

# The urban informal water sector – sustainable development or a temporary problem?

A critical analysis of problems represented in urban water development policies in  
Tanzania and Kenya

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Tiivistelmä/Referat – Abstract <p>The thesis examines how the national water policies of Tanzania and Kenya address informality in the urban water sector by critically analysing the representations of “problems” in policies related to increasing urban water access.</p> <p>While access to safely managed water has increased rapidly on a global in the last decades, in most cities in the global south 30–60 per cent of the urban population relies on informal practices to meet its daily water needs. Especially the urban areas of sub-Saharan Africa (SSA) struggle to increase access to safe water to citizens, resulting in a high reliance on informal practices, such as getting water from unprotected wells or buying water from street vendors. While these practices are generally associated with health risks and higher water prices, they serve as the main everyday water supply for millions of people.</p> <p>Since the state has failed to provide access to water for everyone, both under private and public management, informally managed water systems are, despite their problems, increasingly seen as a viable alternative to the standard solution of expanding the piped network to increase access. Many of the case studies on informality in SSA cited in this thesis argue that the state should accept and support the informal water sector as a pragmatic alternative for water supply in unserved urban areas.</p> <p>By analysing the national water policies of Tanzania and Kenya, this thesis sets out to answer the research questions of (1) how the problem of water supply is constructed in urban water policy in Tanzania and Kenya and (2) how Tanzanian and Kenyan water policies approach the informal water sector. The analysis applies Carol Bacchi's (2009) poststructuralist approach to analysing policy, the ‘What's The Problem Represented To Be?’ (WPR) approach. Four general representations of problems related to urban water access and informality were identified in the data: (1) The problem of lacking infrastructure, (2) the problem of identifying appropriate technologies, (3) the problem of stakeholder involvement and (4) the problem of informality in the water sector.</p> <p>The results show a high reliance on investment in large-scale infrastructure projects as the main policy for increasing access to water in urban areas in both Kenya and Tanzania, even though previous studies on informality and urban water provision suggests this tactic will fail in providing safe water for all. In addressing the informal water sector in urban areas, informality was represented as a problem that eventually will fade away as soon as the piped network reaches all.</p> <p>However, both countries appeared to take a completely different stance towards informality in rural areas. Whereas large-scale infrastructure projects still were the go-to solution for increasing access in urban areas, for rural areas the analysed documents proposed a massive support of community-based informal practices as the cornerstones of future rural water supply, covering tens of millions of people in the coming decade. If the attempt to solve lacking access to safe water in urban areas by expanding the piped network should fail, as previous research suggests it might, the community based policies for rural water supply may be scaled out to solve the urban water problem.</p> <p>This thesis shows that the informal water sector is still to a large extent seen as a temporary problem. However, both Kenyan and Tanzanian water policy has opened the door to supporting informal practices as sustainable solutions as a way to achieve the ambitious goal of safe water for all.</p>			
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## **Acronyms and abbreviations**

COWOSO – Community-Owned Water Supply Organisations

CBO – Community Based Organizations

CLU – Community Liason Unit

CPP – Community-Public Partnership

DAWASA – Dar es Salaam Water and Sewage Authority

DAWASCO –Dar es Salaam Water and Sewage Corporation

DMM – Delegated Management Model

DSM – Dar es Salaam

HDI – Human Development Index

JMP – Joint Monitoring Programme

MDG – Millennium Development Goals

MO – Master Operator

NGO – Non-governmental Organisations

NRM – Non-Revenue Water

PPP – Public-Private Partnership

SDG – Sustainable Development Goals

SSA – Sub Saharan Africa

SSIP – Small-Scale Independent Providers

UN – United Nations

UNICEF – United Nations Children’s Fund

UNDP – United Nations Development Programme

WAHECO – Water, Health, Education and Community Development

WASREB – Water Service Regulatory Board (Kenya)

WHO – World Health Organization

WPR – The ‘What’s the Problem Represented to be?’ approach

WSB – Water Service Boards (Kenya)

WSP – Water Service Providers (Kenya)

WUA – Water Users Associations

## Introduction

Water is one of the most basic human needs but despite remarkable progress, access to clean and safely managed water is still one of the biggest challenges facing people in growing cities around the world. Access to water from improved sources has increased rapidly on a global scale in the 21<sup>st</sup> century. Between 2000 and 2015, the number of people with access to improved water sources has increased from 5,2 billion to 6,8 billion (WHO/UNICEF, 2017). Out of the 1,6 billion gaining access to improved sources, 1,2 billion gained access to piped water networks (WHO/UNICEF, 2017). In 2015, an estimated 89 per cent of the global population had access to at least basic water services, defined as an improved water source that can be accessed within a roundtrip of 30 minutes.

However, improved access to water is by no means equally distributed globally. While 89 per cent of the global population has access to basic water services, this is only true for around 58 per cent of the population in sub-Saharan Africa (SSA), the worst performing region in the world regarding access to water (WHO/UNICEF, 2017). Although the overall access to basic water services has increased relatively fast in SSA (by 0,88 percentage points annually compared to the global average of 0,49 between 2000 and 2015), the situation in cities remains problematic. Between 1990 and 2010, access to improved water services in urban areas remained unchanged, at 83 per cent for the region, while access to piped water in cities actually declined from 43 per cent to 34 per cent (Hopewell, 2014). It is also important to recognise that development in practice can differ from development in theory, and that statistics of increasing access to water do not always tell the whole truth of “deeper access”, i.e. the availability, reliability, quality and cost of water services (Obeng-Odoom, 2012). The stagnation of access to improved and basic water services in urban sub-Saharan Africa is likely to pose an even greater challenge in the future, with today’s urban population of 472 million people expected to double in the next 25 years (Lall *et al.* 2017) reaching over 1 billion people in 2050 (Dos Santos *et al.*, 2017).

The urban population that lacks access to improved water services generally get their water from either unprotected wells and springs or directly from surface water sources

(WHO/UNICEF, 2017). These practices, in combination with extracting water from boreholes and purchasing water from small-scale vendors, constitute the main water supply system in many poor urban areas in SSA (Olajuyigbe, 2012; Liddle *et al.*, 2016) and can be referred to as the informal water sector. The concept of the informal water sector is an ideal type, since in empirical terms the formal and informal are typically intertwined, for example when informal water vendors re-sell water from the formal utility (Misra, 2014) or in the case of community-public partnerships (see section below). However, the concept of “the informal water sector” should be understood not only as informal water sources that exist outside the control of the state, but as practices produced and re-produced both by urban and peri-urban communities, the state itself and everything in between (Roy, 2011; Kooy, 2014).

The informal water sector commonly holds no legal status, and the practices associated with it is sometimes even regarded as illegal (Liddle *et al.*, 2016). Nevertheless, in most cities in the global south, the informal sector provides water for 30–60 per cent of the urban population (Ahlers *et al.*, 2014). Unregulated informal practices within the water sector are not necessarily always indicators of risk. A protected informal source, like a deep well with inner casing and a protective cover situated far enough from contaminating sources, can provide a community with water of the same quality as a formal piped network, or even better. That said, in urban areas, a high reliance on informality is often associated with increased vulnerability both because of a high rate of uncovered water sources and higher risk of contamination. In urban areas, unprotected wells and springs, not to mention surface water, are easily exposed to contamination from sources like factories, dumping grounds or latrines, especially during floods when contaminated water easily can get mixed with the water in an unprotected well. The rapidly expanding city of Lagos in southern Nigeria, where the sewage network is close to non-existent and up to two-thirds of childhood disease can be attributed to a lack of safe drinking water (Gandy, 2006) is a daunting example of this vulnerability.

The informal water sector has often been viewed by states, NGOs and international institutions as a temporary and somewhat problematic alternative to “the urban infrastructural ideal”: a centralised piped water network that provides everyone with improved access to water (Kooy, 2014; Allen *et al.*, 2017). The informal water sector,

and the health problems associated with it, has been assumed to slowly fade away as soon as the formal piped water network is fully developed to provide water for everyone (Kooy, 2014; Mapunda *et al.*, 2018). However, the development of piped water infrastructure has not kept up with urbanisation and is today far from providing safe access to water for the poorest in society. Even in places where the piped networks have been successfully expanded, there are evidence of local communities continuing to rely on the more trusted informal water sources (Kooy, 2014; Liddle *et al.*, 2016) either because of the poor quality of the piped water or because of its bad reputation. This is not only true for the poorest groups in society, also high-income communities sometimes prefer informal water sources in places where formal sources are either unreliable or have a bad reputation (Liddle *et al.*, 2016).

The failure to achieve the “urban infrastructural ideal” (Kooy, 2014) of water on tap for everyone has sparked new ideas about the informal sector’s role as a water provider in developing cities. Despite the problems associated with the informal water sector, informally managed water provision systems are increasingly seen as a viable alternative to the standard solution of increasing water access in developing cities (Ahlers *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018), that is, the formal piped water network, given that the water quality of the informal sector is improved. Many argue that, since the urban infrastructural ideal has failed, the state should accept and support the informal water sector as a pragmatic and cost-effective alternative for water supply in local communities (Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018).

There is, however, not yet compelling signs of states acknowledging the importance of community-based informal water provision systems, let alone incorporating these practices to improve access to water. Mapunda *et al.* (2018), for example, found that while over 64 per cent of communities in peri-urban Dar es Salaam, Tanzania, regarded informal water systems as important in improving access to water, 60 per cent of government affiliated stakeholders were sceptical of the idea, and still regarded public water provision as a viable option for the same communities (Mapunda *et al.*, 2018). Even though the piped water network traditionally has been seen as the gold standard of improved access to water (Kooy, 2014; Liddle *et al.*, 2016) it does not seem impossible to achieve both improved access, reliability and quality of water

through the informal sector. For example, The United Nations Sustainable Development Goals (SDGs) on water and sanitation (goal 6) that aims at achieving universal access of safely managed water for all, doesn't define safely managed as managed by a local government, municipality or corporation. Instead, safely managed water is defined by reliable, cheap and easy access as well as by the quality of the water provided (WHO/UNICEF, 2017). These standards of safe water can potentially be met, or failed to be met, both by informal and formal water providers.

This study focuses on the conflicting views on the development of the water sector in pursuit of universal access to safe water. The failure of the modern infrastructural ideal, both under public and private management, in combination with the persistence and growth of the informal water sector could point the state towards more locally-based and community managed solutions for water provision. To explore the state's attitude and approach towards the urban informal water sector, and how informality is taken into consideration in development of the water sector, I have chosen to conduct a critical analysis of water development policies in Tanzania and Kenya. These two East African countries do not only stand close to each other geographically as neighbours, but also perform at a level close to each other in indicators on urban water development (WHO/UNICEF), have similar sizes of urban populations and urbanisation rates that directly affects the development of water services in urban settings and have a similar history of British colonial authorities setting the standards of infrastructure development and water management frameworks in cities (Kjellén, 2006; Nilsson & Nyanchara, 2008). Interestingly, however, Kenya has in the 21<sup>st</sup> century developed a more commercially based water policy than Tanzania (Sambu & Tarhule, 2013; Butcher, 2016), which makes the comparison between these countries even more interesting. The choice of Tanzania and Kenya as the subjects of this study was also influenced by the rich research on informal water providers in Tanzania, and Dar es Salaam in particular, and the case studies on community-based water provision models in Kenya (see for example Butcher, 2016).

By focusing on Kenyan and Tanzanian water development policy, I hope to provide a better picture of how states in SSA approach informality in the water sector. I also hope to open up for the possibility of finding and comparing different approaches to informality between the two countries.

## Research questions

Specifically, this study seeks to answer two interrelated questions:

First: How is the problem of water supply constructed in urban water policy in Tanzania and Kenya?

Second, how are Tanzanian and Kenyan water policies approaching the informal water sector?

The research material analysed in this thesis consists of four policy documents outlining the national water development plans and strategies of Tanzania and Kenya published on government websites by the national ministries of water, environment and water and irrigation. These two neighbouring countries in East Africa have both similar shares of urbanised citizens (33,8 per cent in Tanzania, and 27 per cent in Kenya) and rate of urbanisation (5,22 per cent and 4,23 per cent). However, Tanzania is both bigger in territory and population and performs slightly worse than Kenya on several indicators of development. Tanzania was ranked country number 154 on UNDPs development ranking with a Human Development Index (HDI) of 0,538 compared to Kenya at place 142 with a HDI of 0,590 (UNDP, 2018). Regarding access to safely managed water sources Kenya is better off with 54 per cent of the urban population having access to safely managed water services compared to 34 per cent in Tanzania (WHO/UNICEF, 2017). The same is true when comparing the share of urban residents in the two countries with at least basic drinking water services, 83 per cent in Kenya and 79 per cent in Tanzania (WHO/UNICEF, 2017).

Even though these official statistics can obscure the reality on the ground by overestimating the share of urban population having access to improved water sources (Smiley, 2013) or by ignoring the deeper meaning of access to water (Obeng-Odoom, 2012), they give an indication about where the countries stand in relation to one another. While there are differences between Kenya and Tanzania, the similarities in some key indicators like demographic pressure and public services (Fund for Peace, 2018) as well as the political systems (The World Factbook, 2019) suggest that a

comparison between the water sector development plans in these two states benefits the aim of the study.

