS OR CUSTOMERS IN WATER GOVERNANCE? COMMUNITY-PUBLIC PARTNERSHIPS FOR PERI-URBAN WATER SUPPLY

Abstract:

We examine the performance of water user associations (WUAs) and the role of actors, power relations, socio-institutional dynamics, and context in supplying water to poor urban/peri-urban neighborhoods of Malawi's two major cities. Using a preliminary survey, key-informant interviews, focus groups, secondary data, and insights from the community-based natural resources management (CBNRM) literature and common-pool resources (CPR) theory, we argue that while a business-based WUA model can enhance water supply and access, the urban/peri-urban and historical context alters the nature of water and social actors and power relations involved, causing tradeoffs between water-supply and social goals of ownership, participation, and empowerment. The ensuing tradeoffs demonstrate that water supply to the urban/peri-urban landscape through community-based initiatives requires flexibility in CBNRM expectations.

Keywords: decentralization, community-based natural resource management (CBNRM), peri-urban, Malawi, water, water user associations

3.1 Introduction

Lack of access to potable water is a global problem affecting nearly 800 million people. Although progress has been made towards addressing the problem, including through the Millennium Development Goal of halving the proportion of people without access to potable water by 2015, many countries still lag behind. Only a third of Sub-Saharan Africa's (SSA) population has access to piped water within household (Seager 2010). Millions rely on unsafe water sources, with grave economic and health consequences, including 2.4 million annual deaths in all developing countries (Bartram and Cairncross 2010) mainly from diarrhea (1.8 million) in children aged 1-5 (UN Human Development Report 2006). In peri-urban areas the quest to improve water access is hampered by multiple factors including insecure and uncertain land tenure, poor or lack of piped-water infrastructure, and dense populations characterized by poverty. Neglect by and poor capacity of central and municipal government authorities complicate water provision (Kalulu and Hoko 2010, Marston 2014).

Government utility agencies and private companies often have no financial incentives to provide water to both rural and poor peri-urban areas, given the high upfront financial and infrastructural investments with no guarantee of cost recovery. Terrain, unplanned settlements, and dispersed poor populations compound the problem and undermine economic viability. Therefore private and public utility agencies tend to cherry-pick cities over rural areas, and wealthy urban over low-income and peri-urban neighborhoods where the poor pay more per unit of water and are often systematically marginalized and underserved even more than in rural areas (Swyngedouw 2006; Bakker 2013), lost in the socio-institutional and policy interstices between rural and urban. Some of these challenges reflect the unclear spatial boundaries of the 'peri-urban.' We define peri-urban as predominantly unplanned

settlements within, and transitional areas along city boundaries characterized by low incomes, overcrowding, insecure land tenure, and lack of basic services including clean water and sanitation (Mbiba and Huchzermeyer 2002).

With the failure of both public and private water-supply systems to improve supply and access for poor urban/peri-urban communities, attention has turned to alternatives involving diverse partnerships among public, private, non-governmental organizations (NGOs), and water-user communities, including community-based natural resources management (CBNRM) institutions couched within neoliberal decentralization and ‘good governance’ goals (Gutierrez 2007, Kalulu and Hoko 2010). Some criticize CBNRM-based decentralization as a deliberate attempt by governments to advance a neoliberal, cost-recovery, demand-driven and profit-inspired agenda which rarely aims to empower communities, in practice (Ferguson, Whiteford, and Whiteford 2005; Blaikie 2006). In this regard, the rise of community-based, decentralized water governance is both a symptom of and potential antidote to “governance failure” in urban water delivery systems (Bakker 2010).

Growing international consensus also favors community-based over centralized public or privatized approaches for theorized benefits including participation, empowerment, autonomy/ownership, and sustainability (Cleaver and Toner 2006). Despite the rhetorical appeal—even romanticization—of CBNRM, performance has generally been poor or at best mixed, prompting claims that CBNRM remains a hypothesis (e.g., by Tacconi 2007). Still, growing interest in communities and the plight of the urban/peri-urban poor also reflects recent (2000s) major shifts in scholarly and policy debates on drinking-water supply and access from supply- to demand-driven and decentralized approaches, and from techno-scientific to more socio-political approaches that recognize the role of social and power relations and institutions in mediating water

access (Ferguson, Whiteford, and Whiteford 2005, Bakker et al. 2008, Swyngedouw 2009, Agnew 2011).

However, CBNRM approaches have more traditionally been used in rural areas where they fill a void because private and public water provision seem financially unviable, and mainly to supply/manage surface and ground water for domestic use (e.g., wells and boreholes) or irrigation (Vasquez 2004, Ghosh 2007) and in managing other natural resources (Kazbekov et al. 2009, Blaikie 2006). Their use for piped-water supply in (peri-) urban settings is nascent and little is known of their performance. To be sure, CBNRM approaches are no panacea in the rural areas where their relative costs and benefits remain uncertain (e.g., Blaikie 2006, Dressler et al. 2010, Zulu 2008). Still, the few studies conducted in urban areas show some early promise on water-supply goals and challenges on broader social goals (Vasquez 2004, WorldBank 2006, Jimu 2008, Opare 2011, Marston 2014), suggesting the need for further analysis.

The objective of this study is to examine the potential of community-based water-supply systems to enhance water supply and broader community empowerment and socioeconomic benefits for poor urban and peri-urban households in SSA using the case of piped water supply from communal standpipes (water kiosks) through Water User Associations (WUAs) in Malawi. The water kiosks are connected to public water systems managed by semi-commercial water boards (WBs). We specifically assess strengths, weaknesses and opportunities provided by the institutional arrangements adopted under this cost-recovery based WUA model. We further examine the nature and impacts of power interactions among the main actors and institutions, their diverse motivations, and how the urban/peri-urban setting affects the nature of CBNRM, its tenets, and expected outcomes.

Malawi is a microcosm of acute challenges associated with water supply and broader social benefits to the urban poor in developing countries. Rapid population growth and extreme poverty exacerbate the challenge. Malawi's population more than tripled between 1996 and 2008—4.04 million to 13.1 million (GOM 2008). In 2012, Malawi ranked 170 out of 187 countries based on the United Nations Human Development Index (HDI) (UNDP 2013). Most (53%) Malawians live below the national poverty line, mostly subsisting on agriculture (Nkhoma 2011). Although some reports (WHO and UNICEF 2014) claim 95% of Malawi's population has access to safe drinking water, only 30% has piped water on their premises, and 65% depend primarily on boreholes, dug wells and unprotected sources, while the majority in peri-urban areas depend on communal water kiosks (GOM 2010) and some informal private-vendor sources, reflecting the regional scenario (Solo 1999, Kjellén and McGranahan 2006). The water kiosks are sparsely distributed, resulting in long walking distances and wait times. Residents pay for the water by the bucket, generally 20 liters in capacity. In July 2013, the cost per bucket was 12-15 Malawi Kwacha (US \$0.04 – 0.05), 4-5 percent of monthly income based on preliminary survey data.

Over 8,800 adults and 4,500 under-five children die annually in Malawi mainly from diarrheal diseases from using contaminated water, causing \$57 million in economic losses (WSP 2010). Over 42 percent of households, mainly women and children, spend more than 30 minute on average daily (maximum six hours) collecting water (GOM 2010). Yet national statistics lump rural and urban areas together, obscuring equally acute water-access challenges within peri-urban neighborhoods where extreme poverty forces many residents to still depend on unsafe water sources. Malawi, among a few developing countries, recently turned from largely failed top-

down to community-based water governance for peri-urban water supply through WUAs.

The rest of the article is organized as follows. First, we discuss the historical evolution of WUAs and situate the study within the broader CBNRM and common pool resources literature (CPR). After a brief methodology, we present and discuss main findings focusing on institutional dynamics. These include organizational arrangements, user representation and participation, water politics and power relations among key actors, and WUA performance against water-supply and broader social goals, framed around CPR theory and institutional design principles. We finally discuss our findings and their implications before concluding. We argue that community-based water governance through WUAs can enhance peri-urban water supply, but the urban/peri-urban context alters the mix of social actors and power relations in ways that undermine participatory-decision making and equitable-benefit sharing.

3.2 Community-Based Water Governance Approaches in Developing Countries

Water-policy reforms from government to community-centered approaches have gained momentum over the past two decades under decentralization and popular CBNRM prescriptions (Ferguson, Whiteford and Whiteford 2005). Their emergence in urban settings is more recent. CBNRM not only offers an alternative to largely failed public and privatized water-supply approaches for the poor, and a means for cash-starved and mismanaged public agencies to externalize water supply and system expansion costs to the users. It is also attractive for its underlying tenets, including community empowerment through user self-organizing into recognized local organizations, e.g., associations, committees, and cooperatives; formulation of locally agreed operational rules on resource use and user behavior including sanctions (often

contained in constitutions), and a management plan for the resource mutually agreed by key stakeholders; devolution to the local institutions of adequate legal resource rights, including decision-making powers and the economic incentives communities need to assume significant responsibility for sustained resource use; significant local participation and ownership; and equitable cost and benefit sharing (Agrawal 2001, Morares and Perkins 2007).

CBNRM proponents argue that local communities: (1) are best placed to collectively manage local natural resources efficiently using common-property systems, (2) have the greatest stake and therefore incentives to manage such resources wisely, and (3) can produce environmental and social benefits (Ostrom 1990, Chambers 1997, Blaikie 2006, Nelson and Agrawal 2008). CBNRM formally commences with a formal agreement between community representatives and a responsible public-sector agency or non-governmental entity. Community monitoring is essential during implementation to prevent or mitigate free-riding behavior, CBNRM's 'Achilles heel.' CBNRM's strong theoretical appeal lies in expectations of enhanced local relevance, appropriateness, efficiency, productivity, community empowerment, equity and social justice (Chambers 1997; Blaikie 2006). Some of the CBNRM ideals/assumptions are flawed and implementation imperfect, resulting in frequent failures (Blaikie 2006). For example, well-meaning reform efforts to replace Irrigation Boards with WUAs in South Africa in order to make water governance more participatory, equitable, and inclusive not only failed to achieve intended outcomes, but also reinforced pre-existing inequitable outcomes (Brown 2011).

Insights from Common-Pool Resources (CPR) theory influence CBNRM concepts and praxis, particularly institutional dynamics. CPR theorists argue that *open access*, not community property systems as Garrett Harding (1968) suggests, is the cause of the

"tragedy of the commons," arising when individuals overuse common-access resources at the expense of the group (Ostrom 1990). They prescribe strong collective institutions as the solution, arguing that such common-property systems can regulate resource use and avoid free-for-all exploitation as effectively as or better than public or private property systems. They hypothesize that given legal resource rights and adequate incentives that make expected benefits exceed perceived costs for most users, local resource users are likely to invest time and energy to collectively manage common-pool resources sustainably (Ostrom et al. 1999). CPR theorists provide lists of conditions, institutional *design principles*, which are believed to improve chances of emergence and success of CPR institutions (Wade 1988, Ostrom 1990). A recent global meta-analysis of the performance of the eight core design principles (CDP) from 91 studies in diverse resources shows that they are largely effective, with minor modifications suggested (Cox et al. 2010). Wilson, Ostrom and Cox (2013 page 21) contend that the CDPs have broader utility even beyond CPR management, "as a practical guide for improving the efficacy of many kinds of groups."

For the Malawi WUA model, understanding the configuration, relative importance, and extent to which CDPs were met is important in understanding the emergence, nature, and performance of CBNRM in urban areas. In particular, the role of the urban context in influencing CBNRM tenets in the form of the relative importance of CDPs is vital, for instance in dealing with WUA membership and the nature of the water resource (CDP 1), relative costs and benefits of collective action (CDP 2), participation form, level and quality and representation (CDP 3), the nature, level and effectiveness of monitoring (CDP 4), graduated sanctions (CDP 5), and conflict resolution (CDP 6). The nature of urban settings often demands polycentric rather than singular forms of

governance (Wilson, Olson and Cox 2013), making collaboration and coordination across groups and nested scales (CDP 8) potentially important for WUA success.

CPR-theory is critiqued for simplistic conceptualization of ‘community’ as a homogenous, spatially bounded entity, narrow focus on formal at the expense of informal rules, and inadequate attention to power and how power relations mediate CBNRM outcomes (Steins and Edwards 1999, La Trobe and Acott 2000, Wilder and Lankao 2006).

In reality, CBNRM failures are more common than successes in achieving ecological/resource and social goals (Blaikie 2006, Seager 2010), casting doubts on their future prospects (Agrawal 2001; Dressler et al. 2010). Many failures have been attributed to unmitigated unequal relations of power which result in local elite capture of resources and benefits (Steins and Edwards 1999, Zulu 2008, Ahlers and Zwarteveen 2009); limited or upward rather than downward accountability of CBNRM leaders (Ribot 1998, Mollinga 2008); poor monitoring and local rule enforcement, and low resource value and inadequate economic incentives (Zulu 2008); imposition of CBNRM initiatives or participation (Cooke and Kothari 2001); and political interference (Jimu 2008). Despite relatively common failures of CBNRM initiatives, and evidence pointing to widening gaps between theory or ideology and practice, and of limited successful outcomes, the concept remains popular and favored as a policy prescription. Blaikie (2006) calls CBNRM a “Trojan Horse” for neoliberal policies. He refers to increasing deployment of CBNRM and support by the international and NGO community as a policy goal for the Global South despite contradictions between CBNRM’s theoretical appeal, popular expectations, and measurable benefits to local communities. In many instances, CBNRM outcomes have been a far cry from its intended goal of empowering local communities and enhancing participation, as conservation of natural resources for the

benefit of either the state or local bureaucrats has remained a core agenda (Blaikie 2006). In fact, CBNRM projects have by and large created opportunities for elites to improve their livelihoods rather than benefitting marginalized, vulnerable community members, and under the guise of decentralization facilitated greater instead of limited state control (Li 2002, Ribot et al 2006).

Despite the many challenges and unknowns, early studies on community-based water supply for urban/peri-urban households in developing countries using cooperatives, committees, and other community organizations show some promise. For instance, SAGUAPAC (*Cooperativa de Servicios Públicos Santa Cruz Limitada*) is a sophisticated, autonomous cooperative that has provided water-supply and sewerage services to 1.2 million people of the city of Santa Cruz, Bolivia since the 1970's (Ruiz-Mier and van Ginneken 2006, Vasquez 2004). Autonomous community water boards based on community *juntas* have also competently supplied water in Paraguay, including to more than 25,000 Itagua city residents, and residence development committees show early promise in supplying water to underserved peri-urban neighborhoods in Zambia (Vasquez 2004). Few studies have been done in Africa; even fewer on communities supplying water from public systems. Early use of water selling committees in Malawi failed due to inefficiencies, mismanagement, and political interference (Jimu 2008, W4P 2008, Moulidi 2012). Our study seeks to fill this gap, particularly the adaptability and performance of CBNRM approaches for urban water supply by WUAs.

3.3 Methods

The study drew from fieldwork conducted in summer 2012 and 2013 in two peri-urban neighborhoods in Blantyre and Lilongwe cities and was predominantly qualitative. The

cities were chosen for two reasons: 1) ongoing rapid urbanization resulting in expansion of unplanned urban settlements, and 2) the nascent implementation of WUAs in Malawi's urban waterscape began in these two cities, which are also Malawi's largest. We relied primarily on focus groups, key-informant interviews, personal observations, and review of policy documents, reports, published studies from various agencies, and newspaper articles. Eight focus groups were conducted with leaders of WUAs selected purposively (based on availability for interviews) and initial consultation with the two cities' public water utilities, the Lilongwe and Blantyre Water Boards (LWB and BWB, respectively). We conducted four WUA focus groups in each city – Chinsapo, Kauma, Area 50, and Ntandire neighborhoods in Lilongwe; and Nkolokoti, Michiru, Mudi, and Ndirande neighborhoods in Blantyre. Each focus group generally had 6-10 participants made up of members of the executive committee, board members, members of the secretariat (who are WUA employees led by an administrator) and lasted about 60-90 minutes.

Focus group discussions concentrated on understanding the operations and performance of WUAs in meeting the water-supply and broader social benefits goals. Discussion topics included the nature, roles, relationships of power among main players in Malawi's urban water sector and impacts thereof; the history, structure, functions and day-to-day operations of each association; criteria for membership and associated rights, privileges and responsibilities, and levels and types of community participation in WUA activities; types/levels of social benefits; strengths, weaknesses and opportunities in water supply; and local perceptions of WUA performance, ownership and benefit sharing. We also conducted 28 interviews with key actors in the water sector, selected through a snowball sampling technique, in order to assess water-access issues, policy reforms, and the perceptions of the emergence of community-based water

supply for peri-urban areas, and closer examination of actors and their motivations. Key informants included government agents, municipal officials, LWB and BWB officials, and key NGO players, including WaterAid (Lilongwe) and Water for People (W4P, in Blantyre).

Respondents for the exploratory household survey were selected through combined stratified random and systematic sampling. One peri-urban neighborhood was randomly selected from a list of neighborhoods with functioning WUAs in each city: Ndirande in Blantyre and Chinsapo in Lilongwe. In each selected community, we selected a central location using information from multiple sources, and then systematically selected 7-8 evenly spaced households along transects running from the center to the four cardinal points (N, S, E and W), as carefully as the settlement pattern and lay of the land would allow. This generated 31 household respondents in Chinsapo Township and 30 in Ndirande (total 61). Since the study focused on understanding institutional arrangements and performance of the WUA model, the survey only supplemented the primary source of information – key informant interviews and focus groups. Thus, the final sample size(s) was considered sufficient to provide a rough general picture through basic descriptive statistics generated with Stata statistical software package. Information sought via household questionnaire included socio-demographic variables, drinking water sources, water-collection roles, water storage practices, and awareness of and perceptions about WUAs. The key-informant interviews and focus-groups were audio recorded with full consent, transcribed, and analyzed qualitatively using descriptive contextualization.

3.4 Water Reforms amid Weak Institutions in Malawi

Recent water reforms shift emphasis from supply- to demand-based approaches, and from public supply to commercial/privatized and community management to enhance supply while recovering costs and ensuring equitable access, affordability, and sustainability (Mulwafu et al. 2003, Ferguson and Mulwafu 2004). The 2005 National Water Policy's goal is to promote:

'sustainable management and utilization of water resources, in order to provide water of acceptable quality and of sufficient quantities, and ensure availability of efficient and effective water and sanitation services that satisfy the basic requirements of every Malawian, and for the enhancement of the country's natural ecosystem' (GOM 2005).

The policy, primarily aimed at sustainable utilization of water resources, also promotes and emphasizes community participation, ownership and empowerment. Several factors make community approaches attractive for water supply, including government resource limitations, old and poorly maintained supply infrastructure, failure of centralized public systems, and limited prospects for privatization to meet the water needs of a rapidly growing urban population (see Figure 3.1). Cash-strapped governments often see CBNRM as a means to externalize water-supply costs to users (as in Zulu 2009). Internationally, the Dublin Principles also promote community participation in the water sector in line with the global push for decentralization to enhance local empowerment, efficiency and 'good governance' (Bakker 2013).

Malawi adopted its decentralization policy and law in 1998. However, Malawi's water-sector reforms have been characterized by an urban bias, weak institutions and leadership, poorly coordinated policies and interventions (including donor activities), and inconsistent measures of access (Ferguson and Mulwafu 2004, Gutierrez 2007, Manda 2009, Mughogho and Kosamu 2012). For example, the water and health

ministries, city councils, and water boards (WBs) have related roles in water and sanitation delivery (see Table 1), yet no clear jurisdictional boundaries.