The content of the national development plans and the national water development plans are analysed using Carol Bacchi's (2009) WPR approach, or "What's the problem represented to be" approach, which has been widely used in recent policy analysis, for example on public drug- and health policies (Lancaster & Ritter, 2014; Bacchi, 2015). The WPR approach can expose how policymakers produce the problems they set out to solve, by analysing the assumptions underpinning specific policy proposals (Bacchi & Goodwin, 2016, 4–6). The water development plans included in this study tend not to explicitly address the informal water sector in great detail, however, some specific informal practices are addressed and often represented as either problems, temporary solutions or possible permanent solutions in the development of the water sector and, more broadly, the national economy. By analysing how the problems related to developing the water sector in Tanzania and Kenya are represented in the countries' national water development plans, we can form a good picture of how these states produce and approach informality in the water sector, as well as which methods, if any, the state suggest for "formalising" the water sector.

### The significance and originality of the research question

The call for governments to acknowledge and incorporate the urban informal water sector in water development policies is a fairly recent one (Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018).

Previous studies on water access and informality in SSA have to a great extent focused on, the technologies and practices used to obtain water in informal settlements (Bayliss & Tukai, 2011; Pauschert *et al.*, 2012; Smiley, 2013; Chakava, 2014; Smiley, 2016; Mapunda, 2018), the progress of countries in meeting their development goals under private/public management (Kjellén, 2006; Bakker, 2007; Sambu & Tarhule, 2013) and experiments with alternative community-based water management models (Schwartz & Sanga, 2010; Butcher, 2016; Ifejika *et al.*, 2018).

My thesis, on the other hand, does not only ask a different set of questions, but also attempts to answer the questions about water in a different way. By building a bridge between informal practices and national policy on water development, I analyse how, and if, governments are taking the informal water sector into account in water development policies. By answering how the problem of water provision is constructed in urban water policy in Tanzania and Kenya, I aim to expose the attitudes implicit in government policies toward the informal water sector. This study is, therefore, both original and significant in its purpose to test the conclusion drawn by previous studies on water informality: that government policies in SSA are not going far enough in supporting urban informal water provision systems.

This study is structured in three parts; a review of the informal water sector in sub-Saharan Africa, a review of the concepts of informality, informal practices and the WPR approach, and finally my own analysis of the urban water policies and how they relate to informality in the water sector in Tanzania and Kenya. The following section takes a closer look on at informality within the water sector in sub-Saharan Africa and provides context by reviewing previous research on the subject. The background section is followed by a description of urban informality, informal practices and the WPR approach. Finally, the third sector of this study focuses on my own analysis of the water sector in the national development plans of Tanzania and Kenya. The final chapters connect my own research to urban informality, urban practices and the WPR approach.

## Background

This chapter provides an overview of the different manifestations of the informal urban water sector in sub-Saharan Africa, based on case studies of both urban and peri-urban settlements. First, I examine the United Nations Sustainable Development Goals (SDGs) on clean water and sanitation (Goal 6) and what consequences the definition of safely managed water has for how we view water access. Second, the chapter provides a description of the water sectors in Kenya and Tanzania followed by a more general overview of the informal water sector across urban areas in sub-Saharan Africa. The final section looks at examples of co-production of water services between communities and the state, or the “formalisation” of the informal water sector.

### Safe water in the Sustainable Development Goals

This study analyses the national development plans of two countries in sub-Saharan Africa against the backdrop of the SDGs (goal 6). More specifically the first target (6.1) to achieve universal and equitable access to safe and affordable drinking water for all by 2030. The share of the population using safely managed drinking water services is the indicator used for measuring the success of target 6.1. Safely managed, in turn, is defined as “drinking water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination” (WHO/UNICEF, 2017, 8). If the improved source is not located on premises, but within a 30 minutes round trip to collect water, the water service is defined as basic, and not meeting the requirements of target 6.1 in the SDGs.

An improved water source can include piped water, boreholes or tube wells, protected dug wells, protected springs, rainwater, and packaged or delivered water. (WHO/UNICEF, 2017). This definition of improved water sources opens up the possibility of reaching target 6.1 through the informal water sector, as long as the water can be guaranteed to be free from contamination and available when needed. Since most of the water provided by the informal sector in sub-Saharan African cities comes from unprotected sources, simply protecting these sources could potentially increase the access to safely managed water for millions of people.

According to data from the Joint Monitoring Programme (JMP) of the United Nations (UN), 82 per cent of urban residents in sub-Saharan Africa had access to at least basic water services in 2015, i.e. improved water within a 30 minutes' round trip, and only 7 per cent relied on unimproved water sources (WHO/UNICEF, 2017).

However, there are some significant flaws in the way SDG 6.1 is measured. For example, the JMP data measures the share of a population using safely managed water as a *primary source*. This means that JMP statistics can hide the fact that some of the water users with access to safely managed water, in fact might rely on more unsafe secondary sources in the case of a power outage, pressure loss or dry period. Adams and Smiley (2018) found that even though 60 per cent of peri-urban residents in Lilongwe, Malawi, had access to an improved water source from communal water kiosks, 15 per cent of the same people used unprotected wells as a back-up source for drinking water. Taking secondary water sources into account therefore reveals a greater inequality in water access behind the official statistics.

Even though the SDGs on water and sanitation works as the general references for successful expansion of water services on a global scale leading up to 2030, the water sector development plans analysed in this thesis are formulated against the backdrop of the UNs previous, Millennium Development Goals (MDGs). The MDG on access to water (Target 7.C) is to halve the proportion of the population without access to safe drinking water. The definition of “access to water” in the MDGs differs from the SDGs. The MDG target 7 defines access to water as the availability of at least 20 litres per person per day from a source within one kilometre of the users (Dar & Khan, 2011). This is good to keep in mind in the review and analysis of water policies formulated against the backdrop of the MDGs.

### The water sectors in Tanzania and Kenya

While there are many similarities between Tanzania and Kenya in how the informal water sector operates and how many urban residents have access to safely managed water, the two countries differ in their approach to private and public management of services.

The water sector Tanzania, specifically in Dar es Salaam, is a good example of the complexity and heterogeneity of water provision systems in urban areas in sub-Saharan Africa. On the one hand, the formal water provision capacity through the piped network is growing fast and alternative models of community-managed water systems are being explored. But on the other, the city suffers from chronic water shortages, unreliable supply and poor infrastructure (Smiley, 2013). The vast majority of peri-urban residents rely on informal water sources while urbanization, population growth and climate change makes it even harder to provide everyone with safe water.

Approximately 75–80 per cent of the population in Dar es Salaam live in informal settlements with extremely limited access to formal water supply (Allen, 2017), where residents rely on informal water systems that depend almost exclusively on groundwater (Mapunda *et al.*, 2018), like shallow wells or boreholes. To meet the growing demand for water, driven by urbanisation and population growth, the formal utility, Dar es Salaam Water and Sewage Corporation (DAWASCO), increased its water production capacity from 300 million litres/day in 2014 to 510 million l/d in 2017. However, the average production in 2017 remained at just 357 million l/d. The increase of piped water household connections has been much faster, from approximately 122 000 connections in 2016 to almost 264 500 in 2017, illustrating the failure of DAWASCO to increase water supply in pace with growing demand (Smiley, 2018). The existing piped water network mainly benefits high-income areas in the city, while 90 per cent of residents in informal low-income urban and peri-urban spaces rely on alternative water sources to meet their daily needs (Allen, 2017; Smiley, 2018). The coping strategies of residents in peri-urban Dar es Salaam range from buying water from community-managed kiosks and boreholes to informal street vendors or shallow unprotected wells to access drinking water. While state-affiliated stakeholders generally see the informal water sector as a temporary phenomenon that will disappear when the piped network reaches everyone (Mapunda *et al.*, 2018), the relationship between authorities and communities is more nuanced than that.

Similarly, in Nairobi, Kenya, the formal piped network run by the Nairobi City Water and Sewerage Company has historically struggled to provide access to safe water for all, with less than half of the urban population having a household connection in 2006 (McGranahan *et al.*, 2006). Around 60 per cent of the population in Nairobi live in

informal settlements with limited access to water services (Crow & Odaba, 2010). The fact that the city's water utility is run by a private company, does not seem to have made a big difference compared to the public utility in Dar es Salaam. In Nairobi's biggest informal settlement Kibera, the cost of water is nearly as high as the rent, sometimes forcing households to reduce their food intake to one meal a day to be able to pay for water (Crow & Odaba, 2010).

In Kenya, urban informal settlements face the same problems and challenges with access to safe water as in Tanzania. On a state-level however, Kenya has chosen a different approach to water management, preferring privatization and public-private partnerships in the water sector (Butcher, 2016). The foundation of most water development in Kenya is the Water Act of 2002. This is also true for the Kenyan policy documents analysed in this study. The Water Act of 2002 defined cost recovery as a core principle of sustainable water provision (Butcher, 2016) and privatized water services by establishing autonomous Water Service Providers, or WSPs (Sambu & Tarhule, 2012). These WSPs are supervised by Water Service Boards (WSBs) that operate as private commercial enterprises, and in turn are regulated by the Water Services Regulatory Board (WASREB) (Sambu & Tarhule, 2012). However, the focus on increasing access to water by privatisation of water services, has not been completely successful in Kenya during the 21<sup>st</sup> century. While some of the WSPs have made progress, many suffer from high-ratios of non-revenue water (NRW), are operating below their capacity or are too small to be economically viable (Sambu & Tarhule, 2012). Other challenges connected to the privatisation of water services in Kenya are the lack of commitment to expand access to low-income consumer, inequity in service quality based on the ability to pay, weak regulatory oversight and a lack of accountability to local customer needs (Nyangena, 2008).

While Tanzania has chosen a different approach in choosing public water management rather than private, there has been some experiments with privatisation. Between the mid-2000s and 2018, the piped water network in Dar es Salaam was managed by two public entities, the Dar es Salaam Water and Sewage Corporation (DAWASCO) which operated and maintained the network and by the Dar es Salaam Water and Sewage Authority (DAWASA) that owns the infrastructure. DAWASCO was formed in 2005, after the government terminated a 10-year contract that had been awarded to a

company called City Water, less than 2 years earlier as part of a World Bank privatisation deal (Dill, 2010). In the fall of 2018, DAWASCO and DAWASA were merged to cut expenditures and improve water services in the city (Rweyemamu, 2018) and the newly formed water authority simply goes by the name the Dar es Salaam Water and Sewage Authority or DAWASA. Even though the water services in Tanzania are provided by public utilities, the policy documents analysed in this study calls for the commercialisation and increased financial autonomy of these utilities to make them more efficient in securing investment and raising water tariffs.

### The informal water sector in sub-Saharan Africa

This study builds upon the definition of urban informality as practices associated with water services that exist outside of what the state regards as legitimate. In this sense, the informal water sector can be broadly described as all practices connected to accessing water in other ways than buying it directly from a formal utility run by the state or a private corporation. These practices can vary greatly, for example from relying on a combination of surface water and street vendors to owning a private borehole or buying water from a connected neighbour, but they all have in common that they do not hold any official legal status (Kooy, 2014; Misra, 2014).

With an expected annual urban population growth of over 4 per cent in the major cities in sub-Saharan Africa (SSA), the urban population is expected to reach 1 billion by 2050 (Dos Santos *et al.*, 2017) and access to water in the region is likely to remain heavily influenced by rapid urbanization in the coming decades. Besides the urbanisation rates, other intersecting factors like persistent poverty and ineffective governance also affect the access, or lack of access, to safe water in urban areas (Kjellén, 2006).

A majority, 62 per cent, of the urban population in SSA lives in informal settlements (Dos Santos *et al.*, 2017), where access to safe water is limited and informal community-based systems are the main water supply source (Liddle *et al.*, 2016). While many households in the urban cores of SSA at least have the option of being connected to the formal piped network, the expansion of this ‘urban infrastructural ideal’ to more peripheral and informal urban settlements have largely failed (Kooy,

2014) worsening problems of access to safe water in peri-urban neighbourhoods. The piped water network has struggled to achieve financial sustainability due to leaks, unregistered customers and poor management (Kjellén, 2006), both under public and private service providers (Kooy, 2014; Liddle *et al.*, 2016; Allen *et al.* 2017; Adams & Smiley, 2018). The un-connected, urban residents instead have to access water by a variety of different coping mechanisms (Liddle *et al.*, 2016), like purchasing water from vendors, buying it from a neighbour with a pipe connection or fetching it from a borehole or a water kiosk. The people, or entrepreneurs, running the informal water supply systems are sometimes referred to as small-scale independent water providers, SSIPs, that fill the gap in service delivery left by the formal utility's failure to expand services in growing cities (Ahlers *et al.*, 2013). For example, in the peri-urban areas of Greater Maputo, Mozambique, SSIPs serve an estimated 31 per cent of the population with water (Ahlers *et al.*, 2013). While many cities in SSA share the same general features regarding population growth and insufficient formal water supply systems, the coping mechanisms and consequences for urban residents can vary greatly, even on a neighbourhood-level. Next, we take a closer look at different examples of how informal water systems manifest themselves in different places and what consequences they can have for urban residents in informal settlements.

#### Strategies for accessing water

Strategies for accessing water can vary greatly between regions, cities, neighbourhoods, communities and income-groups. As noted above, official statistics usually provide only one primary source of water per household, but in reality, most households rely on a combination of several water sources to meet their daily needs (Table 1). A family can choose to pay high prices for bottled water for drinking purposes while still choosing to use water from more risky sources for cleaning-purposes.

*Table 1 Water abstraction methods in 17 communities in Ndola, Zambia*

<b>Source</b>	<b>Drinking water (%)</b>	<b>Domestic water (%)</b>
Shallow well	68,6	75,4
Borehole	11	4,3
River	0,7	0,7
Spring	0,7	0,7
KWSC leaking pipe	0,7	0,7
Dambo (i.e. wetland)	0	0
A combination of the above	9,7	9,4

*Source: Liddle (2016), n=152*

A case-study on different water access strategies in rich and poor communities in Dar es Salaam (Nanyanyuka *et al.*, 2014) identified a total of 28 different access strategies, 6 water sources and 10 intermediaries that provided the water. The most typical access strategies when the piped water is unavailable or failing in the communities studied were: drilling or digging of private wells, installing water pumps and reserve tanks, buying water from vendors, buying water from connected neighbours, buying water from mosques, buying packaged water and lastly using illegal connections or stealing water (Nanyanyuka *et al.*, 2014)

#### *Private wells and boreholes*

Hand-dug shallow wells are one of the dominating water accessing strategies in urban the informal water sector (Liddle, 2016). Digging shallow wells is strongly associated with rural practices that have been incorporated within urban communities as a result of urbanisation (Liddle, 2016). The wells vary in depth, depending on the groundwater level, but the quality and quantity of water from shallow wells is generally low in developing nations (Galiani *et al.*, 2005). In Ndola, Zambia, 68,6 per cent of surveyed households used water from shallow wells for drinking purposes, with 51 per cent of users believing their water was of acceptable taste and quality while 49 per cent thought it was not (Liddle, 2016). The water quality of shallow wells is largely determined by the well's proximity to contaminating sources, as well as the type of internal and surrounding protection of the well as well as its cover. In Ndola, all studied

wells lacked internal casing, almost 50 per cent had no surrounding pavement other than earth and 22 per cent did not even have a cover (Liddle, 2016).

While the hand-dug shallow wells in Ndola generally serve a just one or a few households, deeper private wells with connected pipes can serve whole communities. Mapunda *et al.*, (2018) found that private wells had become *de facto* small-scale utilities in peri-urban sub-wards in Dar es Salaam, where the owners stored water from wells in tanks and distributed it to households through privately owned “spaghetti-networks”. Shallow wells are therefore not only a primary source of informal water that private households resort to, but a water source utilized by vendors that distribute the well water to unconnected communities. In Festac Town in Lagos, Nigeria, 85 per cent of water vendors used wells as their main water source with 66 per cent of the water sold coming from unprotected wells vulnerable to contamination (Olajuyigbe *et al.*, 2012).

In Lilongwe, Malawi, kiosks are the main source of water peri-urban informal settlements, but wells are the primary back-up source among boreholes, rainwater, and private household taps (Adams & Boateng, 2018). Some 15 per cent of the households using wells as a back-up water source use unprotected wells (Adams & Smiley, 2018). Wells are also used as an alternative water source by households that are connected to the centralised piped network in Dar es Salaam, even though the quality is often poorer and the water salty (Nanyanyuka *et al.*, 2014).

Accessing water through boreholes is the other main informal water access strategy that relies on groundwater extraction and is used in urban and peri-urban areas across SSA. Boreholes are constructed using a drill and are superior to wells in that they are much deeper and often have better protection from contamination. Boreholes are often regarded as one of the safest informal water supply sources, but due to high construction costs, boreholes are non-existent in poor-areas that lack NGO aid (Liddle, 2016). A study of 19 boreholes in poor urban settlements on Nairobi, Kenya, estimated the average cost for a 230-meter deep borehole to be 27 500 US dollars (USD). A majority of the users regarded the water source as both reliable and accessible, however, the water prices were unpredictable and the quality did not match the criteria for safe drinking water (Chakava *et al.*, 2014). In Ndola, Zambia, the construction

costs of small-scale private boreholes are approximately 5000 USD, which is considerably less than the big rigs in Nairobi costs, but still more than most residents could ever afford (Liddle, 2016). Due to the high construction costs, boreholes are usually run by the more affluent SSIPs (such as local entrepreneur or community groups), NGOs or the public utility. Water from boreholes is usually sold directly to customers from kiosks and vendors (Chakava *et al.*, 2014).

While boreholes and wells constitute the main water sources for many in informal settlements, households are not always able to access the water themselves, and therefore have to rely on different intermediaries to get the water they need (Table 2). These intermediaries are generally referred to as water vendors. Note that all but one of the water access strategies in Table 2 rely completely on water from wells, even though the water is resold by vendors.

*Table 2 Water access strategies in 3 peri-urban areas in Dar es Salaam*

<b>Households water access</b>	<b>(%)</b>
Pipe-connected household from private wells	28,8
Tankers/trucks from DAWASCO <i>or</i> wells	7,8
Push carts/bicycles from wells	6,5
Purchased in 20-L buckets from wells	42,5
Fetches from open shallow wells	14,4

*Source: Mapunda et al. 2018) n= 153*

#### *Water vendors*

In the water literature, vending refers to the reselling or onward distribution of utility water, or the selling of water from other sources (Kjellén, 2006). Water vending does not refer to the formal utility selling water directly to customers. The term water vendor is usually used to describe the so-called travelling pushcart vendors, that sell water from containers or in sachets door-to-door. However, buying water from tanker trucks that regularly bring water to neighbourhoods or fetching it from a near-by water kiosk, sometimes referred to as a standpipe, can also be considered buying from water vendors. In the cases where water kiosks are run and controlled by the formal water utility, these are not referred to as water vendors but as the formal water supply.

One of the most common ways to purchase water from vendors is in 20-L buckets or containers (Mapunda *et al.*, 2018), but sometimes, water vendors also sell water packaged in bottles or plastic sachets. In Dar es Salaam, water kiosks were originally introduced by the formal water utility DAWASCO, but Nanyanyuka *et al.* (2014) found that many private actors running the formal kiosks got actually their water from informal sources like tanker trucks or illegal connections. Most of the water sold by pushcart vendors comes from connected households that are able to resell some of their water, followed by water from kiosks (Kjellén, 2006). A case-study of two high-income streets and two low-income streets in Dar es Salaam identified buying water from vendors as the primary access strategy during breakdowns of the formal water system (Nanyanyuka *et al.*, 2014).

The need for households to use water vendors to access water is largely determined by the distance to the formal water supply (Kjellén, 2006; Schwartz & Sanga, 2010). Pushcart vendors usually operate in the poorest areas, where piped water infrastructure is scarce or absent, and customers in these areas generally appear to be grateful for vendor services, with less than half of the pushcart vendors getting complaints (Kjellén, 2006). However, not every urban area is suitable for vendors. In a case-study of three areas in peri-urban Dar es Salaam, only one had travelling vendors since the two others were too hilly and sparsely developed for vending to be suitable (Mapunda, 2018). Pushcart vendors usually use carts fitted with bicycle wheels that can carry 6–12 20-L containers, which means that the weight of a fully loaded pushcart can reach 120–240 kg. This is perhaps the reason that it is usually young men that work as vendors (Kjellén, 2006). In Dar es Salaam, over 90 per cent of pushcart vendors are 20–25 years old and depend on vending to support themselves (Mapunda, 2018). Buying water from vendors is generally the most expensive accessing strategy (Kjellén, 2006), as outlined in greater detail below.

#### Health vulnerability

Households connected to the formal piped network often still experience varying availability of water (Nanyanyuka *et al.*, 2014; Smiley, 2018), due to factors like water pressure loss during power-outages or failure of the water service to produce enough water to meet the demand. These households often rely on alternative back-up sources

from informal water sector. However, availability and also accessibility, i.e. when water is available and how long it takes to fetch it, can be even more volatile in the informal water sector and have a greater impact on the life of the end user. Relying on informal water sources often comes with increased vulnerability both in terms of health due to a higher risk of contamination, and economy due to higher water prices.

The quality of the water from informal provision systems is rarely monitored as closely as water from the formal supply system, and many informal sources, like unprotected wells, are more vulnerable to contamination. Relying on informal water sources is therefore connected to a high rate of waterborne diseases like diarrhoea (Olajuyigbe 2012; Chakava *et al.*, 2014; Liddle, 2016; Mapunda *et al.*, 2018). Even the proximity of the water source can have large health-impacts for households, with time spent fetching water being an indicator of child mortality. Pickering & Davis (2012) found that a 15-minute decrease in one-way walk time to the water source is associated with a relative reduction in diarrhoea prevalence by 41 per cent and a 11 per cent relative reduction in under-five child mortality. The high risks related to informal water provision systems also means that improvements in water quality also has the potential of improving the general well-being of people that rely on the informal water sector. In fact, having access to water on-premises results in fewer parasitic worm infections, less diarrhoea and greater child stature (Overbo *et al.*, 2016).

Accessing water from unprotected shallow wells or directly from surface-sources like rivers is the riskiest strategy in terms of health. These sources are vulnerable to contamination, especially during floods when contaminated water easily get mixed with the water in the well. In a case study of Festac Town in Lagos, Nigeria, some form of waterborne disease was observed in 44 per cent of the households relying on water vendors that used open wells as their primary source. 10 per cent suffered from diarrhoea, 18,6 per cent of typhoid fever and under ten per cent suffered from stomach ache or cholera (Olajuyigbe 2012, 236).

A case-study on water supply systems in peri-urban Dar es Salaam found that deep wells and boreholes were often poorly constructed and that the owners did not use any reliable water quality tests before use, other than the water's physical appearance (Mapunda *et al.*, 2018). Most wells and boreholes were also located in valleys and

close to sanitary facilities, which increases the risk of faecal contamination of the extracted groundwater (Mapunda *et al.*, 2018). Liddle (2016) found that in Ndola, Zambia, water users in informal settlements understand the risks associated with groundwater contamination and the need to protect their wells and treat their water. However, the follow up has been limited due to lacking support from authorities (Liddle, 2016).

While not being as unsafe as unprotected wells, private boreholes can also come with increased health risks. Chakava *et al.*, (2014) sampled water from 9 boreholes, all located in poor settlements in Nairobi, Kenya, and found that none of the samples met the WHO guidelines on safe drinking water. 32 per cent of users had experienced diarrhoea, many of them because they did not treat the water before drinking it, as borehole water is generally regarded as safe to drink (Chakava *et al.*, 2014). The households surveyed also spent up to 10 per cent of their income on medical expenses, mostly to tackle diarrhoea.

The high vulnerability regarding health associated with long water-fetching trips and unprotected water sources in the informal water sector suggests that protecting water sources and bringing them closer to households should be a priority of the state, if it is willing to support the informal water sector.

#### Water prices

In addition to health risks, the informal water sector is also associated with economic vulnerability. Water prices vary heavily depending on the source type, which often benefits higher-income neighbourhoods and households connected to a formal water supply, while the poorest households end up paying the highest prices for water (Adams *et al.*, 2018). All case-studies mentioned in this chapter shows higher prices per unit of water in the informal sector compared to the formal supply, either because of higher fees, more middlemen or the high price of constructing private boreholes or wells (Nanyanyuka *et al.*, 2014; Liddle *et al.*, 2016; Allen, 2017; Emenike *et al.*, 2017; Adams & Smiley, 2018; Smiley, 2018).

For example, in Dar es Salaam, 90 per cent of the population in low-income settlements rely on informal water sources at a considerably higher price than the official utility charges per unit of water (Allen *et al.*, 2017). A case-study of peri-urban neighbourhoods in Malawi (Adams & Smiley, 2018) showed that households depending on communal water kiosks paid between 50 and 100 MWK per day, or up to 3000 MWK (8 USD) per month, while households paying a flat rate water bill paid on average just 1 200 MWK (3 USD) per month, even though there were some price fluctuation between different peri-urban villages. In both Arusha (Tanzania), Dodowa (Ghana) and Kampala (Uganda), water prices also vary between members of communities based on social status with tenants paying more for their water than landowners, which in turn can drive tenants to use more risky or contaminated water sources (Silvestri *et al.*, 2018). A case study of two communities in Dar es Salaam showed how households in the poorest areas can pay up to ten times more per unit of water than households in the richest areas pay for water from the formal piped network (Nganyanyuka *et al.*, 2014). Gender also plays an important role, and in both Arusha, Dodowa and Kampala inequalities were identified in regard to women not having the same bargaining power as men (Silvestri *et al.*, 2018). However, in some communities the responsibility of handling water can also work the other way around to empower women (Butcher, 2016).

While households fetching and purchasing water from kiosks, boreholes or standpipes generally pay more for their water than those with household water connections, the ones relying on vendors that sell water in bottles, sachets or 20-liter containers generally pay the most. In Nairobi, Kenya, water purchased from vendors costs 10 times more than water from the piped network, and in Dar es Salaam, Tanzania, it is almost 30 times more expensive (Adams *et al.*, 2018).

The size of the household naturally also impacts the cost and access to water. A study on access to safe water in Ado-Odo Ota, Nigeria, showed that bigger households were more vulnerable, with an increase in the number of household occupants indicating an increase of approximately 31 per cent in the probability of non-regular access to water (Emenike *et al.*, 2017). While it can seem obvious that a household in a high-income neighbourhood with functioning infrastructure pay less per unit of water through their tap than a low-income household that relies on a street vendor to access water does,

inequalities also exists on a neighbourhood-level. As outlined below, households connected to the piped water network through secondary pipes and middle-men in Kisumu, Kenya, paid three times less than their community-peers that happened to live further away from the pipes and therefore relied on purchasing water from a kiosk (Schwartz & Sanga 2010).