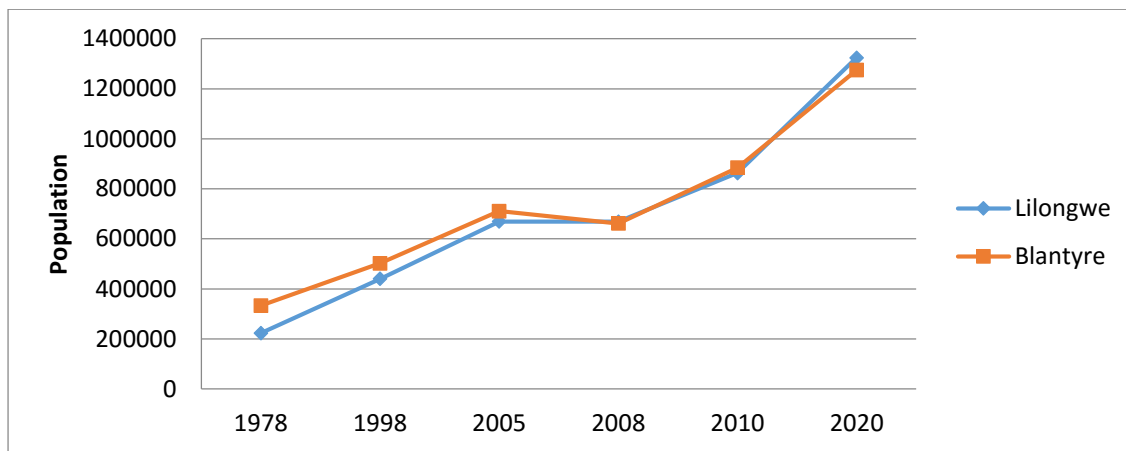


Figure 3. 1: Population trends and projections for Lilongwe and Blantyre cities

Table 3. 1: Major stakeholders in Malawi's water sector and their responsibilities

Organization	Functions and Responsibilities
Ministry of Irrigation and Water Development	• Oversight responsibility for the water sector • National water resources planning and management
The National Water Resources Board	• Formulate and publish the National Water Policy; oversee preparation of a National Water Resources Master Plan
Ministry of Health and Population	• Managing freshwater resources and hydrology
Ministry of Local Government	• Allocating water-resource rights
District Assemblies	• Responsible for water-related sanitation and hygiene
City and Regional Water Boards	• Oversees district assemblies and implementation of decentralization policies, including for water resources management
• Blantyre Water Board, Lilongwe Water Board • North/Central/Southern Region Water Boards	• Implement water and sanitation goals under decentralization reforms • Responsible for water supply to Blantyre and Lilongwe cities, including to water kiosks
Non-governmental organizations and community based organizations Water User Associations	• Supply water to small towns and Mzuzu and Zomba cities in the northern, central, and southern regions, including some water kiosks • Work with communities and government agencies to implement water and sanitation goals • Water supply and management of infrastructure, finances and water kiosks in peri-urban areas • Partner with the water boards (which supply the piped, treated water to kiosks) and other actors • Have a leadership and broader local development role from benefits of community-based water supply

Similarly, several laws regulate water-resources management and provision in Malawi. The 1969 Water Resources Act (revised in 2013) provides for water ownership and allocation, and administration of water rights. The Water Works Act (1995), which is administered by the ministry of water resources and irrigation, regulates water supply, sanitation provision, and management arrangements for responsible agencies. The 1995 Water Works Act tentatively provides for community management via WUAs. The 2013 Water Resources Act has provided more legal clarity for WUA structure, process and implementation. However, it focuses narrowly on rural areas and surface/ground water resources. Further, the Blantyre Water Works Act (1971) and Lilongwe semi-state (Water Works Act 1987) regulate water and sanitation management for the two cities under respective parastatal water boards (Ferguson and Mulwafu 2004; Mulwafu et al. 2003). These five semi-autonomous public water boards, one each for Blantyre and Lilongwe cities and three others in the northern, central and southern regions, were instituted to expand urban water-supply commercialization and private sector involvement under cost recovery while also expanding service to 'underserved' low income populations.

WUAs are formally recognized and registered legal entities, thereby significantly meeting requirements of core design principle 7 concerning rights to organize. Although WUAs are promoted as a community-based solution for water supply in peri-urban areas, the urban model is more top-down and business oriented (with a board, externally audited accounts and heavy WB oversight) than the more people-driven model provided for in the 2013 Water Resources Act. In reality the urban WUA model under study can more accurately be described as a co-management arrangement or, according Mughogho and Kosamu (2012), a state/civil-society/informal-sector (community) partnership involving community representatives, the public WBs, city

councils, and civil society. The most direct water-user involvement is paying for WUA water with limited user participation except through representatives at the institutional leadership level where the elected executive acts as the voice of the people (Figure 3.2). In broader terms, the urban WUA model best fits the sixth rung in Arnstein's (1969) typology of citizen participation, i.e., a partnership involving negotiation and participation among key parties. Arnstein's typology captures levels of citizen participation in the form of a ladder with eight rungs going from no participation at the bottom (level 1, manipulation) to complete participation at the top — level 8, citizen power. The other steps are: 2) therapy, 3) informing, 4) consultation, 5) placation, 6) partnership, and 7) delegated control (page 217). Levels 6-8 represent degrees of real citizen participation, 3-5 are levels of tokenism, and 1-2 represent nonparticipation.

3.5 The Emergence of Water User Associations in Malawi's Urban Waterscape

Malawi's contemporary WUA model emerged from a combination of policy, socio-economic, political, geographic, and historical factors, and actions of key social actors (WaterAid 2008, Jimu 2008, Manda 2009). Population-driven (Figure 3.1) increases in water demand and inadequate planning have put immense pressure on water infrastructure, causing frequent breakdowns and supply disruptions. For Blantyre, mountainous geography and frequent power failures worsen disruptions—sometimes two or more weeks of no water (The Nation Newspaper 2010). Poor urban/peri-urban areas are inordinately affected. Before WUA introduction, communal water kiosks were still the main source of water for peri-urban areas, but they were mainly managed by employees of Blantyre Water Board (BWB) and Lilongwe Water Board (LWB), or by private individuals and groups contracted by the WBs. Earlier studies (e.g., Jimu 2008, WaterAid 2008, Manda 2009) indicate that water-kiosk operation was characterized by

poor management, vandalism, lack of community coherence and poor responsiveness to faults and community complaints. Further, lack of transparency in water billing, overcharging by private kiosk operators, and lack of accountability, financial embezzlement, and inefficiencies led to frequent water-supply disconnections. Political interference compounded the inefficiencies and mismanagement. Members of ruling political parties were favored for jobs and private water-kiosk operational licenses to sustain political patronage and finance party activities. Thus, a change of ruling party was disruptive, causing struggles for control of water kiosks and vandalism (Jimu 2008). Increasing water-bill delinquency caused the WBs to disconnect water supply to and close many water kiosks. Water-bill debts reached 50 million Malawi Kwacha (MK) or US \$362,713 for Blantyre WB (The Nation Newspaper 2007) and by January 2006, MK30.8 (US \$260,906) million for Lilongwe WB (WaterAid 2008). However, in admission to the ensuing hardship for users, disconnecting water supply for poor peri-urban communities was politically sensitive. This added political pressure on the WBs to find a lasting solution that ensures supply resumption and sustenance, and affordability while recovering costs.

The urban WUA model started in Lilongwe first in 2006 and was copied in Blantyre in 2009, as 'partnerships of necessity' among overstretched, cash-starved WBs, water-bill delinquent and poor peri-urban communities, and key NGOs in the water sector. City councils were secondary partners. WUAs were promoted as a sustainable win-win solution premised on the WBs (re-)supplying water at communal water kiosks (mostly owned by the WBs but some constructed by NGOs or donor-funded projects), licensing WUAs to operate the kiosks, and providing them technical, managerial and capacity building support in collaboration with the NGOs. The communities (WUAs) would repay the WBs all past water-bill debts under a repayment plan while meeting

current water bills and operating expenses. A portrait of disempowerment, communities essentially paid for water twice because of previous governance deficiencies and politics which had created inefficiencies and abuses of community finances. Malawi's WUA introduction should thus be situated and understood within a historical context fraught with "governance failure" and political interference as water-kiosk managements was often given to largely unaccountable ruling party loyalists.

The WUA model emerged as a two-part process. First, WBs and NGOs came together in a tri-partite partnership formed under a formal agreement among the Lilongwe Water Board (LWB) and two NGOS, WaterAid Malawi and the Centre for Community Organization and Development, CCODE (WaterAid 2008). WaterAid provided managerial assistance to LWB including the establishment and initial funding of a Kiosk Management Unit within LWB dedicated to coordinating with community water providers and users including WUAs. CCODE mobilized communities and helped build their capacity to form WUAs to manage and maintain water kiosks systems. For Blantyre city, BWB would later (2007) form its formal tripartite partnership with Water for People (W4P), an international water NGO), and Blantyre City Assembly (local government) to work on peri-urban community water supply. In the second stage, the WB/NGO tri-partite partners designed the WUA model in a separate arrangement without meaningful community participation. The emergence of the WUA approach was in reality top-down rather than organic. Although the communities chose WUA approach over LWB and private operator management (WaterAid 2008), they had no input on the structure and content.

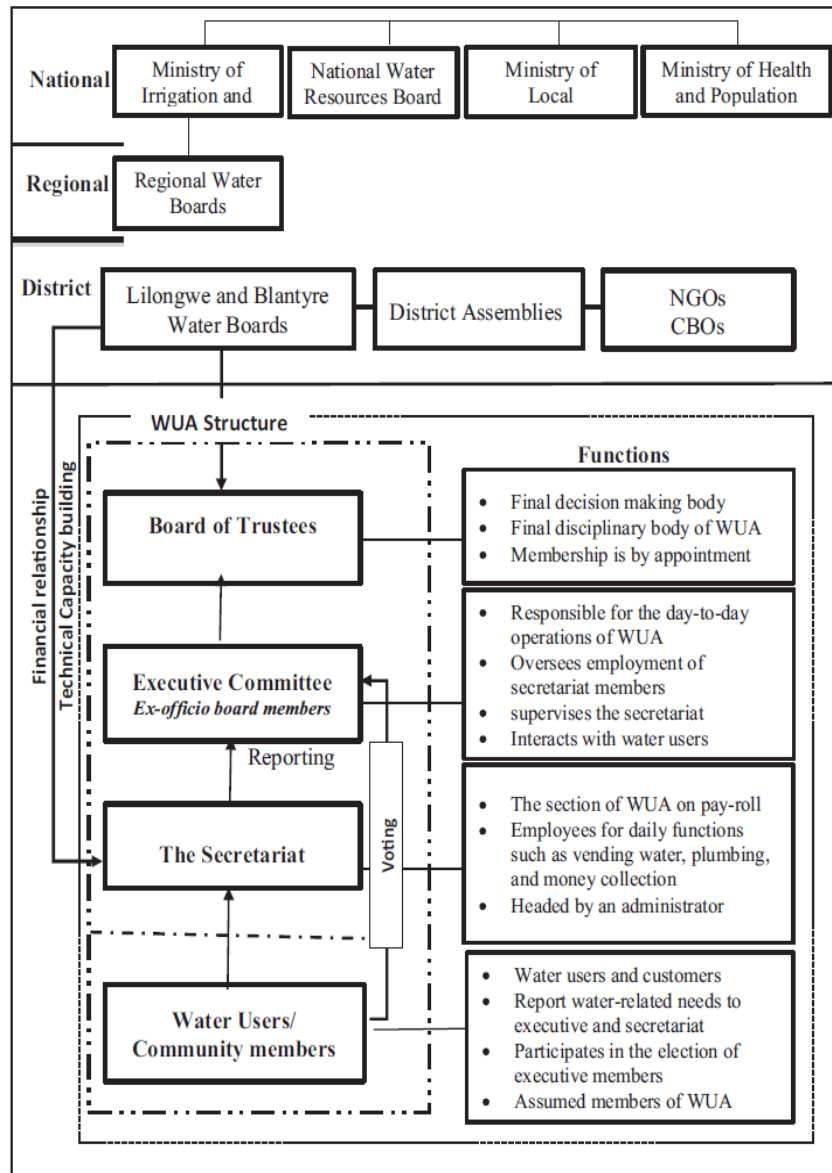


Figure 3. 2: The socio-institutional landscape of WUAs in Malawi

Malawi's urban WUA model has a hierarchical structure. A Board of Trustees is responsible for ultimate oversight, decision making, strategic planning, and supervision of an Executive Committee which is responsible for day-to-day functions. A Secretariat consisting of WUA employees (an administrator, water sellers, an accounts expert, and technical staff including plumbers and inspectors), and the WBs as ex-officio members) manages the water kiosks and immediate water-system network (e.g., water selling, meter reading, maintenance, office and finance management). Paying water users are at

the bottom of the hierarchy (Figure 3.2). The executive supervises the secretariat and its activities, monitors WUA progress, mediates among the board, the secretariat, and WBs and NGO partners on key issues to report to the board, and facilitates an annual general meeting, AGM. The AGM is supposed to be the ultimate decision-making platform for WUA activities, policies/strategies, and review and approval of financial reports, budgets and programs. Both the board and the executive have elected (chair and vice, secretary and members) and ex-officio members including traditional, religious, political, and business leaders from the community. Each WUA has a generic (imposed) constitution, is formally registered, and its Board chair signs a formal agreement with the WB as a water provider.

The lack of real participation in rule/constitution (re)formulation undermines fulfilment of core design principle, CDP 2. Residence within an area of jurisdiction for a WUA defines a water user as a member of the association while the neighborhood extent defines the 'soft' geographic boundary encompassing the shared water kiosks. Separating users from non-users though excludability of non-members is virtually impossible and unnecessary because at the water kiosk money for water payment is the only passport/barrier to access to the potable water resource (undermining CDP 1). Since the primary role of WUA members was paying for water (others were mainly attending meetings and electing leaders), the common CBNRM problem of free riding and need for resource and user monitoring (CDP 4) or conflict resolution among users (CDP 6) become less significant for WUA success (than, e.g., for rural irrigation systems). By March 2014, a total of eight low income areas (LIAs) had WUAs established, each managing multiple kiosks. Lilongwe had more than 500 water kiosks managed by six WUAs. Blantyre had 21 LIAs and more than 424 water kiosks (Moulidi 2012). These numbers change over time.

3.6 Institutional Performance of WUAs in Supplying Water to the Peri-Urban Poor

Preliminary analysis indicates that WUAs have made remarkable progress towards meeting the objective of maintaining and improving water supply to peri-urban communities, and continue to improve in technical and management performance and efficiency. These improvements mark a positive contrast over the performance of preceding private and community kiosk operators which was characterized by water-supply disruptions and disconnections, inefficiencies, and financial mismanagement. Gains in water supply result partly from an increase in the number of water kiosks (reported by 50.9% of survey respondents) and partly from reductions in kiosks breakdowns, disconnections, and water losses from leakages, as maintenance improves. Improvements include securing water meters within vandal-proof wooden boxes, and setting up innovative fault-reporting and response systems to identify and fix leaks (WaterAid 2008). In Blantyre, use of a sophisticated, user-friendly tracking system called Field Level Operations Watch (FLOW) by WUAs has significantly improved fault reporting and response times for repairs (Maoulidi 2012). FLOW, installed and supported by W4P, is based on (Android) cell phones and facilitates fault-report sending and receiving via text (SMS) and maps locations of faults using the phones' Google Earth software and a Global Positioning System (GPS) function. Generally positive user perceptions of WUA performance affirm the improvements. Most respondents (71.2%) considered water kiosks to be fairly well managed under WUAs, 64.4% rated WUA performance as good/average to very good/excellent, while only 18.6% deemed management poor-very poor.

There were also significant improvements in financial management, including billing and revenue-collection. WUAs have not only broken even but have also generated enough profits, after paying current water bills and operating costs, to pay

water-bill debts off—Blantyre WUAs by 2012 (Mughogho and Kosamu 2012). Most of the WUAs in Lilongwe (four out of six) had paid their outstanding debts by 2009. Some WUAs in Blantyre have reinvested their profits to rehabilitate and build new kiosks (Maoulidi 2012). These findings bode well for financial sustainability. Various observers attribute much of the early progress to the setting up of a dedicated Kiosk Management Unit within the WBs. These units have enhanced the ability of WBs to understand and be more responsive to needs of low income communities, and to support WUAs through a hands-on approach focusing on kiosk management, revenue collection, and water pricing (WaterAid 2008). Conversations revealed improved relations between peri-urban water users and the WBs after WUA introduction. WUA professionalization via a paid workforce, modern accounting/billing and water-maintenance systems further enhanced human resource, technical, and organizational proficiency.

These early gains suggest the beginnings of transformation from the previous loss-making, mismanaged and inefficient water providers. Those challenges go beyond the WUAs to entire public water supply systems. Even BWB had been financially unsustainable since 2002 (Kalulu and Hoko 2010). Given dependence of the business-driven WUAs model on paying customers, and the nature of water as a necessity of life, revenues will likely remain strong so long as water supply to the kiosks is assured. Data for water points in Blantyre's low-income areas (2010-2013) showed an increase in the proportion of systems that had intermediate to high levels of service delivery, accompanying an increasing trend in systems that were likely to be sustainable (W4P 2014). Further, our study revealed no complaints of WUA financial mismanagement, which were common in previous community efforts.

However, early WUA gains should be tempered with the reality of continuing water-supply and service-delivery challenges. These include water shortages from excessive demand and limited water availability due to supply disruptions from infrastructure failures, insufficient water kiosks, low water pressure, and limited service hours—usually 6am-6pm (see also Mughogho and Kossam 2012; Maoulidi 2012, W4P 2008). Our survey showed irregular water supply as the biggest problem. The persistent problem of water demand exceeding infrastructural supply capacity, especially in Blantyre, requires infrastructural solutions (W4P 2014). Institutionally, many more respondents were satisfied (40.6%) than dissatisfied (28.8%) with WUA performance. More respondents (39.0%) perceived WUAs unaccountable or very unaccountable than accountable or very accountable (25.4%) over water-revenues accounting. Nearly a third (30.5%) remained undecided, suggesting limited interaction with WUAs or indifference. Further, it may be too early to judge outcomes or performance without further analysis given that current gains are yet to translate into broader community empowerment and ownership

3.7 Power Relations and Water-User Representation

The interests, motivations, goals and power relations among key stakeholders within the particular political-historical context have shaped the emergence of a top down, rather than bottom-up approach in which WUAs are situated. The structure and implementation contravenes some CBNRM tenets and CPR design principles. For the WBs, the immediate motivation was to recover unpaid water bills and ensure payment of current and future bills from the water kiosks. The WBs use their considerable state-derived power as water-provider regulating authorities within the cities, monopoly status as sole suppliers of piped water, ownership of most of the water kiosks, and

recent history of non-payment of bills to influence the structure and functioning of WUAs to this end. According to Arnstein (1969 page 221), the partnership rung of the 'ladder of participation' is built on the principle of give and take, i.e., "power is often redistributed through a negotiation between citizens and power holders," with citizens often contributing financial resources to sustain a shared system. Despite the outward appearance of participation, the WBs maintain a tight and rigid regime of operational control over the WUAs that reinforces pre-existing power inequities.

Rigid WB control over WUA operations and virtual veto power on most WUA decisions has undermined or slowed down WUA autonomy, despite the gains in technical and managerial performance. Most WUA executive members interviewed lamented their limited autonomy in operational decision-making powers and of WB overreach. WBs provide a pre-determined boilerplate constitution for WUAs, limiting user participation in rule (re)formulation and violating core design principle (CDP) 3. WBs determine water supply zone boundaries, retain powers to register and approve/reject WUAs, control water pricing, train WUA office bearers, and even decide what a WUA's emblem will be. In the language of the imposed constitution blueprint for WUAs in Blantyre, the WBs "own and regulate the Water User Association," and have powers to dissolve WUAs or restructure their composition. WBs are also co-signatories on all "contracts, documents, bank account transactions or any matter of financial management requiring the signature of the Water Users Association" along with the Board Chair and another sometimes an executive committee member (Blantyre Water Board undated, pages 9-10).

The BWB and LWB constitution blueprints for WUAs were virtually identical. WBs also audit WUA accounts quarterly. WBs were even accused of going beyond facilitating elections to influencing them, e.g., by approving or making nominations or

even appointing board members against WUA-constitution stipulations. Focus groups also revealed that WB approval was required for many WUA decisions, including water pricing, worker salaries, use of WUA money, constitutional amendments, endorsement of election results, and disciplinary action. Thus, what legitimation and rights to organize the WBs gave the WUAs through registration and certification (adhering to CDP 7), they partly took away by limiting decision-making autonomy of WUAs (CDP 3) and by upending accountability directionality so that elected WUA leaders were forced to be more accountable to the WBs than to water users. WBs, instead of the user communities, appeared to do the monitoring of elected WUA bodies (contravening CDP 4). A sentiment by one WUA executive during focus groups reflects the gathering discontent:

“The best thing would have been to leave everything to the community. The Lilongwe Water Board, Water Aid — all those NGOs, they should be there on the [executive] board as ex-officio members just to see what we are doing; not controlling us in everything. We have the capacity to run water on our own.” (Focus group participant, Area 50, Lilongwe, July 26 2013)

Some WUA executive members accused WBs of usurping their role as WUA representatives and the voice of user communities. One explained:

“You find there are some meetings that are supposed to be attended by WUA members only, yet Lilongwe Water Board goes to attend those meetings in the name of the board secretary. Their kiosks management unit was formed just to run the WUAs so that they get their arrears that we owed them. Now that we have given back what belongs to them, what else do they want from us now?” (Focus group participant, Chinsapo, July 23, 2013)

Therefore, elected executive committees had limited decision-making power beyond supervision of the WUA Secretariat and employees. Most operational decisions were made by the WBs and key decisions by the board and poorly attended annual general assemblies, both of which were heavily influenced by the WBs both within and outside its constitutional authority. Further, the hierarchical WUA structure (Figure 2)

also limited interaction and information flow among key players. The secretariat has to channel concerns and needs to the board through the executive committee, which then reports to the board at quarterly meetings. Some WUA members complained that the infrequency of board meetings delayed decision making on important, pressing issues beyond the authority of the secretariat or executive. Emergency board meetings were rarely organized for such issues. Some even complained that the secretariat administrator (an *employee* who has no voting rights) sat on WUA Boards while *elected* executive committee members did not as in the ensuing quote:

"Yeah, I think that's a very big hurdle because I have never heard of the board interacting with the secretariat- it's only the administrator who is invited to board meetings and she is also not given enough time to express her views." (Focus group participant, Area 50, July 26, 2013)

Although WUA membership was clearly defined (CDP 1), its quality in the urban context made democratic representation a casualty of WUA implementation. Focus groups revealed that contrary to constitutional stipulations, dilutions of democratic representativeness through interference in elections also included appointing local elites whom they favored and could control, crowding out other good candidates, or appointing powerful but illiterate community members who had little capacity to question WB actions or decisions on the board. There were allegations that LWB had coerced some board members to sign documents without adequately understanding the content or implications. Blantyre WUA interviewees often complained that local educated elites dominated board and executive membership. Although this may make good business sense by ensuring that competent people oversee activities of the WUA executive and secretariat, it deprives community members the opportunity to elect less educated but good candidates and have their interests better represented on the board.