Although bringing more reliable and formal water sources to areas that previously relied on vendors does mean lower prices, it won't necessarily lower the household's expenses on water services. In Dar es Salaam, 53 per cent of households surveyed in three neighbourhoods actually paid more for their water after they gained access to the piped network between 2014 and 2017, due to both increased family sizes and easier access which resulted in a higher consumption (Smiley, 2018).

Table 3 Water Prices (Tsh/l) in two communities in Dar es Salaam

Water source	Affluent	streets	Poor	streets
	Osterbay	Masaki	Mkudunge	Nyambwera
House connection (piped water)	1.007	1.007	–	–
Stand pipes	–	–	2.5 – 25	2.5 – 10
Piped water from pushcart vendors	–	–	12.5 – 35	12.5 – 15
Well water from pushcart vendors	–	–	2.5 – 10	1.23 – 5
Tankers	6 – 8	6 – 8	15.0	–
Bottled water	600 – 1000	600 – 1000	600 – 1000	600 – 1000

Source: Nganyanyuka et al (2014). (1000 Tsh equals approx. 0.43 USD)

While water prices can vary significantly between regions, cities, neighbourhoods, communities and even between neighbours, the highest price is generally paid by those living furthest away from formal water sources, who are often also the poorest residents. In addition to increasing cost-vulnerability, the high prices paid to water kiosks and vendors can also push households towards using more unsafe sources like unprotected wells or even surface-water for their daily needs, which further increases health-vulnerability.

### Formalising the informal through community-based models

Responding to the conceived problem of informality, policy makers have sought out tactics to “formalise” the informal economy. In Tanzania, policy makers’ focus on the formal-informal divide has led to a fixation on formalisation, understood as formalisation of businesses, which includes the requirement for registered businesses to have a fixed physical and postal address and registered assets (Steiler, 2018).

The need for a physical address to be regarded as formal, or legal, excludes a big proportion of street traders in Dar es Salaam from the possibility of being regarded as formal, rendering them incompatible with the modern economy and legal system (Steiler, 2018). Steiler’s (2018) study of informal street trade in Dar es Salaam shows that this conception of street trade as illegitimate clashes with how the traders

themselves see the legality and legitimacy of their work. Building on Steiler's (2018) study of formalisation policies in Tanzania, we can assume that applied to water vendors, these kinds of formalisation policies would be equally unfruitful, since small-scale water vendors are likely to face similar problems with fixed addresses and assets.

However, if we define formalisation policies more broadly to encompass the state's attempts to include some alternative water management models and informal arrangements at a community-level in their water provision, we find some evidence of successful attempts to formalise the informal water sector. Especially community-based models, that aim to work out the best water provision solutions according to the need of local communities, have been studied in different parts of the world (Allen, 2017; Adams & Smiley, 2018). Many community-based models have been successful in expanding water services in informal settlements, but they do run the risk of providing the state with an excuse to withdraw its responsibilities from these areas. This section focuses on experiences from different community-based water provision schemes in SSA.

Community-based models either consist of community self-help schemes or the more popular and effective alternative: some form of co-production between communities and the state, attempting to enhance water supply in underserved communities (Adams *et al.*, 2018). The co-production partnerships between communities and the water-utility are often referred to as community-public partnerships (CPPs). Co-production basically means citizen participation in public service delivery with the state or public agencies (Adams & Smiley, 2018), but for the purposes of this chapter, it seems suitable to use the more precise definition of institutionalized co-production. Joshi (2004) defines institutionalized co-production as “the provision of public services (broadly defined, to include regulation) through a regular long-term relationship between state agencies and organized groups of citizens where both make substantial resource contributions”. The concept of institutionalized co-production lets us break free from the normative assumption that unorthodox forms of public organisation are undesirable and ineffective relics of ‘traditional’ arrangements, and instead helps us explore what in many parts of the world constitute the best available alternatives (Joshi, 2004). This reasoning of taking institutionalised co-production arrangements more seriously (Joshi, 2004), resonates strikingly well with more recent calls for the

state to acknowledge the informal water sector as an alternative where the urban infrastructural ideal of a piped network has failed (Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018). The co-production between communities and the state is an appealing idea because of its potential to be a win-win solution that improves service delivery, enhances participation, creates employment and well-being while at the same time enabling formal utilities to expand their customer base (Adams *et al.*, 2018).

Building on the idea of a win-win situation, international lending agencies like the World Bank and the African Development Bank have often propagated for the so-called “formalisation” of the informal economy, through what Ahlers *et al.* (2013) call the ‘legalist approach’ to formalisation. According to the ‘legalist approach’ informality is primarily a form of untapped liquid capital, that should be unleashed by the formal legal system integrated in the capitalist system to boost the economy as a whole (Ahlers *et al.*, 2013). However, as I argue below, both urban informality and the processes associated with “formalisation” or community-public partnerships are much more complex than the legalist approach suggests.

There is some evidence of benefits from CPPs especially in the urban water sector. Co-production has improved accountability and information flow between service providers and users, it has enabled urban communities to participate more actively in water policy formulation and opened up economic opportunities for active participants to found local water provision businesses (Adams & Smiley, 2018). However, CPPs can easily be undermined when participants do not act in good faith, for example when the state uses CPPs to get rid of its service responsibilities in challenging areas, when community elites takes control to prioritize certain areas over others (Adams & Smiley, 2018) or when the partnership is designed primarily to take control over the informal water sector rather than strengthening its capacity (Ahlers *et al.*, 2013). In the case of Dar es Salaam, CPPs have often been successful in improving service provision, especially in low-income informal settlements, but these schemes still suffer from too little state involvement and support, leaving communities on their own after the initial investment in small-scale infrastructure (Dill, 2010; Allen, 2017; Adams *et al.*, 2018)

In Lilongwe, Malawi, a CPP promoted by the state in 2006 to create opportunities for communities to actively participate in water service delivery to enhance water supply in informal urban settlements has led to improvements in both pricing, distance to water sources, efficiency, financial accountability and management transparency. But while the price of water fell, the number of water kiosks in Lilongwe increased and their opening hours improved in areas that used the CPP-model, interruptions in water supply worsened and waiting lines grew (Adams & Smiley, 2018). While the model improved participation its biggest challenges lied with poor infrastructure and limited capacity of informal settlements to address problems (Adams & Smiley, 2018). The experience of CPPs in Lilongwe suggest that community-bases systems can improve some aspects of access to safe water, but they cannot be regarded as perfect models in urban informal settlements (Adams & Smiley, 2018). Urban water systems are too complex for the state to act passively (Adams & Smiley, 2018), especially when it comes to supporting and investing in water infrastructure.

Municipal-community partnerships are also common across the informal settlements of Dar es Salaam. In these partnerships, the city supports community-managed boreholes either through municipal teams working on issues of water, health, education and community development, or the pro-poor units of DAWASCO (Allen, 2017). Most of the community-managed water schemes are boreholes, where water is pumped to storage tanks from where it either flows to distribution points across the settlement, or is being extracted by water vendors. These systems are usually established by NGOs or DAWASCO and managed by local community-bases organisations (CBOs) such as water user associations or water committees (Allen, 2017). In settlements located closer to formal water sources, the community-based water systems often take the form of “middlemen” constructing and maintaining a network of secondary pipes in informal settlements (Dill, 2010). The city’s community-based schemes have often been successful (Dill, 2010; Adams *et al.*, 2018), but the co-production usually does not get the level of state support it needs, in terms of repair and maintenance as well as financial resources to pay electricity costs, water vendors and security personnel, since these systems are often expected to support themselves (Allen, 2017).

## The Delegated Management Model

The delegated management model (DMM) is a form of public-private partnership that aims at expanding water service provision under community-management and generating business opportunities for lower-income residents (Butcher, 2016). In accordance to the model, the former water utility delivers bulk water from master meters (the formal piped network) to small-scale providers, so called Master Operators or MOs, that are approved or appointed by community associations. These MOs are responsible for managing the next step in the supply chain, by connecting and charging households closest to the master meters or selling water to standpipes and kiosks that are operated as separate businesses (Schwartz & Sanga, 2010; Butcher, 2016). The general idea is that the public utility delegates responsibility of water management to the MOs that are in turn incentivized to construct and maintain secondary water provision networks in informal settlement. This significantly reduces risk from the utility's point of view while still providing informal settlements with formal and safe water. The model has been introduced with support from NGOs in several sub-Saharan African countries including Ghana, Mozambique and Kenya (Butcher, 2016).

With the introduction of a Pro-Poor Implementation Plan (PPIP) for Water Supply and Sanitation, policy-makers in Kenya stated their intention to replace informal systems with formal small-scale providers (Butcher, 2016). The preference of building more market-based water management solutions and using small scale providers to deliver “pro-poor” services, has opened the door for the delegated management model in Kenya.

Two case-studies on local-level experiments with the DMM in Kisumu, Kenya, shows how community-based water management both can increase the quality and quantity of water services and deepen democratic practice on a community-level (Schwartz & Sanga, 2010; Butcher, 2016). Both studies showed a significant service expansion and improvement to unconnected households, increased revenue for the formal utility and increased employment as well as a reinforced level of ownership and solidarity within the community. In the neighbourhood of Kondele, the DMM has had positive consequences for women and girls, that are primarily responsible for daily decision-making related to water use and collection (Butcher, 2016). In addition to improving

water access, the DMM has allowed some women to participate more in income-generating activities, such as managing water kiosks. The community-managed system has also provided more flexibility for customers to take water on credit if necessary, since it is easier to negotiate with community-members than to do so directly with the formal utility (Butcher, 2016).

But the DMM is far from a perfect model, and also comes with new challenges. Schwartz & Sanga (2010) noted corruption among some MOs in one neighbourhood as well as some mistrust among the community towards the MOs. The DMM also increased inequalities in how much households paid for their water. As the households with higher incomes tend to be located closer to dense urban areas and in this case, the master meters, these households have the possibility of being connected to the MOs secondary network. However, the poorer households that are located further away from the master meter, have to rely on standpipes and kiosks where they pay up to three times more for water than their more well-off peers (Schwartz & Sanga 2010). In Kisumu, Kenya, the transition to the DMM has been supported by NGOs. But in places that lack outside financing, the initial investment in infrastructure may not be possible which could potentially undermine the whole model. According to Schwartz & Sanga (2010) the DMM relies on infrastructure development to create suitable conditions improved service expansion and billing-collection efficiency. Increased commitment of the state to support the capacity of communities managing their own water systems as well as a solution to the differences in water pricing between connected and unconnected household is needed to make the DMM a sustainable model (Schwartz & Sanga, 2010; Butcher, 2016).

In greater Maputo, Mozambique, the implementation of a delegated management model benefitted the largest small-scale service providers, that had the economic means to 'become formal' and integrate with the water utility through the DMM. The model focused primarily on licensing informal providers and paid little attention to service improvement (Ahlers *et al.*, 2013). Smaller actors within the informal water sector could not necessarily cope with the added license fees and taxes associated with 'going formal', while also not being willing to abandon their investments in boreholes and small-scale infrastructure. This dilemma can potentially drive the smallest informal actors towards an even deeper form of informality (Ahlers *et al.*, 2013).

Ahlers *et al.* (2013) also found that the formalisation policies in Mozambique did little to protect customers that rely on the informal sector and instead focused more on taking control over the informal economy, which in turn is likely to result in end consumers paying even more for their water instead of improving access and lowering prices. Rather than improving services, the community-based model of delegated management was primarily used in Maputo as a tool to gain more control over the informal water sector, while expansion of the formal piped network to the whole city was still the primary target of the authorities, a tactic that I have argued above is not likely to work. The experiences from Maputo contradicts the argument of the legalist approach, supported by the World Bank and The African Development Bank, that formalization ultimately will benefit customers (Ahlers *et al.*, 2013).

## Research approach and conceptual framework

My approach in this research project builds upon practice theory and Carol Bacchi's (2009) poststructuralist approach to analysing policy. From this standpoint, water consumers and policy makers are viewed as having both agency and being driven by structures. According to this practice theoretical view, people do what makes sense to them to do, to understand the social world. This approach allows me to both critically analyse the state's attitudes towards the informal water sector and the water policies proposed in the national water development plans, while also acknowledging the state's role in reproducing informalities.

The poststructuralist premise of this approach rejects the idea that policy proposals are responses from governments to solve problems in society. Instead the approach critically interrogates the political dimensions of 'problems' implicitly represented in policy proposals as value-loaded assumptions that determine how societies are governed (Bacchi, 2009, 31–32). This does not mean that the approach denies the existence of troubling conditions that require a response. What it does is to suggest that these conditions can be represented as problems in very different ways, based on the assumptions of policy makers, that in turn define how policies are formulated. To take the informal water sector as an example, this poststructuralist approach to analysing policy suggests that both the definition of informality as something illegal, the definition of water access as connection to a piped network as well as the idea that water policy proposals are objective responses to real problems needs to be questioned.

### Urban informality

This study uses the concepts of "the informal water sector" and "informal water sources" to describe practices connected to accessing water that exist outside the definition of what the state regards as legitimate water provision, or the formal water sector. The concept of informality covers a wide-ranging scale of economic activity, from marginal operations to large enterprises, that takes place in tight exchange with the formal sector, not outside of it (Hart, 1973). In the urban water sector informality includes everything from using buckets to get water from rivers or ponds (surface water), collecting water from hand-dug wells and springs, using boreholes, harvesting

rainwater or even purchasing water in cans, bottles or sachets from small-scale street vendors.

The concept of informal activities is by no means a straight-forward one and different authors and organizations often define informality in different ways, depending on their objectives. Using the term “informality” or “informal economy” is often far from neutral, especially when the concepts is used to achieve political goals (Steiler, 2018). By definition, income opportunities outside formal employment must include certain kinds of criminal, or illegitimate, activities. However, Hart’s (1973) typology of urban income opportunities distinguish between legitimate and illegitimate activities in the informal sector, depending on what is generally accepted by the public, with small-scale water vending and even large-scale informal water truck operations falling under the label of legitimate informality, while reselling water stolen from the formal utility through illegal connections would be regarded as illegitimate informality (Hart, 1973). Hart (1973) also stresses that his proposed categories of informality refers to activities or roles (or practices), and not persons that can be both formal and informal depending on what they do.

Defining informality as a practice, rather than as something spatial (something that happens in isolated low-income areas) socio-economic (something poor people do) regulatory (state sanctioned) or technological (a decentralised practice) enables us to see how the state itself engages in informal practices (Kooy, 2014) while also allowing us to identify how formal development actually produces informal practices. That said, many of the case studies on the informal water sector referenced in this text define the informal water sector from a technological and spatial perspective, i.e. they map out which methods poor people in the slum use for accessing water, instead of widening the scope of the study to include other spaces and definitions of informality.

According to Roy (2011), urban informality has been understood in various ways, sometimes as the “habitus of the dispossessed”, a “grassroots rebellion of the poor against state bureaucracy” or a “new primary mode of livelihood in a majority of Third World cities”. The problems with these understandings of informality from early 21<sup>st</sup> century work is that they all define informality as something synonymous with poverty or marginality (Roy, 2011). Misra (2014) also points to other weaknesses with

conceptualising water provision systems as either “formal” or “informal”, since informality exists also in formal systems and since informal systems needs at least some markers of formality to function. From this standpoint, Misra (2014) instead argues for abandoning the formal-informal categories for the concept of “emergent formalisations”, to better capture the co-existence of both formality and informality in all organisations.

However, defining urban informality as practices instead of using it as a label for water systems in informal settlements or outside state control, reveals how informality is produced, not only in “the slum”, but also in high-income communities and even by the state and other elite actors like corporations and the development community (Hart, 1973; Roy, 2011; Kooy 2014). Liddle’s (2016) research on informal water supply systems in Ndola, Zambia, shows that relying on informal water sources is not only something the poor do out of necessity. Some of Ndola’s wealthiest citizens prefer having their own private boreholes constructed to a cost of approximately 5000 USD, instead of relying on the much cheaper formal water supply, that was seen as unattractive or unsafe because of its colour, smell and taste (Liddle *et al.*, 2016). Similar tendencies can be found in Kooy’s (2014) research on The World Bank’s project to expand the piped water network in in Jakarta, Indonesia, in the 1990s. One of the failures of the project was the assumption that residents would prefer the piped water network over informal supply sources. It turned out that many chose not to connect to the expanded network even though they had the possibility to do so. Not even all households connected preferred the formal water source, with 15 per cent of connected households identified as zero consumers in 2005. These examples show why informality cannot be seen simply as backwardness, underdevelopment or a lack of modernisation (Kooy, 2014).

Instead, Roy (2011) suggests that urban informality needs to be understood as a heuristic device that “uncovers the ever-shifting urban relationship between the legal and illegal, legitimate and illegitimate, authorized and unauthorized”. In other words, urban informality works as a theoretical tool to show how the slum is produced through the practices of the state (Roy, 2011). In the water sector, developing the formal networked infrastructure produces informality by sanctioning or targeting certain practices as informal, by creating zones of exception where certain actors are

encouraged to engage in informal practices and by contestation to rule as subjects resist or redefine what is a legal and illegal practice (Kooy, 2014).

### Informality as practice

By defining urban informality as a practice, we can utilise social practice theory to show why some informal water provision systems are regarded as informal while other are seen as formal. Practice theory provides a holistic and grounded perspective on behaviour change processes and reveals the difficulties of challenging and changing practices (Hargreaves, 2011). This study also aims at using practice theory as a framework for analysing the state's or utility's support for the informal water sector, or lack thereof, both by examining how the state reproduces informality through its practices and whether the water policies of Kenya and Tanzania are sufficient for changing practices in the informal water sector for the better.

Since the social world, according to practice theory, is mainly populated by diverse social practices (Reckwitz, 2002), the framework of practice theory invites us to have a discussion about the disconnection between “official” and “formal” practices contra “informal”, and “community based” practices. Practice theory offers a framework for seeing and analysing social phenomena (in this case the informal water sector) as something not only driven by structure (like states and organizations) or agency (individuals acting “rationally” by deviating from norms to promote their self-interests), but as a result of individuals carrying forms of interpreting, knowing how and wanting and of the usage of things (Reckwitz, 2002). From a practice theory perspective, people are seen as practitioners engaged in the practices of everyday life, and their reputations, decency, self-respect etc. depend on being recognized as competent practitioners (Røpke, 2009). Practices are composed of both equipment (sometimes referred to as stuff), images (understood as meanings or symbols) and skills (Shove & Pantzar, 2005; Røpke, 2009). Both skills and equipment (including both tools and body parts) are naturally necessary to carry out a practice, but images, or meaning is equally important to make sense of the activity. Meaning includes both ideas of what the activity is good for and what emotions relate to it as well as beliefs and understandings. In a case-study of environmentally friendly practices in an office

setting, Hargreaves (2011) found that while the skills and material used in practices are relatively easy to question, the meanings connected to practices are harder to change. In other words, practice theory suggests that people generally use their abilities (skills and equipment) to do what makes most sense to them (meaning) as a form of reproduction, and without a deeper reflection of what has worked previously in a similar situation.

Here, practice theory also opens up explanations to why some households in the examples mentioned above (Kooy, 2014; Misra, 2014; Liddle *et al.*, 2014) voluntarily choose to rely on informal water systems, even though they are connected to the formal supply network, or have the means to connect. The informants in these case studies cited the unreliability, perceived bad quality or bad reputation of the formal piped water network as the reasons why they chose not to use informal water sources instead. Groundwater is, on the other hand, widely taken for granted as a safe water source and getting water from the ground has legitimacy among many populations (wells and boreholes) especially in areas with high rural-urban migration (Liddle *et al.*, 2014, 2016). A change in skills and equipment (connecting previously unconnected households to the piped network) did not change the behaviour, or practices, of households in Ndola or Jakarta since the meaning of using piped water remained associated with poor quality and unreliability while the practice of getting water from boreholes was connected with better safety, reliability and perhaps also tradition.

Another key feature of practices is that they are only sustained through their repeated performance (Shove & Pantzar, 2005; Hargreaves, 2011) which means that changing the behaviour of water consumers will always take time, and contrary to popular believe, not happen just by connecting more households to the utility's piped water network. However, changing practices is by no means an impossible task. Since practices are (re)produced through continual performance by practitioners (Shove & Pantzar, 2005), very subtle shifts in the elements of practice (stuff, skills and meaning) and how they are experienced by practitioners are central to the broader transformation of practices (Hargreaves, 2011). The case-study of environmental practices in an office mentioned above showed that while many workers did not accept the meaning of recycling and saving energy to reduce the office's environmental impact, they still used their new skills and stuff (paper-bins and turning off equipment when they left

the office) but justified the changed practices with new alternative meanings (cost-saving and being a good rule-following employer, rather than saving the environment) (Hargreaves, 2011). Following the same logic, one of the main benefits of the delegated management model (DMM) in Kisumu, Kenya, was that it provided new meaning to practitioners working together with the formal water utility. Instead of “just” offering a supposedly safer and more reliable water source, the DMM had the advantage of rewarding communities with job opportunities, more flexible water credit and more democratic participation (Schwartz & Sanga, 2010; Butcher, 2016). From a practice theory perspective, this change of meaning from accessing water to increasing political influence and job opportunities helps explain why communities were satisfied with the model.

In the case of the DMM in Kisumu, Kenya, the initiative for experimenting with the model came from the state. In other words, the successful change in practice at the community level was a result of a change in policy, or practice, at the state level. Consumers and producers are both involved in constituting and reproducing practices (Shove & Pantzar, 2005) and practice theory can not only be applied to analyse the behaviour of individuals and communities, but also the practices of the state. In the case of the water sector, this notion also underlines the fact that the state and the utility also plays a role in producing informality.

To apply a practice theory perspective on policy making, it is useful to think of the formulation of policy as “discursive practises”. Discursive practices, originally a concept introduced by Michel Foucault, refers to the practices, or operations, of discourses, understood as knowledge formations (Bacchi & Bonham, 2014). This means that discursive practices are not only limited to linguistic practices or the use of language, but understood as the production of knowledge through a much wider set of practices. Building on this definition of discursive practices, Bacchi & Bonham (2014) suggest that what needs to be analysed and understood are the discursive practices that define what is “the real”, or “what is being done and what is reality made to be”. This brings us to Bacchi’s (2009) approach to analysing policy, the ‘What’s the Problem Represented to be?’ approach (WPR). The WPR approach seeks out to analyse what reality is made to be by questioning the discursive practices that underpin policy proposals. More specifically, this is done by questioning what implicit problem a

certain policy proposal is supposed to solve, how the representation limits policy responses and how the problem could be represented differently. The next section describes the approach in greater detail.

To summarise, this study uses the tools of practice theory outlined above by analysing the discursive practices, or definitions of reality in policy proposals, through problem representations. This approach helps to explain why the state engages in certain practices in pursuit of providing safe water to its citizens, or prefer certain water policies over others.

## Research method

This study is based on a critical analysis of water policies in Tanzania and Kenya. To evaluate what the water policy proposals in said countries reveal about the attitudes towards the informal water sector, I use a poststructuralist approach to analysing policy. This is done by applying Bacchi's (2009) 'What's the Problem Represented to be?' approach, or the WPR approach, to analyse policies on urban water provision in the water sector development plans and strategies of Tanzania and Kenya. This chapter takes a closer look at the strengths and weaknesses of applying the WPR approach to analyse policy makers' attitudes towards the informal water sector. It also provides an overview of data collection process and the analysed material.

### The 'WPR' approach to analysing policy

Using a poststructuralist approach in policy analysis questions the assumptions that policy proposals are based on and directs attention to the heterogeneous practices, knowledge practices in particular, that produce hierarchal and unequal forms of rule (Bacchi & Goodwin, 2016, 4). By focusing on practices, it becomes possible to insist that the realities we live in are open to challenge and change (Bacchi & Goodwin, 2016, 4). The poststructuralist approach to analysing policy challenges the conventional view that rules and regulations, or policies, *address* problems. Instead policies are seen as *producing* 'problems', and by critically questioning how these 'problems' are constructed, it's possible to reveal the underlying assumptions that policies are based on and that in turn affects how our lives are imagined and lived (Bacchi & Goodwin, 2016, 6).

The analytical tool applied for this study's analysis is Carol Bacchi's (2009) approach to critical interrogation of public policy: the 'What's the Problem Represented to be?' or 'WPR' approach. The aim of the WPR approach is to understand policy better than policy makers by examining assumptions and conceptual logics in implicit problem representations (Bacchi, 2012). The WPR approach has an explicitly normative agenda that presumes that some representations of problems benefit the members of some groups at the expense of others, and the goal of challenging these representations of "the problem" by suggesting it can be represented in an alternative way to avoid some of the harming effects (Bacchi, 2009, 44). This approach fits well with the starting

point of this study, that the problem with water development in urban SSA represented by policy makers as a problem of infrastructure is increasingly being questioned. The WPR approach is a flexible research method that can be applied both on specific pieces of legislation, policy documents, government reports or censuses. The use of the WPR approach in this study is also justified by the fact that the policy documents on water development in Tanzania and Kenya rarely explicitly mention the informal water sector. The WPR approach allows us to circumvent that problem by revealing attitudes on informality through the assumptions behind general water policy proposals.

As mentioned above, the WPR method starts from the premise that policy proposals reveal what is thought to be problematic and needs to change, which means that policy proposals contain implicit representations of what is considered to be the ‘problem’ (Bacchi, 2012a). The ‘problem’ represented by policy can be explicit but, as in the case of the informal water sector, most of the time government policies do not officially declare that there is a problem (Bacchi, 2009). Rather, policy makes changes, which implies that there is a problem with the state of things that needs to be changed, an implicit problem is therefore a natural part of policy.

For example: if training courses are offered to women as a part of a policy to increase their representation in better paid occupations, the ‘problem’, or the thing that is ‘holding women back’, is represented to be women’s lack of training. Applying the WPR approach reveals how this policy proposal rests on some deep-seated assumptions about the nature of work and the nature of ‘skill’ while little attention is paid to the kinds of work made available, cultural assumptions of ‘women’s work’ or other factors barring women entrance to high-paying jobs. It is therefore at least possible that policies, with this understanding of the ‘problem’ will change little (Bacchi, 2009, 2012a), if anything.

The WPR approach has been widely used to analyse national policies on topics ranging from employment, public health, education and drug-use by asking the question: What’s the drug-, alcohol-, (un)employment- or education problem represented to be? (Lancaster & Ritter, 2014; Bacchi, 2015; Pienaar & Savic, 2016; Salas *et al.*, 2017). The WPR approach has proved particularly effective in demonstrating how neoliberal discourses represent social and economic problems as problems of the individual,

downplaying the role social and economic structures and policy (Clarke, 2017). Even though the approach was introduced fairly recently in 2009, Bacchi's work (2009) has been cited over 1500 times in academic journals. The examples listed below were among 15 'useful illustrations' of how the WPR approach has been applied up until 2014, listed by Carol Bacchi herself (The University of Adelaide, 2017).