Factors including membership definition/expectations, individual motivations for being a member, the WUA constitutions, information flow, community/WB power relations, and the broader urban/peri-urban context appeared to affect the quality of broader empowerment and democratic character of the WUAs. Sustained access to (affordable) water is the primary benefit and potential motivation for being a WUA member, but this is tied to payment for the water rather than actual participation in WUA activities. The geographic residency-based definition of WUA membership makes it automatic and passive (many residents were still unaware of their membership), rather than opt-in and active, making the associated sense of belonging relatively weak. For many, such membership, without realistic responsibilities coupled with clear incentives and accountability measures, makes WUA membership almost meaningless or taken for granted. Beyond having to pay for water, attending WUA meeting including AGMs and voting for WUA office bearers are the only expectations from individual members. While board and executive members can be removed if they miss 2-3 meetings without excuse or for other reasons, there are no stipulated or realistic sanctions for ordinary members for not participating in such activities. Therefore the notion and risks of free-riding and need for graduated sanctions (CDP 5) as well as monitoring of users/members—as opposed to WUA office bearers who are mostly monitored by the WBs—or of the resource, which is done by a paid technical staff (CDP 4), *appear* less relevant than in standard CBNRM in rural areas. Conflict resolution and disciplinary arrangements are specified only for WUA committee members and employees. The narrow focus on elected officials and employees also reflects apparent confusion on whether a WUA consists only of the elected bodies and paid workers (and WB/NGO ‘partners’) or also includes water users. Thus, the BWB constitution blueprint confusingly defines a WUA as “a democratically elected cooperative association of

individual water users who wish to undertake water related activities for their mutual benefits” (BWB undated page 1). cursory mention of ‘privileges of membership’ lacks clarity on their nature and sharing beyond employment opportunities.

Initial findings showed low awareness of WUA roles, community participation, and ownership. A vast majority (91.5%) of respondents indicated never being informed about or invited to community meetings on water issues. More than half (53%) had never participated in WUA activities. Most (61.0%) did not know how their local WUA started (11.9% and 10.2% said it was started by communities and WBs, respectively), or how WUA executive membership is decided (66.1% versus 27.1% who correctly cited elections). Only a third felt well informed about WUA activities (61.0% did not). Low awareness of WUA roles also reflect the heavy presence of WBs in this supposedly participatory model relative to local WUA leaders. Most (59.0%) respondents thought the WBs, rather than WUAs (only 8.2%), were in charge of water supply, with 22.1% citing the government. This was 5-8 years after WUA introduction. More respondents (33.9%) considered WBs their primary source of help on water issues than WUAs (30.4%); 27.1% cited traditional leaders or ‘city chiefs,’ and 3.4% NGOs. Many perceived WUAs as employees of the WBs, with three main roles: water-fee collection (45.8%, valid N=59), water-kiosk maintenance (20.3%), and ensuring equitable water access for all (15.3%). In contrast on the issue of gender representation on elected WUA bodies, 50:50 men-women was the most popular response, aligning with the target in WUA constitutions. This is encouraging as it reflects the recognition that women and girls are the primary water collectors.

Another challenge for the WUA model, and most CBNRM approaches in general, is lack of regular executive-member compensation. Unlike secretariat employees, both the executive and the board are not paid a salary or wage. They are only paid an

honorarium/sitting allowance for each meeting attended. While this is fine for the board (which meets quarterly), executive members are expected to invest considerable time and effort providing ongoing quasi-professional leadership including supervision of a professional secretariat and a business-oriented enterprise. This simultaneous expectation of voluntarism among community leaders on the one hand, and high quality managerial and business-sound leadership that ensures sustained supply and social benefits, is both a major and self-defeating internal contradiction of CBNRM expectations under a neoliberal cost-recovery or livelihoods support goals, setting an obstacle to meaningful and sustained community participation in resolving shared natural resources challenges, and needs to be addressed urgently (Zulu 2013). On a business footing, investment in infrastructure should be accompanied by investing in motivated key personnel in order to enhance chances of success. Yet here, WUA executive members, who also have to earn a living and support their families in the city or peri-urban area, are expected to take considerable time out of their regular livelihood activities to lead and supervise WUAs for little or no formal pay. One or the other of these competing interests is likely to suffer through neglect, undermining WUA leadership and effectiveness. This can also lead to corruption among executive members as they try to make ends meet. Although having a paid semi-professional secretariat and several layers of checks in the WUA structure can mitigate such challenges, reported stirrings of discontent and complaints about lack of autonomy among WUA executive members increase the risk of rent-seeking behavior. Given the surplus extracted by WBs in debt repayment, there is adequate money for fair, transparent compensation to incentivize executive-committee members.

The partnership nature of the WUA model, particularly cross-institution (WBs, NGOs and municipal government) and cross-scale collaboration (CDP 8) has

contributed to early relative success despite shortcomings in meeting other design principles. The engagement of key water-sector NGOs was critical in WUA genesis and community mobilization, technical and managerial capacity building for both communities (e.g., the FLOW system) and the WBs (e.g., establishing the Kiosk Management Unit), partial funding, and continuing performance improvement. The three key NGOs also played an important intermediary role reconciling WB and community needs and interests. They assured the WBs that WUAs/communities can manage water kiosks effectively, achieve cost recovery (water bills, operating costs), and repay overdue water bills. The NGOs also fund construction of new water kiosks and rehabilitation of old ones.

WBs wield considerable power within the three-way partnerships with NGOs and the city council. The WB/NGO/community and city council relationship has been critical in resuscitating and enhancing community water supply. This at least partly addresses a major motivation for NGO participation — enhancing equitable and sustained access to water and sanitation services for low-income and marginalized communities, from a human-rights perspective, although the issue of water as a human right may be hard to reconcile with a cost-recovery WUA model. However, the WBs have assumed a more prominent role in day-to-day running and strategic issues of the WUAs since establishment, with at least one of the Lilongwe NGOs concerned that NGOs are being sidelined. Involvement of city councils ensures the integration of WUA activities into city decentralized (neighborhood) governance institutions and other activities of programs (e.g., health, sanitation), enhances WUA legitimacy, and can be the conduit for additional resources through other projects and provide institutional support.

3.8 WUAs and Broader Community Empowerment and Social Benefits

Findings on broader community empowerment and social benefits were mixed. Despite the gains in techno-managerial capacity, member participation, ownership and autonomy of elected WUA bodies, and general empowerment of communities were generally low due to both the WUA structure and its implementation driven by somewhat domineering WBs. The limited autonomy may also explain the minimal contribution of WUAs to broader community empowerment and social benefits beyond water supply and jobs. In its WUA guidelines, the LWB asserts that "Water Users Associations bring community cohesion and empowerment in ways that can spread to other development activities within the area." This has largely not happened yet beyond small but increasing examples. It may well be too early to expect such broad social empowerment. Notwithstanding modest gains in community empowerment, relentless critique of CBNRM for pushing community empowerment to the backburner presents a cautionary tale for the long term. The important question remains whether and how a neoliberal-focused WUA that emphasizes cost-recovery and economic incentives might coexist successfully with broader social goals of empowerment and benefit sharing among water-user communities.

The objective of building "the culture of timely payment of bills by the Associations" stated in the WUA constitution blueprint for Blantyre may currently have primacy over others given the recent history of community mismanagement and bill delinquency, and need for financial sustainability. The most significant broader socio-economic benefit was WUA creation of secretariat jobs and the associated on-the-job capacity/skill building. WUA secretariat jobs were purposely limited to WUA-zone residents. In August 2013, the Chinsapo WUA in Lilongwe had 116 community employees. While not large, this number is locally significant because: 1) WUA

‘members’ still had equal opportunities to apply and compete for the jobs through a transparent application and interview process, and 2) the jobs have a multiplier effect, the economic benefits reaching and enhancing the lives of five times (mean household size) the number of household beneficiaries for Chinsapo. In addition to rehabilitating dysfunctional water kiosks, some WUAs have used surplus revenues to support limited community activities, including token cash donations and free water provision at funerals, or financial contributions to local causes and needs, such as orphans. Some executive members recognized WUAs’ incipient broader social roles:

“We have a social responsibility. Every month we manage to pay our water bills and do other things with the rest of the money. We have built an office. We also assist families with money during funerals.” (Focus group participant, Ntandire, July 26, 2013)

“Let’s say if an orphanage wants to buy a piece of land but they do not have the financial resources to do that, we say OK we will donate an amount towards that since the orphanage will help the community. But we should not be very much involved with that because our main objective is to supply water to the community”. (Focus Group participant, Chinsapo, July 23, 2013)

However, there were no transparent, community-determined, and equitable mechanisms for sharing or using benefits (including surplus cash) among WUA members stipulated within the constitution templates or elsewhere. This is a significant weakness which reflects the limited priority given to the issue of generation and equitable sharing of broader material benefits, which could further undermine local ownership and legitimacy, and facilitate elite capture (a major source of failure in many CBNRM initiatives) in the future, and reverse gains already made. This oversight also reflects limited community autonomy, first because requests for WUA resources for social needs are often treated in an ad hoc manner that can easily be seen to be unfair by some members, and second the WBs have veto power over ensuing decisions. With improving participation and maturity of the cooperative culture, the Annual General

Meeting of members can take on benefit-sharing decisions more meaningfully, but a guide in the constitution is useful.

3.9 The Transitory Sense of Urban Community, Ownership, and Participation

Findings raise questions about the role of the mobility of urban populations and the transitory nature of the notion of ‘community’ in altering tenets or expectations from CBNRM in urban waterscapes. Most (63.9%) survey respondents had migrated to the city mainly for employment or following a spouse. This mobility increases social heterogeneity by bringing together people from disparate social, ethnic, economic and other demographic backgrounds with no prior social ties. Iaquinta and Drescher (2000/2) try to capture such social mixing in their typology of the peri-urban as areas which combine urban and rural characteristics and embed residents in diverse, and complex, and nested multi-layered institutions and activities. This explains why traditional leaders or city chiefs still had significant influence in urban settings — they were the third most important source of local help on water issues behind the WBs and WUAs, respectively, but ahead of NGOs. Another reflection of transiency is that most respondents rent, rather than own, houses. The high social heterogeneity and transiency of (peri-) urban society may limit social cohesion and sense of community, which often undermine collective action (Ostrom 2009). Further, urban/peri-urban livelihoods are dominated by paid employment which limits the potential for time commitment compared to rural areas where subsistence farming is the main livelihood with more seasonal and flexible time/labor demands.

Although the high social heterogeneity and transiency may have contributed to observed low community participation and ownership, this has not (yet) significantly undermined attainment of the primary goal of sustainable water supply. This cost-

recovery based WUA model depends for its primary labor needs on a paid semi-professional staff rather than cooperating, volunteer community members (as in rural areas), and on user fees (water price) at the kiosk which were the most critical contribution by water users as they pursue their livelihoods.

3.10 Discussion and Concluding Remarks

This study essentially addresses the broader question of what happens when we bring CBNRM approaches primarily used in rural areas into the ‘urban waterscape’ to meet both water supply and social goals. Our findings show that community approaches can work in peri-urban areas, but there are tradeoffs between water supply and broader social goals and associated strategies. In the case of WUAs in Malawi, the supply of reliable, safe and affordable water emerged more important than broader empowerment goals.

We contend that these tradeoffs should be anticipated, and may even be necessary (at least initially), in peri-urban settings. In particular, WUA ‘professionalization’—or reduction of informality (Marston 2000)—by enhancing technical, managerial, and business capacity and oversight by executive committees and boards of trustees to ensure reliable water supply superseded in priority strategies that enhance community participation, autonomy, democratic empowerment and broader socio-economic benefits. Interviews revealed general support for, or acquiescence to, the tradeoff in goals, except among executive committee members. However, relative success in community (co-operative based) water supply to urban and peri-urban areas has similarly happened through technical-managerial capacity enhancements, but at the expense of broader water-user participation under cost-recovery principles in Brazil, Bolivia, Paraguay and Zambia (Vasquez, 2004). Even the globally celebrated SAGUAPAC

co-operative in Santa Cruz, Bolivia had a miserly 2.5% rate of voter participation in critical biannual elections (Vasquez 2004), which undermines democratic representation and empowerment. Autonomous community-based water boards (*juntas*) which successfully supplied water in Itagua, Paraguay still had 5.3% user participation in community water assemblies (Vasquez, 2004), suggesting a more profound tradeoff between water-supply and participation goals.

The Institutional Analysis and Development (IAD) framework, a broad-based policy analysis and design tool to “understand human interactions and actions across diverse settings” including collective CPR regimes and associated design principles (Ostrom 2010 page 646), can help to explain these findings. The IAD framework is built around the concept of an *action situation* (e.g., community water supply through WUAs); external clusters of variables that affect it, namely *biophysical conditions* (e.g., nature of the resource/goods), *attributes of community*, and *rules-in-use* (rules regulating resource use and user behavior, e.g., WUA constitutions); and the patterns of *interactions* that the external variables create in the action space, producing *outcomes*. Evaluation of interactions and outcomes provides feedback to the external variables and action situation. The urban context (under a broader cost-recovery imperative) turns water into an economic good and makes for unique socio-institutional attributes of users. Combined with a history of community-management failure, it has influenced the emergence of the current WUA model (structure and rules-in-use—constitutional and operational), interactions among key players that construct collective action within the urban/peri-urban waterscape, and outcomes.

The principal motivation at the outset of WUAs was necessarily to externalize costs and recover losses from previous management systems run by private operators or directly under water boards. Water in urban areas is generally a piped commodified

good requiring significant investment in infrastructure extending beyond WUA zones. Thus, there is a business and technical side to water supply in urban areas which requires efficient management and resources, and makes partnerships with relevant public, private and NGO agencies that have such resources/expertise important. This also explains the dominance of techno-managerial considerations over broader empowerment and early water-supply success, although WUAs should at least be allowed to 'earn' more autonomy as they build the needed capacity. As for users, their densely populated, heterogeneous, transitory nature (hence, 'loose' sense of community), wage/salary based livelihoods, and automatic, residence-based membership in WUAs favored 'passive' user participation as paying customers over active participation (voting, vying for office, attending WUA meetings), and helps to explain observed low WUA awareness and ownership. It is challenging, for instance, to convene, coordinate and engage peri-urban residents. However, the diversity of socio-institutional actors and interactions across scales favors partnership-based approaches (polycentric governance) over purely community ones. As Oakerson and Clifton (2011) assert: "the layered urban nature of the urban commons requires more than a single level of collective action," and the WUA partnership may be an appropriate model.

Findings suggest that despite uneven adherence to CBNRM tenets and CDPs, WUAs achieved relative success in water supply and job creation, suggesting that CDPs are not needed universally or equally in (peri-) urban contexts. CDPs on user/resource boundaries (1), appropriate rules and favorable cost/benefit balance (2) and rights to organize (7) were largely fulfilled. CDPs 2 and 8 (nested enterprises) emerged particularly influential on WUA outcomes while CDPs 3-6 were partially fulfilled with no apparent adverse impact on water supply. CDP 8 addresses needs of what we contend is the partnership-based, urban-appropriate (WUA) model, including coordinating key

actors (WUA bodies/members, WBs, NGOs and city councils) across operational scales, harnessing synergies among relative capabilities and roles, and pooling resources, which enhance institutional efficiency. The near-necessary partnership nature of the WUA model, however, also involves power-mediated give-and-take relations which reinforce existing power inequities which favor WBs and techno-managerial water-supply dynamics over empowerment/autonomy. Thus, WB restrictions or dominance undermine the provided right to organize (CDP 7) and limit participation in decision-making (CDP 3). Monitoring of the resource (except for pipe leaks and vandalism) and of users to check free-riding (CDP 4) were limited but not critical partly because users pay for water.

There were no relevant graduated sanctions (CDP 5) or clear conflict resolution mechanisms (CDP 6) for users beyond threats of membership termination for unspecified reasons and disciplinary hearings for WUA employees and elected leaders. Wilson, Olson and Cox (2013) argue that CDPs are contingent and unnecessary in situations of strong within-group (socio-biological) selection and co-operation or in cases of dire emergencies which require cooperation anyway. Thus, the threat of water disconnection, an essential resource, can approximate a pending emergency given recent history, which should incentivize users to cooperate in community water supply without recourse to CDPs. Urban users do cooperate, but primarily through (near-universal) participation as fee-paying water customers financing WUA operations to ensure water supply while most active participation in WUA activities (breaching CDPs 3, 7). However, some CDP breaches are implementation weaknesses that should be addressed.

Our findings do not mean that this WUA model or its implementation are faultless, the tradeoffs optimum, or compromised goals and CBNRM tenets irrelevant.

Sustained success still requires concerted efforts to enhance balance between water-supply and empowerment goals or mitigate adverse impacts of the tradeoffs, and broaden socio-economic benefits beyond modest job creation and minor cash donations. Such benefits, if shared equitably through new locally agreed mechanisms, would add to gains in technical-managerial capacity, legitimacy of WUA bodies through formalization, and limiting political interference. The financial surpluses, if sustained, can accommodate locally appropriate, fair pay to WUA executive-committee members to motivate them to operate more professionally. Such efforts can strengthen local WUA ownership, reduce risks of corruption and elite capture which dog CBNRM efforts, consolidate the fragile early gains, and enhance attainment and sustainability of water-supply and empowerment/socio-economic goals.

It appears ironic that CBNRM approaches whose relative value is still debatable in rural settings are increasingly promoted and expected to succeed in urban areas. We contend that success is attainable but requires flexibility in customizing community approaches to urban settings and CBNRM tradeoffs. Thus, despite the implied CBNRM assumption of universal participation (Brown 2011), findings show that not everyone can or has to participate in WUA activities, or in/at the same manner and level. In reality many water users appeared content with being only paying customers accessing affordable water without being active WUA participants or seeking management control except some WUA executive members. While 'paying customer' seems a passive and inadequate form of participation, it constitutes an essential and virtually universal form of 'member participation' which reliably funds WUA operations that sustain water supply. WUAs should temper participation expectations while seeking more autonomy, and enhancing awareness of member rights and responsibilities, and information flow across actors and levels.

In conclusion, we have examined performance of WUAs in meeting water-supply and broader social/empowerment goals in peri-urban areas using Blantyre and Lilongwe cities, Malawi. The study contributes to the scant literature on community-based water supply in urban areas. Findings show that WUAs can successfully supply water at communal water kiosks, but involve tradeoffs with broader social/empowerment goals and CBNRM tenets. Studies in Latin America affirm this potential and tradeoffs.

Water supply and reliability improved under WUAs relative to preceding community, individual, and public water-supply systems. WUAs generally achieved financial solvency and stability, generating enough surpluses to pay all or most of their past water debts within 3-5 years, and generating locally significant employment. However, WUA autonomy in decision making and user participation in WUA activities were low. Most users (contentedly) participated as paying customers rather than active WUA members.

We contend that the urban and historical context alters the nature of water and user communities and relations (relative to rural areas), and offers explanations for the relative success while also furnishing a cautionary tale. It creates a waterscape that favors partnership approaches which inherently, and by reinforcing power inequities favoring WBs, engender tradeoffs that privilege water-supply objectives through community formalization, professionalization, and advancing a business culture, over broader empowerment goals and some CBNRM tenets reflected in core design principles. Future, (peri-) urban community efforts should anticipate these tradeoffs and be flexible to a plurality of forms of participation while simultaneously seeking

creative ways to enhance meaningful levels of participation and broaden socio-economic benefits.

WUAs so far appear to do more good than harm, and to generate promising community/WB/NGO win-win-win outcomes. However, WUAs should guard against complacency on participation empowerment goals which could reverse initial gains, as Vasquez (2004) fears of SAGUAPAC: *"despite its commitment to the co-operative ideal of participation, which is repeated in its annual reports, the management of SAGUAPAC is surprisingly complacent about the lack of citizen involvement in elections and interprets the low turnout as tacit approval of the performance of the co-operative."* Study findings have broader relevance for low-income urban and peri-urban areas in other developing countries with similar water and socio-institutional contexts, as explained via the IAD framework. The study also underpins the importance of nuanced understanding of the configuration and relative importance or tradeoffs among CDPs in explaining emergence and performance of community institutions in peri-urban settings.

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CHAPTER 4: URBAN POLITICAL ECOLOGY

THE IMPACT OF DECENTRALIZATION REFORMS ON ACCESS TO POTABLE WATER IN MALAWI'S URBAN AND PERI-URBAN INFORMAL SETTLEMENTS

Abstract:

This article examines whether and under what conditions decentralized, Public Private Community Partnerships (hereinafter PPCPs) through the formation of Water User Associations (WUAs) can improve access to drinking water in urban and peri-urban informal settlements. We use mixed quantitative and qualitative methods: household surveys (645), key-informant interviews (n=32), and secondary data (mainly policy documents), multilevel regression and descriptive statistics, and thematic qualitative analysis, and insights from urban political ecology (UPE) to examine the opportunities and prospects for enhancing access to potable water in peri-urban and informal settlements of Lilongwe, Malawi, through this decentralized, PPCP-WUA arrangement. We find that although WUAs enhanced affordability and reliability dimensions of water access, the time burden on water fetchers (mostly women and girls) is significantly higher and water use per capita lower in WUA-supply areas. While residents associate WUAs generally with worsening supply interruptions and waiting times, many conceded that the number of *water kiosks* has increased and the cost of water is more affordable since WUA introduction. We argue that decentralization can improve water-system management and efficiency and enhance water access in the long term; however, infrastructural challenges including low water pressure, low capacity of WUAs, and downsides of unequal power relations remain barriers in the short term.