Lancaster & Ritter (2014) used the WPR approach to study the representation of drugs as a policy problem in five Australian National Drug Strategy documents published between 1985 and 2011. Their research showed how the 'drug problem' in Australian policy over time came to be represented primarily as an economically quantifiable problem, with policy proposals emphasising the economic cost of drugs to society with social harms being portrayed as problematic because of their cost to society, not the wellbeing of drug users (Lancaster & Ritter, 2014).

Similarly, in their analysis of Canadian obesity prevention policies, Sales *et al.* (2017) identified five narratives that may be contributing to weight bias and obesity stigma. The narratives (e.g. obesity can be prevented through healthy eating and physical activity, obesity is an individual behaviour problem) in Canadian public health policies create an opportunity for policies to focus mainly on individual-based healthy eating and physical activity interventions, which in turn has implications for the understanding of obesity (as an individual problem that can be controlled by willpower) (Sales *et al.*, 2017).

### Application of the WPR approach

The WPR analysis is conducted through a set of six questions and an accompanying undertaking to apply the questions to one's own proposals for change:

1. What's the 'problem' represented to be in a specific policy or policy proposal?
2. What presuppositions or assumptions underpin this representation of the 'problem'?
3. How has this representation of the 'problem' come about?
4. What is left unproblematic in this problem representation? Where are the silences? Can the 'problem' be thought about differently?

5. What effects are produced by this representation of the ‘problem’?
6. How/where has this representation of the ‘problem’ been produced, disseminated and defended? How has it been (or could it be) questioned, disrupted and replaced?

According to Bacchi (2012), the approach should be conceived more as an open-ended mode of critical engagement, rather than as a strict formula. For example, in their research on Australian drug policy, Lancaster & Ritter (2014) used only the two first questions in the WPR approach to answer what the (drug) problem is represented to be and what lies behind that representation. Similarly, an analysis of South Africa’s National Drug Master Plan (2013–2017) used question 1, 2 and 5 from the WPR approach to identify three different proposals in South Africa’s drug policy that inflate the “alcohol and drug problem” by reinforcing stigma and marginalisation which in turn justifies punitive policy measures (Pienaar & Savic, 2016).

In my analysis of the water development plans of Kenya and Tanzania, I have focused on questions 1, 2, 4 and 5 in Bachhi’s approach.

The reason behind this application is simply that the policy documents analysed don’t offer data rich enough to answer (3) how a certain representation of a problem has come about or similarly (6) how the specific representation has been challenged or defended. During the data collection process, I did consider including media coverage or parliamentary protocols to shed light on the process of policy making. This would have addressed a common critique against using documents as a data source: that conflicts in the process of making documents are hidden in the final product (Schmelzer, 2016, 19). However, a quick search effort for online news connected to the formulation of water policy in both Tanzania and Kenya, paired with searches for academic journal articles on media and water policy, suggest that the struggles over the water policy formulation process has not been a topic prioritised by news outlets. Also, since most of the policy documents analysed are published in the first decade of the 21<sup>st</sup> century, protocols and reliable news coverage of the policy making process were difficult to obtain online, and as a result, left out of the study.

Since research is as an active component in the shaping of realities, it can also be seen as a political practice (Bacchi, 2012a) which means that the WPR approach, naturally, also opens up the need for a critical look at the problem represented in this particular research project. As outlined in the introduction, the ‘problem’ represented as the starting point of this study is that the share of the urban population in SSA without access to safely managed water is still relatively large and has in many places increased. More specifically to this research effort, the problem represented is that governments are not supporting or embracing the informal water sector as a sustainable alternative to the failing urban infrastructural ideal of a piped water network that provides safe water for everyone.

One could criticise my representation of the problem for being biased towards community-based water solutions, since I have chosen not to focus in detail on other possible aspects of how to make the lacking water provision in urban SSA work. This criticism would be justified, since the whole project started from my interest in alternative water solutions. Another approach to studying the urban water utilities in SSA might as well be to look at corruption, poverty (underfinancing) or environmental aspects (such as the impact of droughts and climate change on the water production capacity).

On the other hand, in defence of the construction of the ‘problem’ in this study, it is one that has surfaced from several case studies into the informal water sector in urban SSA (Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018) and one that policy makers in the region don’t seem to have acknowledged. However, I do welcome a critical WPR analysis into what the ‘problem’ that this study builds upon is represented to be.

### Data collection

The data analysed consists of four policy documents outlining the future development of the water sectors in Kenya and Tanzania. The analysed documents can be divided into two categories: water sector development plans and water sector development strategies, with one document from each category selected for Kenya and Tanzania (Table 4).

The water sector development plans (Tanzania's Water Sector Development Programme 2006-2025 and Kenya's National Water Master Plan 2030) are characterized by detailed and technical plans for the water sector including, for example, maps of water basin systems and extensive cost- and financial calculations with few analytical chapters. Both the WSDP and the executive summary of the NWMP are over 200 pages long. In addition to the executive summary of the Kenyan NWMP, parts of the documents sectoral report C on water supply (152 pages) was included.

Tanzania's water sector development plan (WSDP) has five components: (1) The Water Resource Management Component, (2) The Rural Water Supply and Sanitation Component, (3) The Urban Water Supply and Sewerage Component, (4) Strengthening of the Ministry of Water and (5) Strengthening of the Executive Agencies. Most of the policies and problematisations analysed in this study were included in the first three components.

Kenya's water sector development plan (NWMP) on the other hand, is divided by the country's six geographical catchment areas, each with its own (1) Water allocation policy, (2) Water Supply Development Plan, (3) Sanitation Development Plan, (4) Irrigation Development Plan, (5) Hydropower Development Plan, (6) Water Resources Management and Development Plan (7) Flood and Drought Disaster Management Plan and (8) Environmental Management Plan. Most of the policies and problematisations analysed in this study were included in the Water Supply Development Plan. It is also worth noting that Kenya's National Water Master Plan 2030 has been formulated with technical assistance from the Japan International Cooperation Agency (JICA) that also played a similar role in the formulation of the previous NWMP in 1992. JICA's involvement is most visible in the document as the credited source in tables mapping out both the current and future need for water production proposals and targets for water production, sources target areas etc.

*Table 4 Data collected for analysis*

<b>Policy document</b>	<b>Publisher</b>	<b>Year</b>	<b>Pages</b>
<b>The National Water Master Plan 2030 (executive summary &amp; sectoral report C) (NWMP)</b>	Ministry of Environment (Kenya)	2013	219, 152
<b>The National Water Services Strategy (NWSS)</b>	Ministry of Water and Irrigation (Kenya)	2007	38
<b>Water Sector Development Programme 2006-2025 (WSDP)</b>	Ministry of Water (Tanzania)	2006	213
<b>National Water Sector Development Strategy (NWSDS)</b>	Ministry of Water and Irrigation (Tanzania)	2008	109

Compared to the development plans mentioned above, the water sector strategies (Kenya’s National Water Services Strategy and Tanzania’s National Water Sector Development Strategy) are briefer and offer a more nuanced discussion about the strategies, challenges, goals and reasoning behind water policies, while leaving out technical details about specific project and implementations of said policies.

The Kenyan strategy is 38 pages long and the Tanzanian 109 pages. The Kenyan strategy offers brief descriptions of goals of water sector development as well as challenges facing the country’s water sector, followed by strategic policy responses articulated in brief bullet-points. Each specific topic is given 1–3 pages in the strategy. In contrast to Kenya’s water sector development plan, the strategy offers deeper justifications, arguments and background for the policies presented in both documents.

The Tanzanian strategy follows a similar structure, even though it is a bit more detailed. In Tanzania’s strategy, each topic is contextualised with a brief background, a problem statement, policy direction, goal and finally a strategy expressed in bullet-points. Much like in Kenya’s strategy, each topic is given 1–3 pages, but the chapters are provided with a more detailed introduction.

The documents analysed can be criticized for being outdated. However, these documents do represent the current water development plans and strategies setting the frames for goals and policies to be achieved in 2025 or 2030. No medium-term development plans were included since they are of an even more technical nature and also build upon the foundation of the documents included in this analysis. All documents were obtained from government websites in April 2019.

### Limitations

If the study relies heavily or solely on documents, like this one does, it is generally better to have access to a wide array of documents providing a strong set of evidence (Bowen, 2009). To build a stronger foundation for my analysis and avoid biases caused by one-sided policy documents, I have chosen to include both the most specific policy documents to be found of the development of the water sector (the water sector development plans) and documents providing arguments and nuanced descriptions of the policy directions chosen (the water sector development strategies)

The main upside of building a research project that relies on these kinds of policy documents is that the method is efficient and far less time consuming than other methods like conducting interviews or building a statistical study. Policy documents are also ‘unobtrusive’ and ‘non-reactive’, i.e. they are unaffected by the research process (Bowen, 2009) which means both that they are stable and exact research subjects and that the research project benefits from not having to deal with many of the ethical problems with intervention connected to face-to-face research, especially in the context of development studies. For one, using documents as a primary data source does not distort the effects of a researcher’s presence in the field, that can affect the behaviour of informants (Bowen, 2009).

However, relying on policy documents as a primary data source is also associated with challenges. First, documents are produced for some purpose other than research and usually do not provide sufficient detail to answer a research question on their own (Bowen, 2009). In this study, this is not a big issue since the research questions focus specifically on the implications of written-down policy proposals. However, the fact that policy documents are not standardised and I use data from two different countries

makes the situation in Tanzania and Kenya difficult to compare. The fact that both the water policy programmes comes with different timelines also makes comparison between the two countries challenging.

Documentation is sometimes not accessible, or access is made difficult. The policy documents analysed in this study were retrieved from online sources in April 2019 and may suffer from some biased selectivity, i.e. the available documents are likely to be aligned with corporate policies and procedures (Bowen, 2009) and the most revealing documents are perhaps not possible to find on government webpages. However, in this particular case, biased selectivity can also work in favour of the research project, since it can reveal the emphasis of a particular organisation and, maybe more importantly, what is not emphasised. I would argue that biased selectivity is at least partially circumvented here by incorporating documents from different government ministries published with different motives (plans and strategies). Also, the WPR approach outlined above should not be affected in any meaningful way by biased selectivity. On the contrary, this bias might in fact amplify what the ‘problem’ is represented to be in the policy proposals on urban water development.

A third criticism is that documents can hide disagreements, conflicts of interests or the influences of different actors in the process of making the documents (Schmelzer, 2016, 19). Here, also relying on documents from other organizations and actors involved in the process of policy formulation (such as national archives, newspapers, or NGOs) can help to expose possible conflicts in the process of making the documents. In the case of national water policies, the use of media accounts as a supplement in addition to policy documents is also justified by the fact that media also plays a part in shaping the views of informal institutions (Bob-Milliar & Obeng-Odoom, 2011). However, as mentioned earlier, media accounts of the policy making process are excluded from the study due to a lack of coverage and difficulties in obtaining both online and printed media accounts.

## Results

The analysis is based on four main representations of problems related to urban water supply and urban informality. These representations were identified and selected based on their relevance to the informal water sector as well as on how frequently they were mentioned in the data. The most dominating represented problem in the policy documents was that low access to safe water is a problem of lacking investment in infrastructure in urban areas. This representation contradicts some of the other representations of problems identified, for example the problem of low-income urban areas not using appropriate water supply technologies.

The analysis shows an inconsistency in how both Tanzanian and Kenyan water policy approaches the informal water sector in urban and rural contexts. While the role of the urban informal water sector is largely neglected in favour of a heavy reliance on large-scale infrastructure projects, the rural informal practices are supported through community-based water management policies affecting tens of millions of people. This inconsistency suggests that policy makers apply different standards to urban and rural informality, with the consequence of urban unserved populations being left with the only option of waiting for the successful expansion of the formal piped network.

The high reliance on heavy investment in infrastructure to solve water shortages in urban settings is far from reassuring for the millions of people that so far have been failed by the promise of the urban infrastructural ideal (Kooy, 2014). On the other hand, the policies on rural water supply does show an increased awareness of the weaknesses of the piped network as a one-size-fits-all solution. This at least opens up the possibility for policy makers to apply the rural approach to unserved urban communities, i.e. support community-based informal practices.

To answer the main research question, how the problem of urban water supply is constructed in Kenyan and Tanzanian water policy, the results show that the problem is mainly constructed as a lack of investment in infrastructure and poorly maintained water systems. There are however some nuances and variations in how the problem is represented, with some attention given to the problems of uninvolved stakeholders, a

lacking knowledge of appropriate water supply technologies in low-income areas and informality being represented as problematic.

To answer the second research question, how Tanzanian and Kenyan water policies approach the informal water sector, the results show a high-reliance on investment in formal large-scale infrastructure projects, which implies a neglect of the informal water sector. On the other hand, the analysed documents do address informality mainly from a technical standpoint in expressing the will to explore “alternative” technologies in urban areas and community-based water management in rural areas. In other words, the results show a high reliance on updating and expanding the piped water network as the one-size-fits-all model of urban water development in Kenya and Tanzania, while still leaving the door open for acknowledgement and support to the informal water sector, especially in low-income urban areas and rural areas.

The following sections provide further detail into the process of selecting policy proposals and analysing the represented problems found in the data.