Keywords: Urban political ecology; decentralization; access to water; peri-urban informal settlements; water user associations; Malawi

4.1 Introduction

In peri-urban and low-income formal and informal urban settlements in developing countries, particularly in Sub-Saharan Africa, centralized, state-based approaches to water delivery have generally failed to address growing demand for potable water, a challenge compounded by rapid urbanization and population growth. To improve water access in such settlements, African governments increasingly turn to decentralized arrangements including community-public partnerships. This article examines water access in low-income urban and peri-urban (hereinafter called peri-urban) areas and establishes whether there are differences in water access between neighborhoods that have Water User Associations (WUAs) and those that do not. It uses insights from urban political ecology (UPE) to examine decentralized, Public Private Community Partnerships (PPCPs) for potable water delivery in peri-urban and informal settlements of Lilongwe, Malawi.

Through urban political ecology, the study contextualizes how power relations and institutions mediate access to potable water for better or worse and create winners and losers. We invoke analytical insights from UPE for a more nuanced understanding of power relations among WUAs and other key actors, and the underlying dynamics that enable them to succeed or fail at their core mandate—improving access to potable water for peri-urban and informal settlements. Specifically, we 1) empirically examine the impact of WUAs on household water access; 2) compare water user expectations before WUA introduction and satisfaction with access after WUA their introduction; and 3) interrogate how power dynamics may influence water-access outcomes.

The study was guided by the hypothesis that the institutionalization of the adopted WUA model will lead to improved access to potable water in served peri-urban areas compared to areas predominantly served by publicly-managed water kiosks. It

integrates empirical analysis and qualitative analysis of local perceptions on the performance and impacts of WUAs within the context of community, public, private partnerships. We discover that while WUAs enhanced affordability and reliability of water access, the time burden on water fetchers (mostly women and girls) is significantly higher and water use per capita lower in WUA areas. While residents in WUA areas generally associated WUAs with worsening interruptions in water supply and longer waiting times, many concede that the number water kiosks and water affordability had improved since WUA introduction. We argue that decentralization can improve water-system management and efficiency, and enhance water access in the long term; however, infrastructural challenges, low water pressure and low capacity of WUAs remain barriers to enhanced access to potable water in the short term.

The explosion of urban populations in the developing world in recent decades and unprecedented urbanization rates continue to create poor urban, peri-urban, and informal settlements where lack of access to potable water is one of the most critical problems. In Sub-Saharan Africa (SSA), the urban population is projected to keep growing exponentially; peri-urban settlements will continue to proliferate and expand, all of which combine to create public health ramifications (Boadi et al. 2005, David et al. 2007). In peri-urban areas, centralized, state-based policies have been insufficient at dealing with growing water demand. Historically, state utility companies have had limited incentives for providing water either because complete cost recovery is unlikely or haphazard peri-urban settlement patterns make extending piped networks daunting.

In the absence of affordable, more reliable water-supply systems, peri-urban residents in many developing economies including in SSA turn to informal, small scale, private vendors to fill the gap (Subbaraman et al. 2013). Yet, water sold by informal vendors costs much more than water from publicly managed systems even as it tends to

be of poor quality in many cases (Kimani-Murage and Ngindu 2007). Alternatively, in cities like Lilongwe, Malawi and Nairobi, Kenya, communal water points (*water kiosks*), though often insufficient, remain popular modes of water delivery in peri-urban settlements (Adams and Zulu 2015). Where slum dwellers are unable to afford the cost of water from a wide range of sources, many turn to unimproved sources (Kimani-Murage and Ngindu 2007), which often lead to waterborne illnesses.

Conventional state-based approaches have failed largely due to what urban scholars have referred to as governance failure (Bakker et al. 2008). Governance failure encompasses a myriad of social, political, and economic reasons behind the failure of water systems in the Global South, including but not limited to poorly maintained water distribution systems, institutional weaknesses, ageing infrastructure, and lack of political will (Lee and Schwab 2005). As centralized systems failed, many governments, particularly in Latin America and SSA, turned to neoliberal, market-based privatization (Budds and McGranahan 2003). Some called it the age of commodity (McDonald and Ruiters 2005), an era where the quest to increase investment motivated the transfer of water systems to private entities (Adams and Halvorsen 2014). Prasad (2006) examined 15 years of private sector involvement in water services privatization and noted mixed results with no clear evidence to suggest that it is any better than publicly managed systems. This is contrary to anticipated benefits, especially of increased investment.

It is worth noting that despite Sub-Saharan Africa's long history with decentralization of water systems, driven in part by community-based and participatory development, such reforms have focused mainly on the irrigation sector and on rural water systems (Harvey and Reed 2007). Decentralized urban and peri-urban water systems are relatively recent and our understanding of them minimal in comparison to

rural systems. In Latin America where decentralized water reforms have a much older history, and have been the subject of many studies, decentralized water systems have mainly been at the municipal level and driven by neoliberal reforms (Wilder and Romero Lankao 2006, Herrera 2014). In a study of decentralized water systems in three Mexican cities, Herrera (2014) showed how local context shaped outcomes and argued that the Mexican case reinforces the need to design policies uniquely suited to local conditions. While municipal decentralization experiences has revealed important lessons, including that local context shapes decentralized water systems, we do not sufficiently understand their opportunities for peri-urban informal settlements of SSA where there is growing interest in their applications.

This study explicitly examines the outcomes of a decentralization reform that sought to enhance access to water for peri-urban settlements through the formation of Public Private Community Partnerships (PPCPs) between Water User Associations, public water utilities, and NGOs (Water Aid Malawi, and Water for People). Malawi adopted broad decentralization programs in the late 1990's that aimed, among other goals, to address development at the grassroots level, reduce widespread poverty, strengthen local institutions, and enhance local participation in decision making. The ambitious move to involve local communities and authorities was based on the popular notion then that decentralization will lead to more efficient and effective governance. In 2006, Malawi decentralized water services delivery by institutionalizing partnerships between state-based, parastatal water utility companies and community-based Water User Associations to address chronic lack of potable water in peri-urban informal settlements. While five parastatal water boards (Blantyre, Lilongwe, Northern, Central, and Southern water boards) have been responsible for supplying water to urban centers, they historically were unable to meet peri-urban water needs. In Lilongwe and

Blantyre, Malawi's two major cities, reliance on private vendors and direct public management led to widespread debts and inefficiencies. As a consequence, communities' already scant water-systems were disconnected. WUAs were then formed to act as community-based entities with the core mandate to work in partnership with the Lilongwe and Blantyre Water Boards to provide safe and reliable water supply while paying off debts accrued by previous water providers.

This article uses Malawi's example to explore whether decentralization reforms in the water sector actually lead to improved access to potable water. It draws insights from urban political ecology (UPE) to discuss the conditions under which decentralization reforms in the form of community-public private partnerships could lead to improved access to potable water in peri-urban and poor informal settlements and interrogate the role of power relations. We hypothesized that the PPCPs-WUA arrangement will lead to improved access to water in peri-urban settlements.

The remainder of this paper is organized as follows. First a brief summary of the theoretical backbone of the study—UPE, and its utility for exploring urban water access and governance. Next a brief overview of the study context—Malawi, and the methods and analytical procedures used. We then present results and discussion, including potential limitations. In the conclusion section, we highlight core findings, broader policy implications of results, and theoretical and applied contributions of the paper.

4.2 Theoretical Context

This study draws insights from Urban Political Ecology (UPE) to establish whether decentralized, community-based Water User Associations lead to improved access to potable water in peri-urban and informal settlements. Urban political ecology originated from mainstream political ecology—an approach that combines the concerns

of ecology and political economy in the analysis of environmental and natural resources problems, and credited to the early work by Blaikie and Brookfield (1987). Political ecologists recognize a constantly shifting dialectic between ecological change and society (Boadi et al. 2005). Three important assumptions of political ecology are pertinent to our discussion of decentralized peri-urban governance: first, cost and benefits of environmental change are unevenly distributed; second, the unequal distribution often reifies social and economic inequalities; and finally, that costs and benefits of environmental change are inscribed in and associated with social power (Bryant and Bailey 1997). Thus, political ecology analysis seeks a holistic and nuanced analysis of environmental problems in the search for effective and lasting solutions.

Urban political ecologists view the relationship between water and society as inseparable; they contend that modern conceptualization of water as solely a biophysical resource is flawed (Linton 2008). Urban political ecological perspectives on water conceptualize access to water beyond modernist themes, which limit water to a physical domain, suggesting rather a close interaction between biophysical and socio-political, and cultural and power relations at different scales (Swyngedouw 2004a). Thus, urban environmental problems, including unequal access to potable water, are byproducts of socio-political, economic, and cultural dynamics that are intertwined (Heynen, Kaika and Swyngedouw 2006). These political, social, and ecological processes and the resultant, uneven urban-landscape often co-determine each other (Satterthwaite, McGranahan and Tacoli 2010). For example, Njeru (2006) invokes UPE to show how a spatially uneven plastic waste problem in Nairobi city is a direct consequence of intricate interconnections between social, political, and cultural and power relations.

On the premise that the biophysical and the social natures of water are inherently intertwined, recent discussions on urban water access in the Global South pay more attention to underlying socio-institutional processes (Bakker et al. 2008), with a growing call to situate water-access issues within broader social and power relations (Swyngedouw 2004b, Smith 2002). Scholars in urban geography have adduced diverse but related concepts such as “Hydrosocial Cycle,” “Socio-natural,” and “Waterscapes,” to emphasize social and power relations as key determinants of uneven water access in cities (Swyngedouw 2009, Onda, LoBuglio and Bartram 2012, Boelens 2014). As urban political ecology of water scholarship has developed, with increasing attention on institutions and governance, not only has the role of power relations become more obvious; its diverse manifestations in everyday practices around water is increasingly understood as both the symptoms and causes of uneven access to water (Swyngedouw 2009, Boelens 2014).

Ultimately, an existing and growing body of work on urban political ecology demonstrates the utility of the framework to disentangle uneven access to water as simultaneously embodying existing institutional, socio-cultural, and political arrangements. Through an UPE framework, Loftus and McDonald (2001) uncovered how privatization of water in Buenos Aires, despite anticipated benefits of water privatization—mainly to reduce water tariffs and expand infrastructure—failed due to global financial institutions. In Cape Town, South Africa, an UPE unveiled how spatial patterns in water distribution reflected broader urban inequities that dated to the apartheid era (Smith 2001). In Durban, South Africa, for example, a UPE of water study unraveled that the persistent problem of uneven water access underscored some of the injustices of apartheid such as racially-dividing water networks in residential areas (Loftus 2009).

Our contention is that urban political ecology offers a useful framework to establish whether or not decentralization reforms, through PPCP-WUA partnerships, have prospects for addressing chronic poor access to potable water in peri-urban settlements, and to further dissect if and how social and power relations in different contexts influence outcomes. As population growth continues in Sub-Saharan Africa, rapid urbanization persists, and centralized, state-based water governance models show less promise for addressing peri-urban water needs. UPE is well placed to uncover the otherwise hidden roles of social and power relations while allowing for a nuanced understanding of urban and peri-urban water landscapes. We pay attention to the linkages between contextual, historical, and power configurations and outcomes of decentralization reforms, cognizant of the inherent limitations of using other institutional analysis frameworks (eg. Common Pool Resources Theory) to understand such complex phenomena. In the case of Water User Associations in Lilongwe, Malawi, we hypothesize that the outcomes of decentralized, community-based partnerships will lead to improved access to potable water. However, we contend that successes and failures (outcomes), and the conditions that account for them, can be sufficiently explained through the lenses of urban political ecology.

4.3 Study Context

A landlocked country located in southeastern Africa and currently with about 17.7 million people, Malawi continues to grapple with extreme poverty, underdevelopment, and inequality, and an economy predominantly dependent on subsistence and mainly rain-fed agriculture. According to the World Bank, more than half of Malawians (over 53%) live below the poverty line, a quarter of them in abject poverty, placing the country among the poorest countries in the world in terms of GDP per capita (World

Bank 2015). Mortality rates in Malawi are among the highest in the world across all ages; average life expectancy is estimated at a low 54 years, attributed largely to HIV/AIDS. According to the World Health Organization, waterborne illnesses (*diarrhea, cholera, dysentery etc*) rank among the five commonest causes of deaths among Malawian adults while diarrhea remains the third commonest cause of infant death after pneumonia and malnutrition (WHO 2015). Malawi has made significant strides towards improving potable water access according to the WHO/UNICEF's most recent Joint Monitoring Program (JMP) report. Notably, over 40 percent of the Malawian population are estimated to have gained access to improved sources of water since 2000, although some view the JMP figures as exaggerated (Onda et al. 2012). Currently, the JMP estimates that 95 percent of the Malawian population has access to improved water sources, out of which only a third has piped water on premises.

Malawi's lack of sufficient access to potable water, particularly for poor and marginalized groups including peri-urban communities, represents a paradox shared by many developing countries, particularly in Sub-Saharan Africa: although freshwater resources abound, weak institutions and poor governance impair access to drinking water. Malawi's struggle to meet its growing demand for potable water is a microcosm of Sub-Saharan Africa's chronic drinking water-scarcity challenge, compounded in peri-urban and informal settlements by rapid population growth and urbanization. Over the past few decades, Malawi's population has exploded from just over 200,000 in Lilongwe and Blantyre, the two major cities, in the early 1960's to over 2 million people. Consequently, there is not only the proliferation but also the expansion of informal settlements within and outside city boundaries. As is the case of many Sub-Saharan African countries, Kenya (Mugenda and Muriuki 2015), Nigeria (Aluko 2012), Tanzania (Sheuya 2009) and Ghana (Greif and Doodoo 2015), to mention a few, informal

settlements are characterized by poverty, diseases, insecure tenure and poor housing, and unemployment (Manda 2007). For Malawi, about two-thirds of the current urban population lives in low income and peri-urban neighborhoods which makes the issue of urban water supply critical and Malawi an ideal case study (Adams and Zulu 2015).

Malawi's experimentation with water reforms and policies also exemplifies a growing policy shift towards neoliberal, cost-recovery models of water governance which emphasize profit over the human right to water, prioritize demand over supply-based approaches, and deem water users primarily as customers and water as a commodity (Ferguson, Whiteford and Whiteford 2005). It represents a global shift away from centralized policies in favor of participatory, decentralized and community-based options inspired by benefits of community-based natural resources management (CBNRM), including equitable benefit sharing, participation, sustainability, and community empowerment (Shackleton et al. 2010). Consequent to broad decentralization policies, community-based Water User Associations (WUAs) were adopted in 2006 to manage water supply and delivery in Malawi's peri-urban and poor informal settlements. While the introduction of the decentralized community-based system was mainly aimed at improving access to potable water in peri-urban and informal urban communities, it was also predicated on the core tenets of community-based natural resources management (CBNRM). These include increased participation, empowerment, equitable benefit sharing, poverty reduction, reduced state control, and more decision-making autonomy.

The previous water-supply models (utility companies-based, private operators, community groups) failed to address peri-urban water challenges; they were characterized by water service disruptions and disconnections, financial embezzlement and lack of transparency. WUAs emerged, championed in part by NGOs, traditional

leaders, respectable community leaders and civil society organizations as a way out, providing a win-win scenario for both the water utility companies and local communities. WUAs comprise a board of trustees and the executive—the highest decision making bodies and monthly-paid secretariat in charge of the day-to-day functions such water vending and kiosk inspection. Occupying the lower rungs of the WUAs are the community members, who as customers contribute financially to the sustenance of WUAs by purchasing water and, as members, participate in the election of executives. Recent work has shown that WUAs in Malawi have promise, having moved out of heavy indebtedness to financial solvency (Adams and Zulu 2015) despite evidence of elite capture and uneven distribution of social benefits (Rusca and Schwartz 2012). Even so, there are barely any systematic studies that have documented the impact of community-public partnerships such as Water User Associations on access to water. By addressing this gap, this study examines the extent to which Malawi's unique PPCP-WUA partnerships as part of a decentralization program influence access to potable water and under what conditions.

4.4 Research Methods and Data Collection

We employed a mixed methods approach for this study, primarily drawing from household surveys supplemented by key-informant interviews and focus-group discussions with selected WUA executive and board members. We used the household survey data to quantitatively measure water access based on, among other metrics: drinking water sources, time and physical burden for fetching water daily, water use and storage, and cost of water (affordability). This was supplemented by local perceptions of water access. We also used the household surveys to gauge prior expectations before WUA introduction and to evaluate WUA effectiveness in delivering

water. For greater nuance and cross-validation, we conducted key-informant interviews with water users and some members of WUAs on general perceptions about access to water and the role of WUAs. The household questionnaire was first designed in English, then translated into Chichewa, the main local language. It was pretested and final changes incorporated, with help from research assistants and translators, before data collection.

We sampled households from three peri-urban settlements in Lilongwe (Kauma, Mtandire/Mtziliza, and Area 36) with fairly similar socio-economic and demographic characteristics, predominantly dependent on communal water kiosks, and with high poverty rates and population densities. For the survey, we employed a two-stage cluster sampling technique deployed as follows: In the first stage, two (Kauma, Mtandire/Mtziliza) out of six settlements with Water User Associations (WUAs) were randomly selected. One settlement without a WUA (Area 36), where communal water kiosks are under the management of private operators or directly managed by the Lilongwe Water Board, was selected as a control population. In the second stage, we randomly selected households in proportion to the estimated average number of households in each settlement. Using the power sampling method, at 5 percent error margin, 99 percent confidence interval, and average household size of 5, we sampled a total of 645 households, distributed across the three neighborhoods (Kauma=155, Mtandire/Mtziliza=258, Area36=232). Households were then selected through systematic sampling, first using a central location and then walking along the cardinal directions (east, west, north, and south) in equal spacing. This was determined on the ground and distributed across the cardinal directions based on the sample size per site.

4.4.1 Analysis

To test the central hypothesis that the existence of a Water User Association (WUA) is significantly associated with better water access, we used t-tests, descriptive statistics, multivariate statistical techniques, and linear regression models. We first used t-tests to compared mean differences in water access between WUA and non-WUA areas. We then used a multilevel regression to test for whether the existence of a WUA implies significantly better access to water relative to non-WUA areas. We subjected 12 indicators (quantitative and perceived) of water access in our data selected based on extant scholarship and preliminary findings to principal component analysis (PCA) to identify dominant patterns. Principal component analysis is a multivariate statistical technique commonly used to deal with collinearity by reducing large, multivariable datasets into fewer and interrelated variables with dominant patterns (Jolliffe 2002, Dormann et al. 2013). PCA was useful to remove collinearity, combine water access indicators into discrete groupings with similar underlying dimensions, and set the stage for the multilevel regression.

Table 4.1 outlines water-access variables used for the PCA and the final component loadings. With a minimum eigenvalue and component loading of 1 and 0.4 respectively, five dominant components explaining approximately 65% of the total variance within the dataset were identified. The first component loads highly on total time and frequency of waiting, reflecting the *time burden* on households. The second component loads highly on perceived affordability and cost of water, and depicts *affordability*. The third component is a measure of *reliability* of water supply, loading highly on perception of and satisfaction with frequency of water supply. The fourth component loads significantly on perceived quality of water and whether or not primary source is improved, emphasizing the *quality* dimension. The final component

loads highly on perceived quality of source and per capita availability of water at the household level, indicating a dimension of *adequate improved source*. In sum, the five dominant components—*time burden, affordability, reliability, quality, and adequate improved source*—were used as the dependent variables for the multilevel regression.

Table 4. 1: Component loadings from PCA of variables characterizing water access

Variable	Comp I Time Burden	Comp II Affordability of water	Comp III Reliability of Supply	Comp IV Quality of Source	Comp V Adequacy of Volume
Volume	0.11	0.228	0.06	0.32	0.72
Quantity	-0.17	0.42	0.10	0.33	-0.18
Affordability	0.24	-0.53	0.24	0.17	0.10
Cost	0.02	0.6	-0.24	-0.13	-0.06
Source	0.02	0.03	-0.08	0.7	0.04
Total time	0.42	0.18	0.2	-0.07	0.03
Trips	0.39	0.21	0.33	-0.03	0.10
Distance	0.34	0.10	0.07	-0.19	-0.12
Supply	-0.29	0.07	0.60	-0.05	0.01
Wait frequency	-0.45	-0.09	-0.11	0.05	0.12
Satisfaction	-0.3	0.08	0.54	-0.05	-0.05
Quality	0.17	-0.01	0.10	0.42	-0.6

PCA post estimation results revealed a Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy of 0.71, confirming that variables were adequately common to warrant the use of a PCA.

Finally, to test for whether the existence of a WUA is a significant predictor of better water access, we fitted a multilevel regression model with policy status (WUA/no-WUA) as the independent variable and the PCA dimensions as dependent variables. We binary-coded households in areas with WUA as 1 and households in the control area as 0 and used policy/no policy as the primary independent variable to predict water access. We then used separate models to test for associations between individual PCA-derived measures of water access—time burden, affordability of water, reliability of supply, quality of water source, and adequacy of volume—and policy

status. In all five models, we accounted for possible confounding variables by controlling for total neighborhood population and average income (socioeconomic status). Since our survey was hierarchical in nature, with households nested within the respective peri-urban and informal neighborhoods, we used multilevel regression to produce unbiased coefficient estimates for our dependent variables and standardized errors (Maas and Hox 2004).

We analyzed key-informant interviews qualitatively to supplement the quantitative analysis. First we audio-recorded all key-informant interviews and focus group discussions with participant consent, transcribed, coded, and qualitatively analyzed through thematic contextualization. Using mixed methods, particularly supplementing quantitative results with insights from qualitative data, allowed for a richer, in-depth understanding of water access. We drew excerpts from the key-informant interviews and focus-focus group discussions to discuss our findings from the quantitative and descriptive analyses.

4.5 Results

4.5.1 The Impact of Water User Associations on Water Access

Table 2 summarizes the results of the unpaired t-tests, our first attempt to address the core hypothesis of the study: decentralized community-based water delivery (through Water User Associations) leads to improved access to potable water. With the exception of perceived satisfaction with water supply, we found statistically significant differences in water access between WUA and non-WUA areas, justifying our use of a more robust approach: multilevel regression, to test for how much the existence of a WUA actually predicts access to water. We discover that compared to our control population, WUA areas have significantly less water use per capita, perceive the price of water to be more

affordable, spend considerably more time fetching water, and took more trips per day to fetch water at kiosks. While perceived distance to main water sources tended to be significantly shorter for WUA areas, and residents waited less frequently at kiosks and perceived water from kiosks to be of better quality, we did not find statistically significant differences in perceived satisfaction with water supply between WUA and non-WUA areas.

Table 4. 2: Mean differences in water access between WUA and non-WUA areas

Access	Measurement	WUA Mean	Non-WUA Mean	P-value
Volume	Volume/household size (liters)	28.5	31.04	0.04
Quantity	Adequate water (Yes=1, No=0)	0.78	0.89	0.00
Affordability	Affordable water (Yes=1, No=0)	0.52	0.62	0.01
Cost	income/cost of water * 100	6.50	5.11	0.05
Source	Primary source (Yes=1, No=0)	0.71	0.81	0.01
Total time	Time/trip * number of trips/day	212	114	0.00
Trips	Number of round trips per day	4.13	2.94	0.00
Distance	Very close=1 to Very far= 5	4.07	4.33	0.00
Supply	Very regular=1 to Very irregular=5	3.11	3.43	0.01
Wait frequency	Always=1 to Never=5	2.65	3.52	0.00
Satisfaction	Very satisfied=1 to Very dissatisfied=5	3.03	3.13	0.37
Quality	Very clean=1 to Very Dirty=5	3.4	3.26	0.03

Results from our multilevel regression model (Table 4.3) show that the existence of a WUA significantly influences access to water across four of the five dimensions derived from the PCA. Specifically, a unit change in policy status from non-WUA to a WUA area results in a positively significant increase in time burden, controlling for area socio-economic status and population size. WUA areas are significantly associated with better affordability and water-supply reliability compared to non-WUA areas. Rather surprisingly, our results demonstrate that the existence of a WUA is significantly associated with lower access to adequate volumes of water per capita. A unit change in

policy status (i.e. introduction of a WUA) leads to a significantly lower volume of improved water. We also discover that the socio-economic status of an area (measured by average income) is a confounding factor and does significantly predict satisfaction with water access while the population size of an area (with or without a WUA) does not have a significant association with water access across any access-dimension.

Table 4. 3: Multilevel regression results showing association between WUA and water access

	Model 1 Time burden	Model 2 Affordability	Model 3 Reliability	Model 4 Quality	Model 5 Adequate volume
Policy status (WUA)	1.10***	1.06***	0.80***	-0.14	-0.45***
Area Socioeconomic status	0.01	0.001	0.005***	0.0002	-0.002**
Area population size	-0.0001	-6.8	-0.004	-0.0001*	0.0018
<i>N</i>	636	636	636	636	636

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.5.2 Prior Water User Expectations of WUAs and Satisfaction with Water Access

For greater nuance and understanding of WUA performance and conditions that may explain outcomes, we asked households in the WUA neighborhoods to evaluate whether access to water has undergone changes since WUAs began operations. Households generally (approximately 38 percent) thought that water-supply interruptions have worsened over time. Water-kiosk operating hours within WUA neighborhoods have generally stayed unchanged, with 36 percent of the respondents indicating there is no change. Nonetheless, 25 percent of households in WUA areas thought that opening hours have improved since WUAs started. Water-kiosks usually open from 6am-12pm for the first half of the day and 3pm-6pm for the second half. However, depending on the vendor at post, these hours may vary. More households (approximately 30 percent) think that price of water and affordability have significantly improved compared to

when WUAs had not been introduced. However, nearly the same number of households lamented that price and affordability of water have worsened.

Most households (60 percent) acknowledged that number of water kiosks in their communities has significantly increased due to WUAs. The most frequent response (73 percent) about quality of water is that it has remained the same since WUAs were introduced. Most households (41.5 percent) indicated that distance to their nearest water kiosk has significantly declined compared to previous how long they walked previously. While 35.23 percent of the respondents hold that time taken to get water daily has generally improved, 32 percent believes that the time taken to fetch water has worsened (increased). In addition, most residents noted that waiting time at the water kiosks has worsened significantly, despite an increase in the number of water kiosks.

Table 4.4 catalogs detailed results on perceptions on changes in water access before and during WUA operations.

Table 4. 4: Respondents' evaluation of water access before and after WUAs

Water access indicator	Improved	No change	Worse	I don't know
Interruptions in water supply	29.55	18.75	38.64	10.23
Waiting times	25	24.43	36.36	11.36
Water kiosks operating hours	18.75	51.70	13.64	13.07
Cost/affordability of water	29.98	27.84	29.55	10.80
Number of kiosks	60.23	19.32	8.52	9.09
Quality of water	11.93	73.30	1.14	10.80
Distance to nearest water kiosks	41.48	38.64	7.39	9.66
Time taken to get water daily	35.23	19.32	31.82	10.80

***Numbers represent percentage of respondents. Respondents who moved to area after WUAs had already started operations were coded as not applicable

4.6 Discussion

We investigated whether Water User Associations (WUAs) have an impact on household water access in Lilongwe, Malawi, and under what conditions. We compared access between WUA and non-WUA area; examined prior user expectations and satisfaction with WUAs; and interrogated the role of hydro-social factors using insights from Urban Political Ecology. We hypothesized that decentralization reforms (via WUAs) will lead to improved access to potable water in peri-urban settlements.

We discovered that WUAs enhanced affordability and reliability of water access; however, the time burden on water fetchers (mostly women and girls) was significantly higher and water use per capita lower in WUA areas. While residents generally associated WUAs with worsening water supply interruptions and longer waiting times, many conceded that the number water kiosks and affordability improved considerably since WUA operations commenced. Overall, our results demonstrate that under the decentralization program, WUAs have significantly improved access to water in their operational areas compared to non-WUA areas, even though there was no significant difference in resident satisfaction with water access between WUA and non-WUA areas.

While contextual, historical, and other socio-institutional factors accounted for the short-term successes of WUAs in delivering water, their failures underscore existing challenges under which WUAs were introduced, including weak infrastructure, limited technical capacity, and underlying state politics and power relations that undermined success, all within a neoliberal setting. Significant improvements in pricing and affordability of water, improved reliability of supply, and increased number of water-kiosks in WUA areas compared to previous models of water delivery, all in contrast with non-WUA areas, are consequences of uniform pricing mechanisms and accountability

arrangements instituted through the PPCP-WUA partnership arrangement (Adams and Zulu 2015). Under the PPCP-WUA partnership, setting the price for water is a joint decision between WUAs and the water boards, unlike previously when private vendors charged any price per bucket of water without accountability. Financial accountability arrangements are largely driven by the core motivation of the water boards to recoup debts and improve revenue collection—a clear neoliberal, cost recovery approach which is demand rather than supply-based.

To fully understand how WUAs improved access to water by making water relatively more affordable, it is important to revisit the historical context (Adams and Zulu 2015 discuss this in depth). Prior to the introduction of WUAs, water delivery in Malawi's poor urban and peri-urban settlements was fraught with price abnormalities, as private operators and vendors freely over-priced water. Poorer peri-urban residents paid more for water as no upward accountability arrangement existed to stabilize pricing (Water Aid 2007). The co-setting of prices by WUAs executives and the Lilongwe Water Board is therefore a more transparent process. A member of the kiosks management unit (KMU) of the Lilongwe Water Board compared WUAs with previous models and summed up what has been some of their greatest success stories:

Since WUAs started, there have been no closures of kiosks due to non-payment of bills as was the case in the years prior to formation of WUAs. Consistent payment of bills has been the case since WUAs started. WUAs are struggling with low pressure, which ultimately affects their water sales.....Interview with Kiosks Manager, Sept. 5, 2014.

These findings are consistent with what other studies have revealed about the advantages and prospects of community-public partnerships in Sub-Saharan African countries and what conditions allow them to thrive. In the informal settlement of Kenya, partnerships between water-utility companies and small scale providers improved revenue collection and reduced the cost of water (Nzengya 2015).

Improved disciplinary and transparency arrangements accounted in part for why water is more affordable in WUA operated neighborhoods. Our focus group discussions revealed disciplinary measures in place to deal with vendor embezzlement of money, including fines and loss of employment. If a vendor fails to account for revenue from water sales, he or she is summoned to appear before the executive board. In some cases, the vendor is given weeks to repay or lose their job. The WUA-partnership in addition requires every WUA to have a bank account where water revenues are deposited daily or weekly. Accountability measures require WUAs to have at least six signatories: first the kiosks manager of the water board and WUA accountant; second, the board chair and any member of the board; and finally, the executive chair and the treasurer. Before any financial withdrawal can be made from the bank, three signatures are required—one from each signatory level.

Despite improvements in water access, mainly through increased number of public water points (*water kiosks*), more affordable water through effective financial management and professionalization, fundamental problems with historical antecedents remain. WUAs can do little to change underlying, historical causes of poor water access in peri-urban and informal settlements, particularly long waiting times caused by irregular water supply and weak infrastructure. Households admitted that the number of water kiosks had increased significantly, walking distances to the nearest water kiosks had shortened significantly; yet, they still grapple with disruptions in water supply as waiting times for water continue to worsen. WUAs were built on already existing problems—weak infrastructure and limited capacity of communities. However, findings also reveal underlying challenges to water access in informal settlements that deserve attention. Decentralization only tackles one side of the issue; without deliberate efforts and political will, partnerships do not necessarily lead to the

much needed investment for infrastructure expansion. As many studies have noted, the limited piped network systems in informal communities of developing countries undermine attempts to increase water delivery (Lee and Schwab 2005, Banerjee and Morella 2011) and constitute continuing challenges of poor water access, particularly in cities and urban informal settlements.

While WUAs in Malawi are to be commended for their early and current successes, persistent challenges they encounter can be explained by situating contextual factors within broader debates on uneven city development in the Global South. As demonstrated by work in Ecuador, unique obstacles to water delivery in poor urban neighborhoods, from haphazard housing arrangements to poverty, in many cases reinforce inequities associated with historical urbanization processes (Swyngedouw 2004a). Investments in Malawi's water sector have not adequately prioritized the peri-urban. In our interviews, the chief engineer of the Ministry of Water and Irrigation emphasized the role of frequent electricity-power failures as part of the bigger problem of poor water access in urban and peri-urban informal settlements. In responding to the question of what the main challenges to sustainable water delivery to informal settlements were, he lamented:

Frequent power failures, more especially in the urban and peri – urban areas, result in intermittent water supply. In addition, increasing population leads to greater water demand than available resources can meet. Another cause of the problem is aging water supply facilities....August 25, 2014

The sentiments echoed by the chief engineer underscore deep-seated problems with infrastructure. Electricity is needed for the large water pumps and treatment plants. In the absence of reliable electricity, the utility companies struggle to sufficiently meet water demand. He (the chief engineer) revealed how water policies are formulated and built on a shaky foundation: same infrastructure that has existed since the colonial era.

The findings underscore the complexity of drinking water insecurity in peri-urban settings and the need for more holistic solutions. Granted, WUAs have the will to address deep-seated problems with water infrastructure, but this is not an easy fix. WUAs inevitably have to deal with factors such as limited or spotty electricity to pump treated water, unplanned nature of poor urban and peri-urban settlements which poses a formidable challenge to piped- system extension, and negative power relations from a largely bureaucratic system of water governance. A key success of WUAs has been a significant increase in the number of water kiosks. However, increasing taps has done little, if anything, to address the problem of long waiting times—a reflection of biophysical conditions. Malawi's case and that of other Sub-Saharan African countries reveals the multifaceted nature of poor water access in peri-urban settings.

Urban political ecology provides deep insights into understanding our results and is well positioned to highlight how physical conditions in peri-urban areas, notably of inadequate, weak, or nonexistent infrastructure combined with adverse power relations create a waterscape with winners and losers. Power hierarchies between WUAs and other actors with diverse motivations and interests, coupled with old, weak, and insufficient water infrastructure in the informal settlements create a waterscape where the marginalized, mostly women and children, suffer the most by having to spend more time searching for water. As Swyngedouw and many others point out, access to water is inherently a socio-natural process (Swyngedouw 2004b, Loftus 2009). Thus, in peri-urban Lilongwe, Malawi, water interacts with physical factors (weak/inadequate infrastructure, low water pressure, erratic supply) and the socio-political (WUAs, actors with diverse interests and power relations) to produce everyday uneven urban waterscapes.

As peri-urban residents struggle to meet daily water needs, scholars have long pointed out that in cities, poor areas pay more for water than well-off areas. Similarly, peri-urban residents often pay more than double to price paid by wealthier households with metered supply (Benneh *et al* 1993). At the same time, poverty and poor state enforcement has led to the proliferation and expansion of informal settlements where providing/expanding water infrastructure is practically challenging even if resources were available. Not only are poor households compelled to live in low-quality housing in slum conditions, they are systematically sidelined by broad urban water policies that favor and prioritize the wealthy class over the poor and marginalized. Even under favorable conditions, such communities are incapable of single-handedly managing complex and infrastructure-intensive water systems. This goes to show some of the inherent limitations of CBNRM's assumption that community involvement inevitably leads to sustainable outcomes. On the other hand, the inability of local peri-urban communities to manage complex drinking water systems as in the case of WUAs led to the "neoliberalization of CBNRM" (Zulu 2012), invariably allowing for cost recovery to take primacy over community empowerment.

Malawi's decentralized PPCP-WUA arrangement also demonstrates that while power relations and limited community autonomy usually undermine community-based natural resources management (CBNRM), they may in some cases facilitate achievement of desired results, including in this business-oriented, partnership model where different actors bring different types and levels of resources and therefore power, even as they all need each other for ultimate success. Focus group discussions with WUAs and key-informant interviews with diverse actors highlighted diverse interests, power relations among and between actors and WUAs, and lack of autonomy on the part of WUAs to undertake their core mandate. Yet the overbearing nature was

what accounted for the efficient system in the first place and is therefore hard to blame for the failures. Nevertheless, we discovered through our interviews and focus group discussions that Water Board (WB) control can be too extreme, to the point where WUAs needed their approval before surplus revenue from water sales could be reinvested. For decentralization reforms to yield desired outcomes, as Ricks (2016) also asserts recently based on a case study of Water User Groups in Indonesia, local context plays an important role.

4.7 Conclusion

We investigated whether community-based Water User Associations (WUAs) have an impact on household water access in Lilongwe, Malawi, and under what conditions. We compared access between WUA and non-WUA areas, examined prior user expectations and satisfaction with WUAs, and interrogated the role of power relations with insights from Urban Political Ecology. T-tests revealed significant mean differences in 11 out of 12 water access measures between WUA and non-WUA neighborhoods. Multilevel linear regression analysis using five consolidated dependent variables (measures of water access) revealed that WUAs enhanced affordability and reliability of water access. However, the time burden on water fetchers (mostly women and girls) was significantly higher and water use per capita lower in WUA areas. While residents in WUA areas generally associated WUAs with worsening interruptions in water supply and longer waiting times at main water points, many conceded that under the management of WUAs, distance to nearest water kiosks is shorter as number of water kiosks significantly grew under WUAs.

While decentralized governance through community-public partnerships showed promise in generally enhancing water access in the short term, physical

challenges from weak to limited infrastructure undermined efforts by WUAs. Malawi's case does not suggest that community-public partnerships are by any means faultless. Still, they at least show that outcomes are context specific, particularly contingent on local conditions, and therefore not broadly applicable. Under limiting conditions, including deficient technical expertise, our results show we can associate WUAs with marginal levels of improved access to water. Conditions that accounted for WUA successes include uniform pricing mechanisms and accountability and greater technical oversight from the Lilongwe Water Board. Further, the historical context with mediating influence of NGOs in the partnership was critical from the beginning, acting as a glue that bound WUAs, water boards, and communities. The NGOs helped to balance the exercise of power among water boards and WUAs/communities. These factors could be summed up as professionalization of WUAs and the involvement of NGOs and other actors in the partnership. Nevertheless, WUAs continue to operate amid considerable technical challenges beyond their capacities. Despite significant increases in the number of water kiosks, interruptions in water supply have worsened and households spend more time to fetch water.

Urban political ecology (UPE) provided unique insights to disentangle some of the conditions under which decentralized reforms, through the PPCP-WUA partnership, led to improved access to water in the short term while at the same time highlighting some of the core underlying, contextual factors that undermined their performance. We highlight, as do many critical urban scholars (Smith 2002, Swyngedouw 2004a, Truelove 2011), that local context, physical characteristics (particularly infrastructure), and power relations together create waterscapes with winners and losers. One of our study's major contributions have been the extension of otherwise orthodox applications of urban political ecology in urban areas to peri-urban phenomena. Malawi's experience

shows that community-based partnerships can enhance water access under particular conditions. Our findings convey that increased state support is necessary for the sustainability of WUAs and other forms of community-public partnerships especially for informal settlements. Our evidence points to a relatively successful WUA system, yet raises concerns about long term sustainability of local institutions where local technical capacity and expertise are too limited for capital and infrastructural intensive water delivery systems.

In closing, our key points are that decentralized, PPCP-WUA partnerships can enhance many dimensions of water access under particular conditions. However, some dimensions can be worsened—in particular the time burden on water fetchers, mostly women and girls, in terms of not only more water fetching trips but also waiting times. Some of these challenges are due to continuing structural issues outside WUA control, such as poor infrastructure, low pump-pressure and therefore reduced availability of water. Malawi's PPCP-WUA example demonstrates that local context shapes CBNRM approaches, and underscores that for peri-urban settings, and more importantly complex water systems, poor access to water is due to an array of factors far too complicated for most local communities. Deliberate prioritization of peri-urban spaces by governments is an important step towards addressing issues of poor water access.

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CHAPTER 5: CONCLUSION AND IMPLICATIONS

5.1 Introduction

This chapter summarizes key findings of the dissertation research and their broader implications for our understanding of the efficacy of community-public-private partnerships (CPPP) for water delivery and provision of broader social goals in poor urban and peri-urban informal settlements of Malawi and elsewhere in Sub-Saharan Africa. Presented in a three-manuscript dissertation format, the findings are discussed in relation to the three research hypotheses (see below). The dissertation project aimed to establish the potential for community-public partnerships, a form of decentralized water governance, to address the challenge of growing potable water demand in poor urban and peri-urban settlements.

Lack of access to sufficient and sustainable quantity and quality of drinking water remains a daily nightmare for many globally—nearly 700 million people are without access to improved sources of water. The situation is especially dire in Sub-Saharan Africa where pervasive lack of potable water is worsening due to rapid population growth, urbanization and peri-urbanization, and the continuing formation of urban informal settlements where residents are gravely underserved in terms of clean water and many other amenities. As Sub-Saharan Africa urbanizes faster than any other region in the world, the important question remains: how can access to water be enhanced? In particular, what institutional arrangements have the most potential for informal urban settlements where centralized, state-centric models of water delivery through utility companies alone have failed?

This dissertation is therefore about what opportunities and prospects exist for enhancing access to water in poor urban and peri-urban informal settlements through community-public partnerships. In Malawi, attempts to address growing water demand

in peri-urban settlements include formation of partnerships between communities and parastatal organizations in charge of water delivery (Lilongwe and Blantyre Water Boards for the cities of Blantyre and Lilongwe, respectively). I used the specific case of Water User Associations in Malawi to explore the opportunities and prospects for enhancing access to potable water through community-public-private partnerships.

The core hypothesis I address is that decentralized water governance through community-public private partnerships (Water User Associations) will enhance access to potable water compared to previous models under which water was supplied to such communities predominantly through either the parastatal water utility operators or private operators or vendors. To address the core hypothesis, I: (1) investigated patterns and underlying causes of water insecurity in Malawi's informal settlements; (2) explored the key water policies and institutional arrangements in Malawi within which WUAs are embedded, including the role of actors and stakeholders and their interests and motivations related to water delivery; and (3) examined the performance of WUAs to establish whether they significantly improved access to water compared to non-WUA neighborhoods, including the nature and role of the CPPP approach and power relations among key actors.