### Analysed policy proposals

Four major policy themes relating urban water supply and informality were selected for the analysis (Table 5). The identification of the general policy themes was done by reading through the introductions, summaries, stated policy goals and strategic policy measures included in all analysed documents, combined with a review of the table of contents and a search for keywords like informal, informality, unregistered, vendors, technology etc. The analysed policy proposals were selected using the following criteria: if they specifically addressed urban informal water systems, if they addressed informality in rural settings and if the policies were mentioned frequently as the main policy proposals for increasing urban water access.

The policy proposals selected for the analysis are: (1) Investment in large-scale infrastructure projects, (2) Identifying and promoting alternative water supply technologies (3) Supporting community-based water management in rural areas, and (4) Formalisation of informal water providers.

*Table 5 Selected policy proposal and policy document*

<b>Policy proposal</b>	<b>Policy document</b>
1) Investment in large-scale infrastructure projects to develop, refurbish and expand urban water supply systems.	Water sector development plan of Tanzania (WSDP), Water sector development plan of Kenya (NWMP) Water sector development strategy of Tanzania (NWSDS), Water sector development strategy of Kenya (NWSS)
2) Identifying and promoting alternative water supply technologies.  The proposal is specifically aimed urban low-income groups and cost-effective technologies. The proposal also includes involve consumers and communities in the planning and selection process.	Water sector development strategy of Tanzania (NWSDS), Water sector development strategy of Kenya (NWSS)
3) Establishment and support of community-based water supply management models in rural areas.	Water sector development plan of Tanzania (WSDP), Water sector development plan of Kenya (NWMP)
4) Formalisation of informal water providers.  This is primarily done by tying them to formal Water Service providers to guarantee water quality control and use of approved tariffs.	Water sector development strategy of Kenya (NWSS)

The process of identifying policy proposals quickly revealed a heavy focus on investments in infrastructure projects as the main policy proposal addressing water access in urban areas. The need for new infrastructure, or lack of sufficient infrastructure, was mentioned in all analysed documents (Table 5). In the water development strategies, insufficient infrastructure was mentioned as one of the main challenges associated with urban water supply in either the background or introduction sections of the documents. Investment in infrastructure was even more frequently mentioned as the main solution to urban water access in the water sector development plans. The Kenyan water sector development plan NWMP proposed a “large-scale

urban water supply system development to cope with rapid growth of the urban population” for all of the urban centres (NWMP, 2013, EX-32, EX-49, EX-68, EX-87, EX-105) while Tanzania’s water development plan WSDP listed inadequate investment in infrastructure as the main challenge for the development of the water sector (WSDP, 2006, 1-4) and the rehabilitation, expansion and construction of new water infrastructure as the first prioritized areas of intervention (WSDP, 2006, 4-10). The proposal clearly fulfils the criteria of being frequently mentioned and represented as the main policy, and was therefore selected as the first proposal to be analysed.

Informality in the urban water sector was only addressed in detail in the water sector development strategies of Kenya and Tanzania, and relatively briefly in sections ranging from about six to ten pages (NWSS, 2007, 10–12, 16–18; NWSDS, 2008, 50–56). That said, these sections were detailed enough to be included as policy proposals (Table 5, proposals 2 and 4) in the analysis, fulfilling the criteria of explicitly addressing the urban informal water sector.

All documents did however address the rural informal water sector in greater detail, in calling for down-up community-managed solutions with a flexible mix of water system technologies. The more specific water sector development plans of both Kenya and Tanzania even incorporate the rural informal water sector as a key policy component. The Kenyan development plan NWMP (2013) proposes the policy of small-scale rural waters supply systems for all of Kenya’s rural population that is not covered by a piped water network, estimated at approximately 17 million people in 2030 (NWMP, 2013). The Tanzanian development plan (WSDP, 2006) proposes that all rural water supply and sanitation services should be managed on a community-level, covering 50 million people by 2025 (WSDP, 2006, 1-10). The frequent mentions and reliance on community-based solutions in rural areas, in combination with its relevance for informality in that the policy includes a support of informal practices and actors, is the reason why support of community-based water management in rural areas was selected as the third policy proposal to be analysed (Table 5).

## What's the problem represented to be?

By following the WPR approach and working backwards from the policy proposals to identify the implicit representations of the problem the policies are intended to solve, four general problematisations, or representations of the water problem in urban and informal settings, were identified (Table 6).

The representations of problems identified in the data are: (1) Low access to safe water in urban areas is a technical problem of lacking investment in infrastructure, (2) Rural and poor areas are not using the appropriate water supply technologies, (3) Communities are not committed to sustaining their water supply systems and (4) Informality is in itself a problem of the water sector. Note that policy proposals 2 and 3 share two different representations of problems (Table 6).

Table 6 Representation of the problem (WPR), policy proposals and policy documents

<b>Representation of the water problem (what's the problem represented to be?)</b>	<b>Policy proposal</b>	<b>Policy document</b>
1) Low access to safe water in urban areas is a technical problem of lacking investment in infrastructure and poorly maintained water supply systems.	1) Investment in large-scale infrastructure projects to develop, refurbish and expand urban water supply systems.	NWSDS (Tanzania), WSDP (Tanzania), NWMP (Kenya), NWSS (Kenya)
2) The appropriate water supply technologies are not identified, leading to a high reliance on advanced capital-intensive solutions in areas where it's not cost-effective.  Large-scale waters supply systems are not suitable for small rural communities, where a mix of different water supply technologies are required.	2) Establishment and support of community-based water supply management models in rural areas.  3) Identifying and promoting alternative water supply technologies by involving low-income urban communities.	NWSDS (Tanzania), WSDP (Tanzania), NWMP (Kenya), NWSS (Kenya)
3) Communities are not committing to sustaining their water facilities if they are not involved in the selection, operation and maintenance process.	2) Establishment and support of community-based water supply management models in rural areas.  3) Identifying and promoting alternative water supply technologies by involving low-income urban communities.	NWSDS (Tanzania), WSDP (Tanzania), NWMP (Kenya), NWSS (Kenya)
4) The informal water sector is operating in an unprofessional manner outside basic standards and regulations leading to a lack of water quality control with implied health risks and loss of revenue.	4) Formalisation of informal water providers.  This is primarily done by tying them to formal Water Service providers to guarantee water quality control and use of approved tariffs.	NWSS (Kenya)

The problem representations implicit in the policy proposals show several interesting contradictions. In the policy documents, both Kenya and Tanzania introduce proposals with contradicting representations of the problem, representations of informality and proposals on how to “fix” the problem.

First, Kenya's water sector development strategy (NWSS, 2007) expresses hostility against informality in general (Table 6), which in the policy proposal is defined as water providers operating outside state control or regulation, calling for informal actors to be "formalised" by signing a contract with the formal service providers. This narrow conception of informality and how to "formalise" informal actors has not been successful in the past (Steiler, 2018) and is, on the contrary, a way in which the state itself produces informality (Roy, 2011). On the other hand, both Kenya's and Tanzania's water development strategies (NWSDS, 2008; NWSS, 2007) express a will to explore "appropriate water supply technologies" for low-income areas, arguing that capital-intensive solutions don't always work for increasing access in low income areas. This second problematisation (Table 6) relating to urban informality in the water sector is contradicting the proposal to formalise the informal sector (Table 6, policy 4), by implying a criticism against the "urban infrastructural ideal" (Kooy, 2014) and a need to include low-income urban communities in the planning and development of their water supply systems.

Another interesting conflict in the represented problem of water access is the one between rural and urban areas. While the problem of lacking access to water in urban areas is generally seen as a technical infrastructure problem that can be solved with aggressive investment in modern solutions, the problem of poor access to water in rural areas is represented as the same modern solutions not being appropriate in rural settings. These differing representations expose a view of rural areas as traditional and backwards, in need of more flexible and local solutions while the centralised piped water network is seen as a fitting solution for all urban, modern, areas.

The representations of the problem as the appropriate technologies not being identified and the lack of infrastructure are also in conflict with one another. While the water sector development strategies of both Kenya and Tanzania (NWSS, 2007; NWSDS, 2008) suggest that alternative cost-effective technologies need to be identified and promoted, especially in unserved low-income urban areas the more technically oriented water sector development plans (WSDP, 2006; NWMP, 2013) put forward large-scale infrastructure problems as the main solution for urban water supply,

representing the problem, not as a lack of alternative solutions, but as a lack of investment in piped water systems.

The following sections elaborate on the represented problems behind the policy proposals identified in the data by applying questions 2, 4 and 5 in the WPR approach (Bacchi, 2009) to each represented problem. Some further attention is also given to the internal contradictions between the representations, mentioned above.

### The problem of lacking infrastructure

Of all the policies put forward to increase water access in urban areas in Kenya and Tanzania, the proposal to increase investment in large-scale infrastructure projects to refurbish and expand the existing infrastructure as well as plan and develop new infrastructure is dominating in all analysed documents. For example, Kenya's water development plan (NWMP, 2013) that divides the country into six catchment areas, puts forward heavy investment in infrastructure as the main policy to increase urban water access for five of these six catchment areas:

*It is therefore required to implement a large-scale urban water supply system development to cope with rapid growth of the urban population and achieve the target coverage ratio of 100%. (NWMP, 2013, EX-32, EX-49, EX-68, EX-87, EX-105)*

Tanzania's water sector development plan (WSDP, 2006) offers a similar prioritisation of policy interventions. The plan lists 10 priority areas, nine of which directly involve increased investment in infrastructure and represent lacking infrastructure as the problem:

*In order to achieve the Water Sector Development Programme objectives, resource allocation and expenditure during programme implementation will focus on the following priority areas:*

- (i) rehabilitation of malfunctioning water supply systems including pumping facilities, treatments plants, distribution mains and networks in both rural and urban areas;*
- (ii) expansions of existing water supply systems in both rural and urban areas;*
- (iii) construction of new water supplies schemes to bring services to areas not covered by existing water supply systems in both rural and urban areas including periurban areas;*
- (iv) development, extension and upgrading of urban sewerage facilities;*
- (v) rehabilitation and expansion of hydrological, hydro geological and hydro meteorological networks;*
- (vi) exploration of underground water in the thrust of finding new water sources, especially in dry areas to ease drilling of boreholes;*
- (vii) catchment restoration and conservation of water sources from pollution and close monitoring of water quality;*
- (viii) promotion and construction of rainwater harvesting incorporating small, medium and strategic large-scale dams and reservoirs;*
- (ix) promotion of improved latrine facilities in rural areas as well as awareness creation on hygiene; and*
- (x) capacity building, training and strengthening of BWOs, LGAs, UWSAs, executive agencies, and at national level to carry out their mandated responsibilities. (WSDP, 2006, 4-10)*

The problem represented within these policy proposals is that there is a lack of functioning water service infrastructure in urban areas. In other words, low access to safe water in urban areas is represented as a technical problem of lacking investment in infrastructure and poorly maintained water supply systems. This representation is implicit in the policy proposal of more and better infrastructure, but the lack of adequate infrastructure is also explicitly stated as one of the main challenges for urban water supply in both Kenya's water sector development strategy (NWSS, 2007) and Tanzania's water sector development plan (WSDP, 2006), even though other reasons for poor water access also are given:

*Sustainable access to safe water and basic sanitation is still declining in terms of quality and quantity. The main reasons are old infrastructure, inadequate management and maintenance of existing infrastructure, insufficient sustainability, investments not enough concentrating on the options of fast tracking access and informal service provision operating outside a framework of basic standards and regulation. (NWSS, 2007, 2)*

*Water insecurity is compounded by (a) inadequate investments in constructed water storage and other water resources infrastructure to buffer against the impact of droughts and floods (climate variability) and inadequate investments in water quality management and pollution control; (b) investments in costly but unreliable infrastructure, and (c) inadequate investments in water resources management systems, institutions, and regulations... (WSDP, 2006, 1-4)*

The representation of the main problem with urban water access being insufficient infrastructure has big implications. Both Kenya, Tanzania and the UNs sustainable development goals have stated the objective to provide safe water for all by 2030, or in the case of Tanzania, by 2025. For Tanzania, this means that between 2006 and 2025, 13,6 million urban dwellers will have received improved services (WSDP, 2006, 1–11). In Kenya, the urban water supply will have to cover an urban population of 44,3 million in 2030 (NWMP, 2013, MA-49).

However, these enormous development plans, and the representation that a lacking infrastructure is the problem, is built upon the assumption that heavy investment in infrastructure will in fact increase safe access to water (question two in the WPR approach, Bacchi, 2009). This assumption is contested by earlier research on the water sector in SSA, showing how the piped water network has struggled to achieve financial sustainability, both under public and private service providers (Kjellén, 2006; Kooy, 2014; Liddle *et al.*, 2016; Allen *et al.* 2017; Adams & Smiley, 2018). One example is the piped network in Dar es Salaam, that in spite of increasing capacity, has failed to keep pace with urbanisation (Smiley, 2018).

According to Kjellén (2006), the reasons why investment in the piped water network has failed to increase access to safe water is its lack of financial sustainability due to leaks, unregistered customers and poor management. These issues are also addressed in both Kenyan and Tanzanian water policy. In addition to water supply and resource development, Kenya's water sector development plan (NWMP, 2013) also includes management plans and a plan for institutional strengthening (NWMP, 2013, EX-13) which includes capacity strengthening at the community level. Tanzania's water sector development plan (WSDP, 2006) comes with a similar water resource management component (WSDP, 2006, 4-10) as well as with a plan to commercialise all urban water supply agencies by making them financially autonomous and responsible for investments and meeting their own operations and maintenance costs. This is argued to strengthen their incentives to be financially sustainable.