Addressing these three questions has together provided holistic answers that provide a nuanced and multi-faceted understanding of the link between this particular model of WUA implemented under a public-private partnership and water access in peri-urban and low-income unplanned urban settlements using the cases of Lilongwe and Blantyre in Malawi, within the broader context of other social benefits normally expected from such community-based approaches, including community empowerment, development, sustainability, and participation.

5.2 Summary of Findings

Hypothesis I: poor access to potable water in peri-urban settlements is due to a combination of bio-physical and socio-economic factors.

Descriptive, and linear and logistic regression analyses of 645 household-survey respondents under a multidimensional water-access framework encompassing four indicators of access—*time burden, water adequacy, water availability, and affordability*—demonstrated that poor access to water is significantly associated with long waiting-times at public water-kiosks. Further analysis revealed that such long wait-times were due to erratic water supply, overcrowding, and high rates of water-kiosk non-function.

Although water access in terms of quality (using an improved primary water source) appeared good (91 percent of the households reporting this), actual use of such safe water sources was often limited by the major challenge of water availability with nearly 60 percent of households reporting irregular water supply as the largest problem followed by long waiting times (17 percent). This forces residents to frequently resort to using secondary water sources, which is mostly from unimproved sources (only 37% indicated their secondary and alternative water sources to be from improved). Similarly the per capita mean daily water use of 28.5 liters for WUA areas was slightly higher than the minimum daily threshold for Malawi (27 liters/day) and W.H.O. (20 liters/day), and is much higher than the 14 liters recorded recently in Ethiopia (Demie, Bekele and Seyoum 2016).

The most notable finding under Hypothesis I is that from the standpoint of growing peri-urban settlements, waiting time, when coupled with the number of trips required to meet daily water needs, imposes a significant time burden on households, particularly on women and girls, which detracts from other social and economically

productive activities. On average, a typical household made 5 trips to a primary water source daily and spent a daily average of 3.5 hours collecting water. This includes an average of 37.5 per trip waiting at the water-kiosk/water source to fetch water, nearly eight times longer than the average time it takes them to travel to the nearest primary water source—of 3.8 minutes (some waited up to three hours in one trip to fetch water)—adding up to an average of nearly 3 hours in total time spent daily.

Clearly, ignoring waiting time and number of trips, as is traditionally done in official statistics on water access, is misleading and grossly overstates access, and can lead to misdirected interventions. Travel time often receives more scholarly attention as an indicator of water access, and is measured without necessarily being decomposed into travel and waiting times. Number of trips is rarely incorporated in spite of demonstrated evidence that households often require multiple water-collection trips per day (Thompson et al. 2000). This research shows that waiting time is a major component of temporal (and distance) indicators of water access in peri-urban environments and should be measured separately from travel time in order to better monitor time burden as a measure of access and device appropriate policy interventions. For instance, while shortening walking distance to water sources—often by building more water points— is a common and commendable prime policy target to enhance water access, long waiting times may require different kinds of interventions dealing with increasing reliability of supply, such as enhancing water pressure in the system, and improving problem identification and repairs.

As hypothesized, general indicators of socio-economic wellbeing correlated well with measures of water access. Measures of better socio-economic status—such as higher income, renting a house, number of rooms in a homestead, and employment of a household head—showed significant positive association with improved access to

water. Conversely, indicators of poor socio-economic status, especially large household size, were associated significantly with poor water access. Households with employed heads used significantly more water per capita compared to households with unemployed heads, while larger households tended to have access to significantly less water per capita. In addition, logistic regression analysis showed that larger and often poorer households had significantly reduced odds of meeting Malawi's minimum volume-per-capita standard of 27 liters. While it is widely known that socio-economic characteristics of households influence levels of access to water (Mahama, Anaman and Osei-Akoto 2014, Adams, Boateng and Amoyaw 2015), this study advanced this knowledge further by showing that even among predominantly low income neighborhoods where one would expect no significant differences in poverty levels, sufficient differences exist in access to potable water across all the four dimensions based on these socio-economic status variables.

Although private-home taps emerged as an important alternative source, households lamented the water prices at the communal kiosks that were twice or thrice the cost of in-house tapped water. This is concerning yet unsurprising as studies have documented how poor households often pay more per unit of water (e.g., Water Aid n.d). Lack of willingness of respondents to invest in home taps (cost) or inability to do so because they rent their home further makes the promotion of more public/communal water sources the most reasonable short term solution.

The findings under hypothesis I clearly show the complexity of water access in a peri-urban landscape and the implications for improving access. The predominant dependence on communal water kiosks (60 percent of respondents) coupled with limited alternative, improved sources, implies that these communal water kiosks remain the most important sources and therefore should be the main policy focus to

enhance water access. At the same time, the results, particularly on long waiting times, demonstrate that ultimately, the complex water-access challenges in Malawi's peri-urban settlements is rooted in weak, nonexistent, or limited infrastructure and biophysical conditions. While adding more water kiosks is important, doing so without sufficiently addressing underlying core issues of weak infrastructure may actually escalate the problem by severely undermining water-flow pressure and therefore reliability by overloading the limited infrastructure. Further, the results demonstrate the multifaceted nature of poor water access in poor urban and peri-urban settlements, which calls for a more integrated, empirical analysis that addresses both the biophysical and social dimensions of the problem.

Hypothesis II: Existing institutional arrangements including diverse actors and functions of the Water User Association (WUAs), combined with the historical context result in tradeoffs between enhanced managerial efficiency and formalization, and (low) levels of community ownership, trust, and participation in decision-making.

Under hypothesis II, I essentially addressed the broader question of what happens when community-based natural resources management (CBNRM) approaches, conventionally used in rural areas are transferred to an urban or peri-urban setting. I more specifically engaged with the question of whether the core water-supply mandate behind the CBNRM/WUA approach and expected social goals of empowerment, ownership, and participation are compatible, and if not what trade-offs ensue and to what effect. The results showed that while these broader social goals are still important to Water User Associations, the supply of reliable and safe water was more important, superseding participation, empowerment, and broader socio-economic benefits.

In a peri-urban landscape (in contrast to a rural one), biophysical conditions and the nature of the peri-urban landscape, coupled with the commodified nature of piped

water, create a unique set of challenges and opportunities. Water delivery requires massive infrastructure and technical know-how to manage—both generally beyond the wherewithal or capacity of communities on their own. This puts a premium on the need to formalize and professionalize community water-supply and systems in technical and managerial terms (including financial management). This professionalization appeared to contribute to the limited broader community participation in favor of managerial efficiency. In addition, the nature of a community in a peri-urban area is different from that of a rural setting. For instance, ethnic composition and social heterogeneity is high, community cohesion tends to be lower, and most urban dwellers' livelihoods are based on wage employment, which demands much of their time, and frequent movement to the city core in search of opportunities.

Together, these factors reduce the incentives for and ability of water users to participate in collective action around water supply, and given the essential nature of water to support life, reduce the role of most urban/peri-urban dwellers to paying water customers rather than participants. While these imperatives for professionalization influenced the emergence of WUAs in the first place, they also created an environment where limited community interest and participation paved the way for unequal power relations that tend to favor such formalization. In this case, the parastatal Lilongwe Water Board (LWB) wielded considerable power as the institution in charge of the water-supply infrastructure, and dominated decision making in favor of formalization and its primary motive of recouping outstanding community water-bill debts and ensuring that current bills are also paid. NGOs and the City Council played the key role in bringing together the interests of water-user communities and the water utility to manage the community/utility power relations for the creation of a win-win situation that benefits both parties.

As hypothesized, the peri-urban terrain and characteristics, combined with the limited capacity of WUAs to manage infrastructure, created an opportunity for the Lilongwe and Blantyre Water Boards to exert the dominant influence and control. At the same time, we discovered that while the social and power relations accounted for the limited success in terms of community participation and interest, and low awareness of WUAs and their activities, the densely populated nature of the peri-urban landscape, the transitory nature of housing arrangements (mostly renting), the heterogeneous backgrounds of community members, and limited collective action undermined successful delivery of additional social benefits.

Findings are generally consistent with *hypothesis II* and show that contextual factors make achieving both water supply and social benefit goals particularly hard. However, the findings also demonstrated the potential for community-public partnerships (via WUAs) to successfully supply water, albeit with trade-offs against broader social and empowerment goals and CBNRM tenets. Institutionally, WUAs improved their technical and managerial capacity to supply water, accountability and their financial solvency, and stabilized peri-urban water delivery. This further allowed most WUAs to pay off debts that had accrued under prior, pre-WUA water providers and supply models, and to generate locally significant employment. However, WUAs continue to struggle with limited autonomy for decision making and generally low interest from water users who mainly contributed to the partnerships by purchasing water and to a lesser degree electing executive members. While there is need to enhance levels of community autonomy via WUAs, as well as levels of participation, under the peri-urban/urban context formalization and managerial capacity to supply water and the financial health to sustain it appeared more important than the particularities of participation and some broader benefits. Further, there was

community empowerment, but it took a different and arguably more important form – WUA professionalization.

Despite modest gains in community empowerment, relentless critique of CBNRM for pushing community-empowerment to the backburner presents a cautionary tale for the long term sustainability of WUAs, given ample scholarly evidence that CBNRMs intended goal of empowering local communities has often been underachieved (Blaikie 2006). As Ribot et al (2006) contend, CBNRM projects have generally created opportunities to benefit the state, or at least been used as a tool to advance a state agendas rather than primarily to improve livelihoods and empower communities. One could very well argue that the historical context that necessitated a decentralized, community-based approach to water delivery in peri-urban settlements is an artifact of disempowerment and governance failure. Peri-urban communities already paid for water; however, widespread inefficiencies created debts for communities to repay. This accounted for the core motivation of establishing WUAs with a clear neoliberal agenda, to externalize costs, recoup debts, and make communities customers rather than participants. Even though this neoliberal, demand-based approach may have been necessary and essentially accounted for the short term managerial success of WUAs, the important question for the long term remains whether and how a neoliberal-focused WUA that emphasizes cost-recovery and economic incentives might coexist successfully with social goals of empowerment and benefit sharing to communities.

It is interesting to contrast how public participation may play out in different contexts, for instance in a developed country scenario. In the Malawi WUA case, technocratic knowhow appeared to trump participatory process, suggesting that our understanding of participation should take context into account. In contrast to expectations of broader participation and empowerment in the case of community-

based approaches, participation may hardly supersede professionalization and technical know-how in a developed country context. As Swapan (2016) recently noted, our characterization and measurement of what constitutes successful participation especially in a developing country context must account for attitudes, cultural backgrounds, and political contexts which although dynamic, may significantly influence attitudes toward participation. In the case of WUAs tempering expectations, or at least the levels and types, of participation can allow CBNRM approaches to approach professionalization and reap more benefits for their efforts.

In sum, under *hypothesis II*, the central contention is that while popular CBNRM tenets emphasize community participation, empowerment, and equitable benefit sharing (Blaikie 2006), their application in peri-urban environments requires flexibility in CBNRM expectations and tenets, including openness to different forms of and levels of participation. As has been noted for other community management cases, not everyone has to participate in CBNRM for significant benefits to accrue, and indeed business skills and formalization have been major obstacles to enhance ecological livelihood sustainability from community managed resources (e.g., Zulu 2013).

Hypothesis III: the institutionalization of the adopted WUA model will lead to improved access to potable water in served peri-urban areas compared to areas predominantly served by publicly-managed water kiosks.

Descriptive statistical tests suggest that WUAs had significant impacts on water access. There were significant differences in 11 out of 12 water-access variables between WUA and non-WUA areas. Households in WUA operational areas used less water per capita on average (28.5 liters) compared to non-WUA areas (31.0 liters). Correspondingly, households in WUA areas were significantly less satisfied with the adequacy of water than households in non-WUA areas. However, households in non-WUA areas paid more

for water. Strikingly, households in WUA areas spent significantly more time to fetch water than non-WUA households.

Multilevel linear regression analyses using five dimensions of water access derived through a principal component analysis revealed that WUAs enhanced affordability and reliability of water. A unit change from no-WUA to a WUA-area residence resulted in a significantly more affordable perceived cost of water to a household. In addition, WUA areas were significantly associated with a better measure of reliability of water access (measured by satisfaction with and regularity of water supply). On the downside, the time burden on water fetchers (mostly women and girls) was significant higher in WUA areas. Further, residents generally associated the era of WUAs with worsening interruptions in water supply and longer waiting times, despite significant increases in the number of water kiosks.

While the findings largely support the hypothesis that WUAs will be associated with improved access to water, access did not improve across all dimensions. This suggests that while the WUA- based decentralized community-based partnership model adopted in Malawi can and did marginally improve access to water, deep-seated problems with infrastructure undermined success. The successes associated with WUAs can largely be explained by WUA formalization and professionalization. This included setting of uniform pricing, instituting financial accountability arrangements, employing a professional secretariat separate from the elected WUA executive, improving the technical capacity of WUA employees, and enhanced technical oversight from the Lilongwe Water Board.

Insights from urban political ecology (UPE) further uncovered and confirmed unequal and unmanaged 'power relations' as a possible condition under which decentralized, community-public partnerships for water delivery may fail to yield

desired broader social results. Communities are represented by WUAs, yet with limited capacity to make changes to the existing water services infrastructure. Peri-urban communities are at best co-managers or custodians of the water system, hence unable to actually upgrade or enhance the infrastructure—evidently a demonstration of unequal power relations. Even if communities wanted to organize to solve poor infrastructure, they are constrained by the limitations of the partnership where the water board owns the infrastructure and communities act as managers or caretakers.

At the same time, the findings also demonstrate an instance where the same power relations also largely accounted for the managerial successes compared to previous water providers and supply models. While the partnership arrangement achieved modest success, it amounted to a waterscape where the elite members among the key stakeholders occupied the highest rung of the system and therefore had the strongest influence on decisions. These elites, including the water boards, have mainly wielded power by dictating and directing decision making in their interest. Ultimately, the end users occupying the lowest rungs of the decision making ladder, have not actively participated in decision making. In particular, women, who generally have greater concerns with access to water, were largely reduced to vendors with no representation on the Board. As the work of Rusca et al. (2015) shows, the WUA model can be fraught with elite capture as it generally allows the privileged in the communities to occupy higher rungs of decision making (e.g., the board of trustees and executive board), and obtain increased societal status, sometimes including financial benefits. However, elitism has not materialized to a degree that causes grave concern, thanks in part to the business-oriented design of the WUA model, which may arguably make the concept of elite capture less appropriate when applied to relations among the core sets of actors. This WUA model separates the elected (political) arm where such elite

capture tends to emerge and undermine collective success, from the professional secretariat led by a manager with much control from the water agency, and the decision-making Board overseeing everything.

In fact, it has to be accepted that the WUA model was built on a partnership in which the differential types and levels of contributions of individual partners give them different, unequal but complementary roles and levels of power. Despite this, the two core partners —the user communities and water boards—clearly need each other, the communities to obtain a vital resource that had been disconnected and the water boards to outsource management in an otherwise challenging economic and political environment while still making profits or at least recovering costs. While the relationship is necessarily unequal because the water boards bring the most to the table, the unequal nature of the relationship in this context is not necessarily a problem.

The WUA arrangement in Malawi demonstrates a rare, positive power inequality where the apparent dominance of the water board in decision making, particularly on techno-managerial matters and professionalization, was beneficial and largely accounted for the relative success in water supply achieved so far. This may appear at odds with what is known generally in the urban political ecology literature and also mainstream political ecology, where it is generally assumed that the powerful often pursue their own interests and motivations to the disadvantage of the less powerful. While the water board's motivations were selfish (aimed at debt repayment, prompt payment of bills, etc.), in this partnership arrangement, the outcome was good for both the water board and the community, hence a win-win situation, despite—or even because of—unequal contributions and relations of power. Clearly, the technical know-how that was embedded in the unequal power relations in the governance of peri-urban

water systems may be necessary, and in the short term, technocratic know-how more important than equitable participation.

Thus, the evidence under *hypothesis III* indicates that WUAs organized under community-public partnerships have the potential to enhance water access on multiple dimensions, in this case adequacy (per capita water use), availability, and affordability. There were still challenges associated with poor infrastructure and reflected through increased time burdens on water fetchers (mainly women and children) and increased levels of interactions. Still, although it is too early to judge the long term sustainability of the relative success achieved so far without further longitudinal analysis, early results are very promising.

To sum it all, the CPPP based WUA model adopted in Malawi's two major cities brought several benefits. It: 1) contributed significantly to improved access to water on several dimensions of access relative to previous water-supply arrangements or areas with no or low adoption; 2) enhanced management effectiveness, technical capacity, and financial accountability and transparency in WUA management of water supply at kiosks; 3) cleaned up and formalized an originally messy system historically fraught with mismanagement, embezzlement of funds, corruption, and inefficiencies; and 4) created locally significant employment and other limited social benefit opportunities. Nevertheless, fundamental challenges and failures remain against the backdrop of contextual *in situ* conditions: local communities with limited interest in WUA activities (some even unaware of WUA presence), limited social cohesion, and ethnic heterogeneity. Most notably, historically-rooted poor infrastructure and other challenges undermined success. It created a peri-urban waterscape where despite efforts to increase the number of community-water kiosks, irregular water supply and therefore waiting times worsened.

5.3 Significance and Implications of Findings

This dissertation has made contributions to intellectual and theoretical debates, and applied research with implications for policy-based solutions for addressing poor or lack of access to potable water in informal settlements, especially as population growth and urbanization continue to threaten livelihoods in Sub-Saharan Africa. It has contributed to the theoretical and applied discussions of urban political ecology (UPE) and common pool resources theory (CPR) through cross-fertilization between these two frameworks. It extends the conventional, solely urban applications of UPE to the oft-forgotten peri-urban and low income or unplanned urban spaces in order to understand how power relations and the social and economic context, and the mediating influence institutions shape access to water. Specifically, the study illustrates the importance of a holistic approach that pays attention to the dual influence of physical and social factors on particular water-access outcomes. Further, by focusing on water access in a broader policy context, the study addresses one of the core weaknesses and critiques of political ecology research —limited policy relevance of many studies (Walker 2006).

As for the CPR theory and CBNRM praxis, this study advanced our understanding of how the peri-urban landscape changes the opportunities and constraints offered by community-based resource institutions and governance. The urban and peri-urban environment provides unique conditions relative to rural areas where community-based approaches have traditionally been applied, which necessitates adjustments to community approaches that result in trade-offs between water supply goals and core tenets of standard CBNRM. Such special conditions include limited social cohesion, diverse ethnic composition, and predominantly wage-based livelihoods which come with higher time burdens, all in contrast to rural communities. These factors tend to reduce the incentives or capacity to participate in collective water supply. In addition,

the nature of the water resource changes from a largely unprocessed and often free resource in rural areas to a much more processed and (therefore) commodified tapped-water resource dependent on an elaborate water-supply infrastructure. This imposes much stronger demands for cost recovery and favors partnerships with better resources, agencies, and a rigorous business approach and techno-managerial capacity not normally possessed by communities, and places new demands of CBNRM approaches that prioritize water-supply goals and related narrow empowerment goals, over broader social goals of community empowerment, participation and socio-economic benefits. The relative success of the WUA model illustrates the need for flexibility to make community-based approaches successful under particular contexts.

The dialogue between CPR and UPE created a platform to address some of their weaknesses—UPE pays more attention to power relations without sufficient emphasis on institutional arrangements; CPR emphasizes institutions and collective action without adequately addressing power. It took the creation of effective, formalized local institutions (the WUA) to reverse challenge of water supply and financial insolvency that had prevailed when institutions were either absent or weak (including centralized state water supply) and to re-start water supply to many of these areas. In addition, it took the intervention of concerned water sector NGOs and local city government to bring together the local communities and the parastatal water boards and manage to a significant degree the exercise of power between these two core actors within the context of community, public, and private partnerships (CPPP). So, this dialogue between UPE and CPR theoretical approaches not only nuances and enhances the analysis of water access under WUAs, but it also enhances both bodies of literature and has policy implications in improving intervention outcomes.

The core policy lessons and implications of the dissertation are that CPPPs built around the WUA model have the potential to improve water supply to traditionally underserved peri-urban and low income urban areas and perform better than centralized, informal community, and private approaches, at least in the short term. However, their continued success also calls for an institutional landscape that prioritizes capacity development and support for communities. This relative success largely depended on enhancing the capacity of communities to operate effectively in non-traditional business oriented and techno-managerial roles. This may come at the relative expense of and/or run counter to what CBNRM usually expects for rural areas—maximum participation, broad community empowerment, increased autonomy and ownership, and broader social benefits, even as the water boards work in reducing the infrastructural water-supply barriers that disadvantage communities, especially women and girls. At another level, rural based CBNRM can also learn and benefit from such formalization and business-oriented efforts.

In the context of other countries in Sub-Saharan Africa, adoption of Malawi's WUA model will not automatically guarantee success. To be sure, adoption of the CPPP approaches should happen with cautious consideration of local biophysical and social factors. Where the institutional environment is conducive, WUAs as a form of CPPP can lead at least to efficient management of the water supply system given that partnerships are necessary for dealing with possible monopoly on the part of entirely state-centric or privatized approaches. Policy makers and city planners aiming at improving peri-urban access to water through partnerships between communities and government entities should bear in mind the complexities (both challenges and opportunities) associated with the peri-urban landscape, the mix of actors involved, and the capital intensive, commodified nature of water.

5.4 Limitations and Emerging Research Questions

While this dissertation has made important scholarly and applied contributions, the results, interpretations, and policy recommendations should be viewed and applied with careful consideration of potential limitations. I concede, as the findings demonstrate, that although the water-access problem in the peri-urban settlements of Malawi were inherently both biophysical and social in nature, the limited exploration of how the former influences access to water, relative to the depth of discussion provided on the socio-institutional dimensions, constitutes a weakness that warrants future work. The long waiting times are a direct reflection of underlying biophysical conditions such as the capacity of the existing water supply and treatment infrastructure. Explicitly addressing such dimensions of access will provide more nuance and detail to the findings. This limitation of the research design opens avenues for future research that will systematically explore the interconnections between long waiting times, erratic water supply, and population and density of neighborhoods, impacts of terrain, location and structure of the pipelines and the rest of the systems, and implications of their coupling effect with weak infrastructure and social conditions on household water access.

Future work will also map the actual water infrastructure and existing water resources, to determine and better understand the spatial distribution of water access across the peri-urban settlements and what biophysical conditions may explain variation in water access. In addition and related to these, I will collaborate with climate scientists to delve into potential impacts of climate variability on freshwater resources in Sub-Saharan Africa, and how that may in turn influence water access, and what pathways these influences will most likely follow. This will provide a more integrated analysis of the multi-faceted nature of water access.

The findings and conclusions from the dissertation could benefit from a more in-depth discussion of gender especially considering that significant literature has pointed to an inseparable, complex relationship between gender and water. Potential impacts of poor water access on households, especially on women and girls, have not been systematically explored beyond possible effects from long waiting times. Even with waiting time, this work did not account for different uses of waiting time as a coping mechanism adopted by women and girls. Other intra-household conditions may potentially account for differential access to water other than the socio-economic status this dissertation has highlighted. Therefore, important questions to explore further as this work develops include: how do women use waiting time at communal water kiosks? In what ways does poor water access impact households and communities? Relatedly, it will be important to draw distinctions between de-facto and de-jure female household heads so as to understand the leadership roles taken by women to cope with poor access to water at the household level.

Further, while this dissertation has argued that poor access to water disproportionately affects women, it has assumed the effects to be uniform across different classes of women, which may not be accurate. Further work will address this weakness by exploring potential differentiation among women in terms of access and coping mechanisms. For example, the extent to which the effects of poor water access are moderated or mediated by income differences (e.g., household monthly income ranged from 0.7 USD to as high as 350 USD), access to extended family networks, household size (ranging from 1-13), and other social factors need detailed investigation.

In Chapter 2 where I explore the association between access to water and indicators of economic wellbeing, I draw from income data that is self-reported and potentially inaccurate because of two reasons: most respondents were women who

estimated income with little knowledge about their husbands' finances, and secondly, income sources for peri-urban residents are diverse and variable, making accurate estimates notoriously difficult. In spite of this limitation, I took careful steps to measure income as accurately as possible by asking respondents or their spouses to build a picture of monthly income based on different sources. The method was also standardized. In addition, I employed proxies for general socio-economic wellbeing—asset ownership, number of rooms, and rent.

As with any study with a qualitative component, responses are subject to biases from wrongful recall or intentionally giving false data (Creswell and Clark 2007). Careful steps were taken to minimize this to the barest minimum by asking certain questions multiple times. Even though biases are possible, triangulation of data from both quantitative and qualitative sources allowed for corroboration of evidence.

I acknowledge that despite socio-demographic similarities among the study and control neighborhoods, there may be additional similarities among individuals within clusters that do not hold across different clusters, and between sample and control neighborhoods. Therefore, my assumption that the communities are homogenous (have equal variance) across the study areas may constitute a simplification.

Finally, my inability to speak and understand the Chichewa language proficiently may influence the accuracy of some key-informant interviews. I relied on translators during the interviews and drew results and conclusions from their transcriptions. Here, I used fully trained translators and research assistants who were familiar with qualitative data collection methods to curb potential errors as much as possible.

APPENDICES

Appendix A: Household Survey Questionnaire

A PhD Dissertation Survey Conducted in Lilongwe, Malawi

By Ellis Adjei Adams

Michigan State University

July-November 2014

[NOTE TO ENUMERATOR: INTRODUCE YOURSELF AND EXPLAIN THE STUDY. SEEK APPROPRIATE VERBAL CONSENT BEFORE THE START OF INTERVIEW]

Section A: Location and Identification Information

Area ID: (<i>Kauma-A41</i>); <i>Mtandire- [A56]</i> ; Area 36- <i>A36</i>		A1
GPS Coordinates (Household)	X-Coordinate	A2
	Y-Coordinate	A3
Start Time:	End Time:	Duration (<i>Minutes</i>):

Enumerator Information

Household Information

Date	Name of Enumerator	Checked	Coded By

Enumerators Remarks (Enter relevant special notes here)

Number of People in Household	
Males	A5:
Females	A6:
Total [Household Size]	A7:

B: General Demographic and Socio-economic Information

Address questions to head of household. If HoH is not present, interview any adult member of the household over 17 years old. Enter responses in boxes.

FOR EACH MEMBER OF THE HOUSEHOLD														
<i>List the full name of HoH</i> <i>If HoH is absent, use information of eligible respondent instead</i>	Sex of HoH 1=Male 0= Fem	Age (yrs)	Relation to HoH	Highest Level Of School	Able to read and write 1=Yes 0= No	Marital Status	Employment status	NUMBER OF CHILDREN			Native In this Area/ Town? 1=Yes 0=No			
								No. Children Born	No. Children alive	No. Children Under age 5				
B1	B2	B3	B4	B5	B6	B7	B8	B9A	B9B	B9C	B10	District of birth B11	How did you come to this community B12	For how many years have you lived here If native, put 999 B13

Rel. To HoH
 1. Self (HoH)
 2. Spouse
 3. Son/daughter
 4. Brother/sister
 5. Mother/father
 6. Grandfather/mother
 7. Granddaughter/son
 8. Aunt/uncle
 9. Cousin
 10. Mother/father-in-law
 11. Daughter/son-in-law
 12. Nephew/niece
 13. Other (specify):

Education level
 1. No education
 2. Primary education
 3. Secondary education
 4. Vocational/technical
 5. College/tertiary
 99. Other

**Marital status
(For age ≥ 10)**
 1. Married
 2. Widowed
 3. Divorced/Separated
 4. Never married/Single

Employment Status
 1. Employed for wages
 2. Self-employed (business, trading, etc)
 3. Unemployed
 4. Student
 5. Retired
 6. Unable to work (ill)
 99. Other:

Reasons for Moving
 1. Migrated with family as a child
 2. Followed relative other than parents
 3. Followed spouse/partner
 4. To seek employment
 5. To seek land for settlement
 6. To seek land for agriculture
 99. Other:
 999. Native of area/born here

B14. What is your ethnicity?	Chewa	1	Nkhonde	7
	Lambya	2	Nyanja	8
	Lomwe	3	Sena	9
	Mang'anja	4	Tonga	10
	Ndali	5	Tumbuka	11
	Ngoni	6	Yao	12
	Other (Specify):			99
B15. What is your religion?	Christian	1	Traditional (Za makolo)	3
	Muslim	2	None	4
	Other:			99
B16. Who owns this house or compound?	Household head	1	Occupied without rent	5
	Spouse of household head	2	Owned by a relative	6
	Rented from private owner	3	Other (Specify):	99
	Rented from government	4		
B17. What type of housing do you and your household live in?	Single family house	1	Apartment	5
	Rented room in a house	2	Tent	6
	Workplace quarters	4	Other:	99
B18. What is the main construction material used for the outer walls of your household?	Cement blocks	1	Bricks	4
	Metal sheets	2	Mud	5
	Wood/bamboo	3	Other:	99
B19. What is the main roofing material of the household	Grass	1	Concrete	4
	Iron sheets	2	Roofing tiles	5
	Plastic sheets	3	Other:	99
B20. What is the construction material of the floor of the house?	Cement	1	Wood	4
	Sand	2	Tiles	5
	Smoothed Mud	3	Other:	99
B21. What is the frequency of rental payments for your house?	Monthly	1	Weekly	4
	Yearly	2	Do not pay rent	99
	Every two weeks	3	Other:	99
B22. How much do you pay as monthly rent?	_____ Kwacha			
	Do not pay rent			99
B23. What type of lighting does this household mainly use?	Electricity			1
	Kerosene/lantern/candles			2
	Solar			3
	Other (Specify):			99

B24. How many rooms are used by this household for sleeping only? _____

B25. How does this household dispose most of its garbage	Public rubbish heap	1	Burn or bury	4
	Private rubbish service	2	Rubbish pit	5
	Throw in bush	3	Other:	99

B26. What is the main source of fuel for household cooking? **B26:**

1. Firewood 2. Charcoal 3. Gas stove 4. Electric stove 5. Kerosene stove 6. Solar energy
7. Paraffin 8. 9. Crop residue/sawn dust 10. Animal dung 99. Other (Specify)

Section C: Drinking Water Sources and Access

Use codes from table below to answer questions C1- C5

1	Tap in house	7	Rainwater
2	Tap in yard/plot/compound	8	Surface water (River, Lake, Stream, Pond)
3	Communal tap/water kiosk	9	Small scale vendor
4	Neighbors tap	10	Borehole
5	Protected well (Covered)	11	Tap or Kiosks in another community
6	Unprotected well (Open)	99	Others:

C1. What is your household's primary source of drinking water?	
C2. When the primary drinking water source in C1 is not available, what source does your household use for drinking?	

C3A-E. What is the primary water source your household uses for the following needs in the dry season/now?

C3A. Cooking		C3D. Bathing	
C3B. House cleaning		C3E. Cleaning dishes	
C3C. Laundry/washing clothes		Other:	99

C4A-E. In the last wet/rainy season, what primary water source did your household use for the following?

C4A. Cooking:		C4D. Bathing:	
C4B. House cleaning:		C4E. Cleaning house dishes:	
C4C. Laundry/washing clothes:		Other (Specify):	99

C5. What water source do members of your household use for washing hands after using the toilet?

[Code]_____ [12]. Tip Tap [999]. Household members do not wash hands

C6. Which person in the household usually collects water from the main source?	Adult woman	1	Both adult woman & female child	6
	Adult man	2	All household members	7
	Female child under 15	3	Other	99
	Male child under 15	4	Water on premises	999
	Both adult man and woman	5		

C7. How many minutes does it take you to walk or move to your households main water source?
 _____Minutes **[Put 0 minutes if water source is on premises]**

C8. How many minutes do you normally wait at the primary water source to get water?
 _____Minutes **[Put 0 minutes if water source is on premises]**

C9. After you fetch water from your main water source, how long does it usually take you to get home?
 _____Minutes **[Put 0 minutes if water source is on premises]**

C10. For Enumerator: How many minutes does it take your household to get water in a round trip?
[C6+C7+C8] _____Minutes **Water source is on premises [0]**

C11. Which container do you mainly use to fetch/carry water from the water point to your household	Open container/pail/bucket	1	Jerri can (Zigubu/gallon)	4
	Covered container/pail/bucket	2	Bucket with cover	5
	Basin	3	Other:	99
			Not applicable	999
C12A. Do you currently treat your drinking water to make it safer drink?			Yes	1
			No	0

C12B. If yes to C12A, What do you normally do to your drinking water to make it safe to drink?

Boil water	1	Solar disinfection	5
Add bleach/ chlorine	2	Let it stand and settle	6
Strain it through a cloth	3	Use Water Guard	7
Use a water filter (ceramic, sand, composite etc.)	4	Other (Specify):	99
		Not applicable/Do not treat water	999

Water Use, Storage, & Cost

C13. Do you pay for water from the main source?	Yes	1		
	No	0		
C14. If water is on premises, how much was your water bill for last month?	_____Kwacha [999] Not applicable			
C15. On an average, how much does your household normally spend on water in a day?	_____Kwacha [999] Not applicable			
C16. How much does the '20 liter bucket' of water cost at your primary water source?	_____Kwacha [999] Not applicable			
C17. Think about all the water your household use every day. How many liters do you use on average? Enumerator calculates total volume based on number of 20 liter buckets of water used daily	_____Liters know [9] Total volume I don't			
C18. Who provides money to pay for water used by this household?	Husband	1	Son	5
	Wife	2	In-law	6
	Both husband and wife	3	Landlord	7
	Daughter	4	Other:	99
C19. Do you store your water from the main source?	Yes		1	
	No		0	
C20. If yes to C19, how long do you usually store water from the main source for household use?	1-2 days	1	More than 4 days	3
	3-4 days	2	Do not store water	999
C21. If yes to C19, what container do you normally use for storing water?	Bucket	1	Bottle/Pitcher/Jug	6
	Jerry cans	2	Drum	7
	Big basin	4	Other:	99
	Pot	5	Do not store water	999
C22. Are your water storage containers covered or exposed?	Some covered some open	1	None covered	3
	All covered	2	Do not store water	999
C23. What other purposes are the water storage containers used for?	Only for storing water	1	Cleaning household	4
	Bathing	2	Other:	99
	Washing	3	Do not store water	999
C24. [Enumerator probes by asking how many 20 liter buckets they are able to store]. Assuming you filled all your household water storage/fetching containers with water, how many liters of water will that be? _____Liters Do not store water [999] I don't know [9]				
C25. Do members of your household share drinking cups	Yes	1		
	No	0		

[Enumerator probes for close accurate estimations [Based on 20 liter bucket estimations]

C26. How many liters of water does your household use **daily** for the following? **[Enumerator Probes]**

C26A. Cooking:		C26D. Bathing:	
C26B. House cleaning:		C26E. Cleaning house dishes:	
C26C. Laundry/washing clothes:		C26F. Drinking	

C27. In the last rainy/wet season, how many liters of water did your household use **daily** for the following?

C27A. Cooking:		C27D. Bathing:	
C27B. House cleaning:		C27E. Cleaning house dishes:	
C27C. Laundry/washing clothes:		C27F. Drinking	

C28. Has your household ever collected water from untreated sources (rivers, streams etc) because you did not have money to purchase water from a water kiosk/public tap?

[1]. Yes [0]. No [9]. I don't know

C29. Has your household ever collected less water than you needed because you did not have the money to pay for water? [1]. Yes [0]. No [9]. I don't know

C30. If yes, how many times in the past month did you collect less water than your household needed because you could not afford to pay?

[1]. Once [2]. Twice [3]. Three times [4]. More than three times [999]. Never [9]. I don't know

C31. Is the path to your primary water source easy to walk? [1] Yes [0] No [999] Water on premises

C32. If yes to C31, why is it not easy to walk? **If no to C31, circle 999 and move to next question**

1. Dark in the evening 99. Other:
2. Too uneven 999. Easy to walk/ Water on premises
3. Too dirty

C33. How often do you find people already queuing at the water source when you arrive?

1. Never 4. Always
2. Sometimes 9. I don't know
3. Often

C34. How do you transport water from the main source to your home?

1. By foot 3. By cart 999. Do not transport/Water is on premises
2. By bicycle 99. Other:

C35. How many times within a day do you usually collect water from the main source?
_____ (number of times)

999. Do not collect water every day/Water source on premises [999]

C36. What time of the day do you usually go to the main water source to collect water?

1. Early morning 4. Night time
2. Middle of the day 99. Other:

3. Late evening 999. Water is on premises

C37. How many times within a week does it happen that you need water from the main source and it is unavailable? _____times **[Put 0 if water source is always available]**

C38. Would you be willing to pay to connect your household to a tap/pay for a household tap?
[1].Yes [0]. No [999] I already have a household tap

C39. If no, why would you not consider having your household connected to a tap?

1. Administrative steps are complicated
2. I do not know who to talk to
3. The cost to connect is too expensive
4. I will not be able to afford monthly bills
5. I am a tenant/I rent this house
99. Other: 999. Already have a home tap/ Willing to connect a household tap

C40. How much extra will you be willing to pay for the current price of water per 20L bucket at the kiosks in-order to contribute towards building more water kiosks for the community?
_____Kwacha [*If unwilling to pay, put 0 Kwacha*] [9] I don't know

Section D: Perceptions of Potable Water Access and Quality

D1. Do you think your household can afford the cost of water needed for all household needs daily?	Yes	1	I don't know	9
	No	0		
D2. Do you think you get adequate water for all your household needs daily?	Yes	1	I don't know	9
	No	0		
D3. On a scale of 1-5, how affordable is the cost of water for your household needs?	Very unaffordable	1	Affordable	4
	Unaffordable	2	Very affordable	5
	Undecided	3	I don't know	9
D4. How would you describe the distance to your primary source of water on a scale of 1 (very close) to 5 (very far)	Very close	1	Far	4
	Close	2	Very far	5
	Undecided	3	I don't know	9
D5. In the last week, how many days was drinking water available from your main source of water?	Always available	1	Less than three days	4
	Six days	2	Water was always unavailable	5
	Five days	3	I don't know	9
D6. How many hours in a day is water usually available at the main source?	_____Ho urs		I don't know	9
D7. On a scale of 1-5, how regular is the flow of water from your main source?	Very regular	1	Irregular	4
	Regular	2	Very irregular	5
	Undecided	3	I don't know	9
D8. How often within a week do you wait at the main water source before you get water	Always	1	Rarely	4
	Very often	2	Never	5
	Sometimes	3	I don't know	9
D9. On a scale of 1-5, how satisfied are you with the	Very dissatisfied	1	Satisfied	4
	Dissatisfied	2	Very satisfied	5
	Undecided	3	I don't know	9

frequency of water supply from your primary source?				
D10. What do you think is the most serious problem with water supply for your household or community?	Irregular supply	1	Water tastes bad	5
	High cost of water	2	Water looks unclean	6
	Low water pressure	3	Long waiting times at source	7
	Frequent breakdowns	3	Other:	9 9
D11. On a scale of 1 (very clean) to 5 (very dirty), what is the quality of water from your main source?	Very clean	1	Dirty	4
	Clean	2	Very dirty	5
	Undecided	3	I don't know	9

Section E: Sanitation and Toilet Facilities

E1. Do you have a toilet facility in your household or homestead? [1] Yes [0] No

E2. What kind of toilet facility do members of your household primarily use?	Water closet/Flush toilet		1	Eco-San	5	
	Ventilated Improved Pit		2	Bucket latrine	6	
	Pit latrine with slab		3	No facility/Bush/Field	7	
	Open pit latrine/without slab		4	Composting toilet	9	
	Public shared latrine		5	Other:	9 9	
E3. Does your household share toilet facility with other households?	Yes		1			
	No		0			
E4. How many other households use the toilet facility your household uses?	_____Households Not applicable [999]					
E5. In your opinion, which of the following is the most important good sanitation practice?	Wash hands with soap before eating		1	Properly dispose faeces	5	
	Wash hands with soap after eating		2	Bath twice daily	6	
	Treat water before drinking		3	Clean my teeth daily	7	
	Sweep my household/surroundings		4	Other:	9 9	
E6. In the last six months, which of the following waterborne diseases has any member of your household suffered from? [Check all that apply] [Select appropriate Code]	Cholera	Check all that apply	Cholera Only		3	
	Dysentery		Diarrhea only		4	
	Diarrhea		Dysentery only		5	
	All of the above		1	Cholera and Diarrhea		6
	None of the above		2	Cholera and Dysentery		7
	Other		9 9	Dysentery and Diarrhea		8
	E7. In the last month, has any child in this household stayed out	Yes		1	I don't know	
No		0				

of school because of any of the illnesses listed above in E6?				
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Section F: Community Water Governance & Perceptions about Water User Associations

F1. What is your most important need regarding water services in the community?	Regular water supply	1	Water of good quality	4
	Adequate quantity of water	2	Water point close to my household	5
	Affordable water	3	Other:	99
F2. In your opinion, who should be responsible for providing this community with water	Government	1	The community	5
	Lilongwe Water Board	2	Individuals themselves	6
	Water User Association (WUA)	3	Lilongwe city council	7
	CBOs/Churches/NGOs	4	Other:	99
F3. Are you aware of the presence of a Water User Association in this area?	Yes	1		
	No	0		
F4. In your opinion, what is the main function of WUA in your area?	Collect water fees at kiosks	1	Provide money for community projects	5
	Manage existing water kiosks	2	Build more water kiosks	6
	Resolve water use conflicts	3	I don't know	9
	Improve water supply	4	No WUA in my area	99
			Other:	9

Water Access under WUAs Compared to Lilongwe Water Board

Consider water supply under WUAs in the past 3-5 years compared to previous supply under Lilongwe Water Board. Has the following aspects of water supply improved, stayed the same, or worsened in the last 3-5 years.

	Water access indicator	Improved [1]	Same/ No Change [2]	Worse [3]	I don't know [9]	Not Applicable [999]
F5	<i>Interruptions in water flow or supply</i>					
F6	<i>Waiting Times at the kiosks/Long queues</i>					
F7	<i>Water Kiosks operating hours</i>					
F8	<i>Price of Water</i>					
F9	<i>Number of kiosks</i>					
F10	<i>Quality of water</i>					
F11	<i>Distance to water kiosks</i>					
F12	<i>Time to get water</i>					

F13. What were your initial expectations when WUAs were first established?	There will be more water kiosks or water supply will improve	1	No initial expectations	4
	I will have a chance to participate in community water decision making	2	Water will be provided free	5
	Cost of water will become cheaper	3	Other:	99
			There is no WUA in my area	99

F14. Has **overall water supply** improved under WUAs compared to when Lilongwe Water Board supplied it for this community?

[1]. Yes [0]. No [9]. I don't know [999]. There is no WUA in my area

F15. Do you think community water supply under WUAs is more sustainable than through the Lilongwe Water Board?

[1]. Yes [0]. No [9]. I don't know [999]. There is no WUA in my area

F16. Are you aware of any community meetings organized to discuss water issues in this community?

[1]. Yes [0]. No

F17. Have you ever participated in any community meetings about water issues before?

[1]. Yes [0]. No [9]. I don't know [999]. I never heard about any community meetings on water

F18. If yes to **F17**, how many times have you participated in community meetings in the past year?

_____Times [9]. I don't know [999]. No community water meetings have been organized

F19. If there is a meeting in the future about water issues in this community, will you attend?

[1]. Yes [0]. No [9]. I don't know

F20. Will you be willing to serve on the executive board of WUA if given the chance?

[1]. Yes [0]. No [9]. I don't know

F21. In your opinion, how well do you think water kiosks in this area are managed?

[1]. Well managed [3]. Poorly managed
[2]. Fairly well managed [9]. I don't know

F22. Do you think that community based water management is an effective way to improve water supply in this area? [1]. Yes [0]. No [9]. I don't know

F23. In your opinion, how would you describe the current water prices at the water kiosks?	Too high	1	Low	4
	High	2	Too low	5
	Almost right	3	I don't know	9

Use the table below to answer questions F24-F25

Criteria for Effectiveness of Water User Associations			
Trust (transparent records in use of funds)	1	Water Point opening hours	7
Equitable and transparent benefit sharing	2	Community cooperation and cohesion	8
Amount of money raised from water sales	3	Number of water kiosks they have built	9
Regular supply of water	4	Provision of social benefits to community	10

Community participation in decision making	5	Other:	99
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F24. In your opinion, what is the most important criterion for judging the effectiveness of Water User Associations in the community? [**Insert Code here**_____]

F25. In your opinion, what is the second most important criterion for judging the effectiveness of Water User Associations in the community? [**Insert Code here**_____]

F26. How do you rate the performance of the WUA in your area based on your selected criteria?
[1]. Extremely poor [2]. Poor [3]. Average [4]. Very good [5]. Excellent [999].
No WUA

F27. What do you think is the best solution to the problems of water access in this area?

1. The community should manage their own water
2. The water board should manage water supply
3. Government should invest more money in water
4. Water should be managed by private operators or individuals
5. Water supply should be left in the hands of NGOs
6. Other (Specify) _____ [9]. I don't know

F28. After WUAs pay water bills to the water board, and pay the salaries of workers, what do you think the surplus money from water sales should be used for?

1. Build more water kiosks
2. All the money should go to government
3. For various community development needs
4. Half to the government and half for building more kiosks
- [9]. I don't know [99]. Other [999]. There is no WUA in my area

F29. Have you personally received any social benefits from WUA funds (eg funeral donation etc)	Yes	1	I don't know	9
	No	0	There is no WUA in my area	999
F30. Do you know of any social project undertaken by WUA apart from building water kiosks?	Yes	1	I don't know	9
	No	0	There is no WUA in my area	999
F31. In your opinion, what should be the most important social service WUAs should focus on?	Build roads	1	Solely manage water kiosks	5
	Contribute to funerals	2	Provide employment	6
	Give out loans	3	Other:	99
	Take care of orphans	4	There is no WUA in my area	999

F32. In your opinion, who owns the water kiosks in this community?

1. Lilongwe Water Board 2. Lilongwe City Council 3. The community 4. The government 5. The village/traditional head 6. NGOs 9. I don't know 99. Other:

Section G. Transparency, Accountability, and Community Participation in WUA

G1. Who do you think should be allowed to serve on the WUA executive board?	Adult men only	1	More adult men than women	4
	Adult women only	2	More adult women than men	5
	Equal number of adult men and women	3	There is no WUA in my area	999
		Other:		99
G2. Who do you think WUAs should be accountable to for their roles	The government	1	Both government and community	4
	The community	2	Both Water Board and community	5
	The water Board	3	There is no WUA in my area	999
		Other:		99
G3. How satisfied are you with the work of WUA in this community	Very Satisfied	1	Dissatisfied	4
	Satisfied	2	Very dissatisfied	5
	Undecided	3	There is no WUA in my area	999
G4. Who do you think should elect or select the executive members of WUA in the community?	Politicians	1	City council	4
	Water Board	2	NGOs	5
	Community members	3	Other:	99
			There is no WUA in my area	999
G5. Who do you think elects or selects the executive members of WUA in your community?	Politicians	1	NGOs	4
	Water board	2	City council	5
	Community members	3	Other:	99
			There is no WUA in my area	999
G6. Should WUA executive board members be paid?	Yes	1	I don't know	9
	No	0	There is no WUA in my area	999
G7. On a scale of 1-5, how accountable do you think the WUA is for the money they collect from sale of water from kiosks?	Very accountable	1	Unaccountable	4
	Accountable	2	Very unaccountable	5
	Undecided	3	There is no WUA in my area	999
G8. How much do you trust the WUA in your community to effectively manage and improve water supply?	Not at all	1	Undecided	4
	Little	2	A lot	4
	Moderately	3	Completely	5
			There is no WUA in my area	999

G9. Have you ever gone to the office of WUA in the community to report a problem about water supply?	Yes	1	There is no WUA in my area	999
	No	0		
	Yes	1	There is no WUA in my area	999

G10. Have you ever participated in a meeting organized by WUA to elect officers or executives?	No	0		
G11. Have you ever participated in a community meeting by WUA dealing with water supply issues?	Yes	1	There is no WUA in my area	99
	No	0		9

G12. Do you think it will be easier for you to participate in community management of water if you were in a rural area/village? [1]. Yes [0]. No [9]. I don't know

G13. What would you say your involvement with WUA on water issues is?	Water customer/user only	1	Executive member	3
	Employee	2	Other:	99

Answer the following questions on a scale of 1 (Not at all) to 5 (Completely)

G14. How much do you trust the WUA in this community on matters related to water supply?	Not at all	1	A lot	4
	Very little	2	Completely	5
	Little	3	I don't know	9
G15. How much do you trust the government to improve access to water in your community?	Not at all	1	A lot	4
	Very little	2	Completely	5
	Little	3	I don't know	9
G16. How much do you trust the Lilongwe Water Board alone to improve access to water for this community?	Not at all	1	A lot	4
	Very little	2	Completely	5
	Little	3	I don't know	9

Section H. Social Capital and Collective Action

To what extent do you agree or disagree with the following statements?

H1. People in this community are generally good and will take care of other people's general needs	Strongly agree	1	Disagree	4
	Agree	2	Strongly disagree	5
	Undecided	3	I don't know	9
H2. People in this community are generally good and will take care of other people's water needs	Strongly agree	1	Disagree	4
	Agree	2	Strongly disagree	5
	Undecided	3	I don't know	9
H3. When it comes to matters relating to water supply needs, everyone in the community should be on their own	Strongly agree	1	Disagree	4
	Agree	2	Strongly disagree	5
	Undecided	3	I don't know	9
H4. Should you have concerns about water supply in this community, who will you approach to solve the problem?	Lilongwe Water Board	1	NGOs	4
	WUA	2	Village head	5
	City council	3	I don't know	9
			Other	99

H5. What would you say are the two most important things that need improvement in this community?

[Pick 2 in order of importance]

1. Clean/adequate water supply 2. Food shortage

3. Roads
5. Irrigation water
7. Education facilities
9. Agricultural technology
11. Security

4. Transportation
6. Health facilities
8. Credit systems
10. Afforestation
99. Other (specify) _____

H5	Response code
H5a	1 st :
H5b	2 nd :

H6. Are you or someone in your household a member of any groups, organizations, or associations?

[1]. Yes [0]. No [9]. I don't know

H7. If yes to H6, which of the following organizations do you or members of your household belong to?

[Check all that apply]

Association or Group	Yes (1)	No (0)		Yes (1)	No (0)
H7A. Farmers Group			H7G. Political Group		
H7B. Cooperative/Traders Association			H7H. Youth Group		
H7C. Religious group/church			H7I. Women's Group		
H7D. Professional association			H7J. School Committee (PTA)		
H7E. Credit/finance group			H7K. Parents Group/Association		
H7F. Neighborhood association			H7L. NGO		
Others:					
H7M. [Total number of organizations including in 'Other' Category] _____					
[Put zero if household members belong to no organizations]					

H8. If no to H7, why are you or any member of your household not a member of any local organization in the community	We cannot afford dues	1	There are no benefits	4
	We don't have time	2	We don't trust the leaders	5
	We don't know any organizations	3	Other:	99
	Not applicable			99 9

H9. What will you consider as you/your households degree of participation in community associations?

[1]. Very active [2]. Somewhat active [3]. Not active [4]. Not applicable [999] [9]. I don't know

H11. If you have any problems relating to development in general, who will you turn to for support?	Family member	1	Section or village head	5
	Elected official e.g., MP	2	Friend	6
	Local government official	3	Church leader	7
	NGO	4	Other:	99
	Women's group	1	School committee e.g., PTA	4

H12. In your opinion, what is the most important local organization in the community?	church group	2	Political party group	5
	Health committee	3	Microcredit group	6
	WUA	4	Other:	99
H13. Have you ever been asked to participate in a collective water management activity in the community?	Yes	1		
	No	0		
H14. Have you ever participated in a collective water management activity in the community e.g., building a kiosks	Yes	1		
	No	0		
H15. Are you willing to participate in any collective initiative to improve water supply in the community?	Yes	1		
	No	0		

H16. What is the biggest obstacle that prevents you from taking part in community water management activities?

1. There is no payment for the labor
2. There is a lot of corruption with the current WUA leadership
3. The work is usually done by a few, but the benefits are shared by all
4. The benefits are not enough
5. My participation will not change the water situation in the community
6. I am unaware of where meetings take place/do not hear of meetings
7. I do not have time/ I am busy
99. Other reasons (Specify):

H18. How much do you trust the power of the government alone to significantly improve your life?	Not at all	1	Undecided	4
	Very little	2	Completely/Very much	5
	Little	3	I don't know	9
H19. If this community went without water for a long time (eg a month), which people in this neighborhood do you think will gather to take action?	No one in the community	1	Neighborhood association	7
	Women in the community	2	Parents of school children	8
	Men in the community	3	Poor people	9
	The entire community	4	Rich people	10
	Community leaders	5	I don't know	9
	The Youth	6	Other:	99

H20. In the past year, how often have members of this community gotten together to jointly petition government officials, political leaders, or community leaders about a development issue or goal?

[1]. Never [2]. Once [3]. A few times [4]. Frequently [9]. I don't know

H21. In the past year, how often have you joined together with others in this community to address a common issue? [1]Never [2]. Once [3]. A couple of times [4]. Frequently [9]. I don't know

H22. Overall, how would you rate the level of participation in this community?

[1]. Very low [2]. Low [3]. Average [3] [4]. High [4] [5]. Very high

Section J. Socio-Economic Status

J1. What is your household's total average monthly income from all sources? [Write total income in box]

[Enumerator calculates total income]

Income Source	Amount in Malawian Kwacha
Paid employment/wages	
Sale of crops and other farm produce	
Non-farm household/individual enterprises/business	
Rent from houses/lands/animals/equipment you own	
Sale of own livestock/fish/milk	
Sale of wild animals/fruits/mushroom etc.	
Sale of own produced firewood/charcoal	
Remittances from relatives outside	
Other sources	
J1. Total monthly income	MK:

J2. Which of the following assets do you own or have?

[Enumerator: Ask of what they think other valuable assets are and include in extra spaces provided]

Asset	Yes (1)	No (0)		Yes (1)	No (0)
J2A. Radio			J2I. Telephone		
J2B. Refrigerator			J2J. Electric generator		
J2C. Bicycle			J2K. Livestock		
J2D. Motor cycle			J2L. Flush toilet		
J2E. Car			J2M. Piped water		
J2F. Cell phone			J2N. Electric stove		
J2G. Sewing machine			J2O. Savings account		
J2H. Houses for renting			J2P. Television set/TV		
J2Q. Total number of assets listed					

J3. Which health facilities do you and members of your household use when sick?

- | | | |
|----------------------------|---------------------------------|------------------|
| 1. Government hospital | 4. Herbalist/traditional healer | 6. Mobile clinic |
| 2. Private hospital/clinic | 5. Home treatment | 7. Pharmacy shop |
| | | 99. Other: |

J4. Have you or any member of your household used a credit scheme before?

[1] Yes [2] No [3] I don't know

J5. H8. What was the credit mainly for?

- | | | |
|---------------------------|--|--|
| 1. Fertilizer | 4. Buy food | 7. Start a private business |
| 2. Agricultural seed | 5. Buy clothes | 8. Repayment of debt |
| 3. Child's education | 6. Medical expenses | 9. Social obligation (wedding, funeral etc.) |
| 10. Other (Specify) _____ | 999. No household member has used credit | |

Appendix B: Community Key-Informant Interviews Guide

Key Informant Interviews Guide-Study Communities [Introduction, Informed Consent, and Assurance of Confidentiality]

Objective:

Explore and examine

- *Key water access challenges for households*
- *Household coping mechanisms for poor access to potable water*
- *Gendered household dynamics in relation to water access*
- *Perceptions about the role of community in solving the problem (under WUAs)*

Questions

1. What water sources do you use for purposes such as (a) drinking (b) laundry (c) washing dishes (d) Bathing (e) House cleaning [in the dry season and in the wet season]
2. Which of these uses do you consider the most important
3. Who usually fetches water for the household? How many times in a day? Who provides the money to pay for the water? Etc.
[Probe for gendered household dynamics of water-related work]
4. What do you think about water issues in this community? Are they getting better or worse? What do you think can be done? Do you see any differences between rainy seasons and dry seasons? In terms of water supply?
5. When water is not available from the kiosks, what do you normally do? What alternative sources do you rely on for your household uses?
6. Are there times within the week or month when water access becomes more difficult?
7. Are the water problems different in different seasons? Example in the rainy season, the dry season, the cold season etc.
8. Is there a time you need water but you are unable to pay for the water? In such times, what do you normally do?
9. a) Do you face any challenges in finding water for the uses listed in 1?
b) Can you share some of these challenges?
c) What do you normally do about the challenges you face when it comes to finding water for your daily uses?
10. What do you think about how much water is available for all your uses? Do you get enough for everything you need water for?

11. How about the cost of water in this area? Do you think it is more expensive, or just enough price for you to afford, or too cheap? Please explain your answers. For example, why do you say it is expensive or not?

9. In general, what do you think can be done about the drinking water situation? Who do you think can help improve water supply in this area?

10. In general, do you think your drinking water is safe? How concerned are you about the quality of drinking water from the main source (water kiosks). What makes you think it is safe or not? Have you had any issues like diarrhea drinking the water?

Operations of WUAs

11. Are you aware of the operations of WUAs? Can you tell me briefly what you have heard about them? What are some of their activities in your area? Do you think the executive boards have made a difference in the water situation in this community? If you have to judge whether WUAs are effective or not, what will you say?

12. Who do you think is doing more to help bring drinking water to your community? What do you think about their work and how it is helping the drinking water situation or not in this community?

Government NGO WUAs Water Board City council None

13. What changes might you suggest you want to see about water issues in this community?

11. Would you be interested in attending the meetings of the WUAs? Have you attended before? Have you been invited before? Are there reasons why you will not attend the meetings?

12. What might you suggest about the water problems in this community? What should be done? What do you think can solve the problem?

13. Do you think the WUA executive board is transparent? Are they accountable to the community for the work they do? For example in using the money that is collected at the kiosks?

14. What will you recommend to the WUAs to improve access to water in the community?

15. What are your final thoughts on the issue of water as we bring the focus group discussions to an end?

16. What kinds of benefits do you want to receive from WUAs/ what are some of the social projects should undertake in this community? With the proceeds from water sales?

Any other questions

Appendix C: WUA Focus Group Guide

Focus Group Interviews with Water User Associations, Lilongwe
[Introduction to the Study and Consent to Participate and Audio Record]
Objective: *Examine if, and how, WUAs meet social goals of participation, empowerment, and development along with their water supply roles in Peri-Urban Settlements*

Goals of the Focus Group: Understand and uncover the following:

1. The institutional/actor arrangements/dynamics within which WUAs are embedded
2. The functions of WUAs both in terms of water delivery and social benefits/ Do WUAs have clear understanding of their roles?
3. Relationship of WUAs with other actors (NGOs, Water Board, City Council etc)
4. Power relations and control/who makes decisions/ who controls affairs etc/Influence of power relations on decision making
5. Relationship of WUAs with the communities they serve [Participatory spaces for community, whose concerns are addressed, interactions, exclusion etc]

Topics to Cover in Focus Group Discussion

- | | |
|---|-----------------------------|
| 1. History of WUA/formation process | 9. Community expectations |
| 2. Water supply and social benefit vision | 10. Political influence |
| 3. Constitutions/ who formulated/ | 11. Accountability |
| 4. Daily Functions | 12. Leadership and roles |
| 5. Cost and benefit sharing of water proceeds | 13. Motivations for work |
| 6. Elections | 14. Community participation |
| 7. Gendered decision making/ leadership | 15. Goals/achievements |
| 8. Revenue and technical management | |
| 9. Challenges | |

Important Documents to Collect

Constitution	WUA formation documents
Minutes from executive meetings	Government water policy documents
Water billing and consumption records	Revenue from Water Sales (Sales/bills)

History of WUA Formation and Individual Roles

1. When was the WUA established? How was it formed? A little history about how people came together to form this WUA?
2. How many are you on the executive board? What is the structure of the WUA leadership? Can you all tell me a little about what you do on this board?
3. What motivated you to become part of the WUA executive body?

4. What are your goals as a WUA? What do you exist for? What changes do you want to see in the community?
5. Does this WUA have a constitution that guides its activities? Can I have a copy? Who wrote the constitution? Do you use the constitution? How? What are some of things the constitution is useful for?
6. Can you tell me a little about the process of membership into the executive body? Who gets access into the membership? Who does the selection of members? What is the current state membership? [Administrators, staff, etc]
7. What is the composition of the executive board? Who does it comprise of?
8. Can you tell me a little about your activities as a WUA executive board? The roles you play for the community/ your functions of water supply?
9. Apart from supplying water to the community? What other functions do you perform in the community?
10. How does the secretariat work together with the executive board? What are some of the challenges of the entire leadership trying to work together?

Issues of water access and challenges

11. Can you share with me some of the problems of water access in this community?
12. What will you say is the most serious of all the water problems in this community?
13. How is your executive board working to tackle these problems regarding water supply in the community? What are your priority areas?
14. How about the decision making processes regarding water? How are they made on the board? How are those decisions implemented?
15. What is the role of the Water Board in your decisions? Give me examples of decisions you have made in the past and how you negotiated with the water board? What are some of the challenges you face working together with the water board?
16. How often do you meet as an executive board? What kinds of issues do you normally discuss at your meetings? After your meetings, what happens next?

Accountability and community participation in WUA

17. In your opinion, do you think your executive board is representative? What about gender ratio? How many women serve on the board compared to men? How has gender representation been dealt with?

18. Are members of the executive board remunerated? If not, what benefits do you receive serving on the executive board? What are your motivations for still serving on the board?
19. Does membership of the executive board have a term? How long do they serve? How are they replaced if their term of office comes to an end?
20. In your view, what are the characteristics or features of a well-functioning WUA?
21. What do you think has changed in the community since WUAs started here? In terms of water? And in terms of community benefits?
22. What would you say are some of your successes or achievements as an executive board working on water issues in this community? Specific examples?
23. Do you encounter any political interference in your work? If yes, how does it happen? How does it influence your work?
24. What are some of the expenditures you use the money collected at the water points for? What is the greatest chunk of the money used for? Apart from sale of water from the water points, do you get money from any other sources?
25. How does your WUA leadership interact with the community? Are there forums for the community to air their concerns? How many times? What do you discuss? Who is invited to those forums? What is usually discussed?
26. Do community members come to you with concerns? What are some of the concerns they come to you with? How do you address them?
27. What kinds of improvement do you want to see in the water system? What do you see as the major area where you are failing in your activities?
28. Which of the following are you accountable to and why? [Water board, politicians, NGOs, community, etc]/ Have you worked with any of them? How?
29. Do you experience political interference? How do you deal with it?
30. Do members of the WUA undergo training for their functions? What is the nature of the training? How are roles differentiated among the executive board members?
31. Do you think the concept of WUA is sustainable in the long term? In the next 10 years or so, should WUA still exist? Will WUAs exist? What do you see as the future of WUAs?
32. What organizations exist? Which organizations do people belong to? Which ones are most influential for everyday life? Most important one they interact with the most. Which one is most important and why?
33. **Thank you very much for your time. If I have questions, I will come again**

List of Participants

NAME	Gender M/F	AGE	MEMBERSHIP POSITION	EDUCATION

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