*Ultimately all authorities will need to become commercial organisations with increasing responsibility for meeting their own operation and maintenance costs and capital investments. This will require raising tariffs while getting a better understanding of the willingness and ability to pay and assisting the poor through differential charging, introducing modern billing systems, full ownership of assets, better management of customer debt, and capital investment through grants and loans. (WSDP, 2006, 1-11)*

In addition to institutional capacity strengthening and commercialization, the analysed water policies also propose different tactics to minimize non-revenue water (NRW), that in Kenya is estimated at a ratio 45 per cent of all produced water (NWMP, 2013, EX-15). Especially the Kenyan water sector development plan stresses the need to install water meters for all households and old pipes in urban areas to minimize the NRW-ratio to 20 per cent in all catchment areas (NWMP, 2013, EX-32, EX-49, EX-69, EX-88, EX-106, EX-123). While the assumption that simply investing in, updating and expanding urban water infrastructure will increase access historically has not proved true in SSA, the water policies of Kenya and Tanzania do address capacity building and careful planning as a component of the infrastructure development plans. From this limited set of data, it is however impossible to assess whether the

infrastructure proposals analysed differ from previous attempts to solve the water problem by heavy investment in infrastructure.

To address the fourth question in the WPR approach, what is left unproblematic or silent in this representation of the problem (Bacchi, 2009), I would argue that the role of the informal water sector in delivering water to millions of urban residents is the biggest blind spot. The representation of the problem with urban water supply being a lack of investment in infrastructure ignores the everyday practices of obtaining water by all those not currently not connected to the centralised water system. This neglect of the informal water sector is precisely what scholars like Kooy (2014), Liddle (2016) and Smiley (2018) have argued is one of the main barriers to increasing safe water access, especially in low-income urban areas.

As to what effect this representation of the problem produces (WPR question five), the representation of the problem being underinvestment in infrastructure will certainly produce the demand for more investment in urban water infrastructure. This narrative also seems to be more powerful in the analysed water policies than ideas about exploring alternative technologies, elaborated on in the next section. While the proposal to support appropriate and cost-effective technologies, especially in low-income urban areas was put forward in the water sector development strategies (NWSS, 2007; NWSDS, 2008), the more technical and detailed long-term water development plans (WSDP, 2006; NWMP, 2013) pay little attention to alternative technologies in urban settings, and instead focus on solving the problem represented as a lack of functioning infrastructure in cities. The representation of the problem as a lack of infrastructure commits the same sin as the second identified problem (the lack of appropriate technologies in low-income areas) in assuming that informality is something that will fade away when the superior piped network is expanded, even though informality exist on all levels of society (Roy, 2011) and there have been instances when also high-income communities with the option of being connected have resorted to more trustworthy informal solutions (Kooy, 2014; Liddle *et al.*, 2016). The pursuit of the urban infrastructural ideal (Kooy, 2014) stands in direct conflict with the proposals to explore “alternative” urban water technologies in the water sector development strategies and is clearly the dominating narrative in both Kenyan and

Tanzanian water policy together with institutional strengthening and community-based rural water management.

### The problem of finding the right technology

The representation of the problem as a problem of finding the right technology was found in all analysed policy documents. In the policy proposals identified for the purpose of this study (Table 5), the representation of a lack of appropriate technologies as a problem was implicit in both proposal 2 (to promote alternative cost-effective technologies where the piped network has failed) and 3 (to establish community-based water systems in rural areas with technologies best suited for the community's needs).

Policy proposal 2, was identified in Tanzania's and Kenya's water sector development strategies (NWSS, 2007; NWSDS, 2008). While the represented problem of lacking infrastructure, analysed above, works as a justification for pursuing further investment in large-scale infrastructure projects as the go-to solution for increasing access to safe water in urban areas, the implied problem with finding the right technology, is much more nuanced with a built-in critique against relying solely on the expansion of the piped water network. Especially, the Tanzanian development strategy articulates this critique in several sections:

*There has been a historical failure to provide water supply and sanitation services to low income groups and people living in peri-urban areas, thereby denying them social equity considerations, and the right to water for life and survival. (NWSDS, 2008, 51)*

*Furthermore, the cost-benefits of alternative technologies to increase coverage have not been given due consideration. Peri-urban and rural areas have been neglected in favour of larger urban centres. (NWSDS, 2008, 56)*

Here, the criticism of the urban infrastructural ideal (Kooy, 2014) is quite explicit. The problem represented in the quotes above and in the proposal to promote alternative cost-effective technologies, is that the appropriate water supply technologies are not

identified. This in turn has led to a high reliance on advanced capital-intensive solutions in areas where it's not cost-effective. The proposal also includes identifying the low-income groups in need of alternative technologies:

*Low-income groups will be identified and provided with appropriate water supply and sanitation services. However, these groups will be expected to contribute to the cost of the provision of these services in line with their ability to pay. (NWSDS, 2008, 51)*

Here, the Tanzanian water sector development strategy's proposal that low-income groups are "expected to pay" for their water implies that the problem of finding the right technology is in fact a problem of achieving financial sustainability in low-income areas. In other words, the problem is represented as a lack of cost-effective technologies where the cost of investment, maintenance and operations does not exceed the revenue from users. This connection between financial sustainability and technology is also implicit in Kenya's water sector development strategy (NWSS, 2007) that blames both donor funds and the formal water service providers for the lack of suitable technologies in places where the piped network is not financially sustainable:

*Donor funds concentrate more on improving services to already connected consumers by upgrading existing systems, and not enough on providing services to the urban poor through low cost technologies, which could offer fast tracking of access in the urban setting. Low cost technology already in place does not respond to minimum requirements and is therefore often not sustainable. In addition, formal WSP do not yet have enough knowledge to install and operate sustainable commercial viable low-cost systems such as kiosks. (NWSS, 2007, 17)*

Here, the water sector development strategy of Kenya acknowledges that there are low cost technologies in place, but that these technologies do not respond to minimum requirements, supposedly requirements of quality, price and formality. The quote also stresses the need for formal water service providers to learn how to operate

commercially viable low-cost systems, emphasizing the representation of the problem as a lack of cost-effective technologies.

The underlying assumptions in this representation of the problem (question two in the WPR approach), is that supporting alternative technologies in areas neglected in favour of urban centres where the piped network actually works, would increase both access to safe water and revenue. This assumption is in line with evidence from studies on the delegated management model that, despite some challenges, has managed to increase both economic opportunities, involvement and access to safe water in low-income urban areas (Schwartz & Sanga, 2010; Butcher, 2016).

What is left unproblematic or silent in the representation of the problem (question four in the WPR approach) is the definition of safe access to water. While the representation of the problem here goes much further than in the first proposal to formalise the informal water providers, it still relies on defining access to safe water in relation to the piped network, hence the term “alternative” technologies. Kenya’s water sector development strategy (NWSS, 2007) interestingly, limits the scope of “alternatives” to not include ground water sources, which in practice means that the water used has to come from the formal utility, and that “alternative technologies” refers to supply technologies like tanker trucks or water kiosks:

*Protection of water sources on the surface does not solve the problem of contaminated ground water and therefore the use of such inappropriate water sources by informal providers shall be discouraged. (NWSS, 2007, 17)*

In other words, what is left unproblematic is the assumed superiority of the urban infrastructural ideal. The represented problem implies another, deeper, problem, i.e. the inability for low-income communities to sustain the advanced, scalable and (normally) cost-effective large-scale water supply system. An alternative representation of the problem could be that not enough support is given to existing community-based water supply solutions. This would open up more concrete policy proposals like supporting and developing the informal water sector, instead of just “identifying cost-effective alternative technologies” in relation to the piped network,

which leads us to question number five in the WPR approach (What effects are produced by this representation of the problem?) (Bacchi, 2009).

Representing the problem as a lack of identified, alternative cost-effective water supply technologies results in a proposal to explore alternative technologies. This is a step in the right direction, from the perspective of the case-studies recommending state support to the informal water sector mentioned above (see Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018). However, the problem represented in this policy still regards the urban infrastructural ideal as the most attractive model, regarding everything else as “alternatives” or exceptions to the rule. This can potentially prove challenging in higher income communities that are covered by the piped water network but still prefer relying on the possibly more trusted informal, ground water based, systems (Kooy, 2014; Liddle *et al.*, 2016).

#### Rural and urban informality

Interestingly, in policies concerning rural water supply, the effects of the represented problem changes and result in completely different policy proposals. When looking at the more specific and technical policies laid out in Kenya’s and Tanzania’s water sector development plans (WSDP, 2006; NWMP, 2013), the proposal to identify and promote cost-effective alternative solutions in unserved low-income urban areas is dismissed. However, the represented problem of finding the right technology still persists in the policy proposal to establish and support community-based water supply systems in rural areas. In Kenyan and Tanzanian rural water policy, local solutions are no longer presented as “alternative technologies”, but as the foundation of the rural water supply. Kenya’s water development plan (NWMP, 2013) proposes the policy of small-scale rural waters supply systems for approximately 17 million rural Kenyans in 2030. The policy in Tanzania goes even further, proposing that all rural water supply and sanitation services should be managed on a community-level, covering 50 million people by 2025 (WSDP, 2006, 1-10), with a technology mix that resembles today’s water practice:

*Conditions in Tanzania's districts vary widely, from semi-desert to rain forest. The technologies used for acquiring water supply are correspondingly varied. (...) The technology mix includes hand-dug wells equipped with hand pumps, boreholes and hand pumps, gravity-fed piped systems, electric- or diesel-driven pumped and piped systems, charco dams, protected springs, and windmills. The proportion of each of these technologies in use depends on the climate, topography and the type of water source. (WSDP, 4-26–27)*

The different approaches to using a wide mix of water supply technologies in urban and rural areas, suggests that policy makers apply different standards to the rural and urban population when it comes to water supply. When anything else than the piped water network is described as “alternative” technologies in urban settings, these systems are the norm in rural water policy, or even described as traditional as in Kenya's water sector development strategy:

*Domestic water sources in the rural setting include small-scale piped systems, water points with hand pumps (wells, boreholes) and traditional sources such as streams, dams, shallow wells and springs. These traditional sources are very susceptible to pollution because they are open or not protected. (...) In addition, communities are often not sufficiently trained in running the installations, including management aspects, such as bookkeeping and also register a high turnover of committee members. Water quality at the source is generally not monitored, thus subjecting the users to water of unknown quality. There is not enough awareness and appreciation of the importance of good hygiene in most rural areas. (NWSS, 2007, 19)*

This representation of rural water management as problematic because of “traditional” sources and unprofessional managers helps explain the different approaches to rural and urban water policy, where rural communities are described as traditional and unfit for modern technological solutions and urban communities are left with the policy proposal of “identifying alternative technologies” in anticipation of the expansion of the piped water network. Interestingly, framing rural communities as traditional, can

actually work in their benefit, since both Kenyan and Tanzanian water policy supports local, flexible water provision arrangements that, in light of earlier research, for example on the community-based delegated management model (Schwartz & Sanga, 2010; Butcher, 2016), should have a higher chance of succeeding in providing the community with safe water. This brings us to the third problem, that is also implicit in the policy proposals to explore community-based water management: the problem of uninvolved and uncommitted water users.

### The problem of uninvolved water users

The problem of appropriate technologies analysed above was identified in two different policy proposals, to identify appropriate technologies in low-income urban areas and to support community-based solutions in rural areas (see Table 5). Implicit in these two policy proposals is also the representation of uninvolved communities as the problem. In other words, the problem is represented to be that communities are not committing to sustaining their water facilities if they are not involved in the selection of technology as well as the operation and maintenance processes. This representation of the problem is not only implicit, but frequently and explicitly articulated in all the analysed documents, especially in sections that justify the reliance on community-based water management systems in rural areas. One of the clearest examples is found in Tanzania's water sector development plan:

*For a long time, the government has been the owner and operator of rural water supply systems. This has led to a lack of commitment by communities to sustain their facilities. It has also led to overlap of roles and inadequate coordination. The existing water supply systems are unable to meet water demands. This has led to the prevalence of water borne diseases and loss of productive time that is used to search for, collect and transport water. (...) The process of bottom up planning needs strengthening. (WSDP, 2006, 1-4)*

The bottom-up planning is suggested in the water sector development plan to concern up to 50 million Tanzanians in 2050, since the water management model laid out in the WSDP rest on a community-based management model for the country's whole

rural population. The model proposes that Community-Owned Water Supply Organisations (COWSOs) responsible for the planning, management operation and maintenance of the water services are established in villages. The model is described as quite flexible and the COWSOs can take many different legal forms, like Water Users Associations (WUA) or community-owned companies, depending on the technical option chosen and the number of communities served (for example if it is a single borehole or a local piped system serving more than one villages). Kenya's water sector development plan (NWMP, 2013) also sets out water resource management as one of the water policy's core pillars. With stakeholder involvement as the first specific policy objective:

*All water resources are managed, regulated and conserved in an effective and efficient manner by involving the stakeholders, guaranteeing sustained access to water and equitable allocation of water while ensuring environmental sustainability. (NWMP, 2013, EX-13)*

In both Kenya's and Tanzania's policies, the assumptions underpinning the representation of lacking community involvement in water system management as a problem is that increased involvement would strengthen the commitments to sustain the communities' water facilities, resulting in better run and autonomous operations. This assumption also has some support in evidence from studies on community-based water management models in East Africa. Water management models based on co-production between the state and communities has not only strengthened communities' participation in the formulation of water policy, but also paved the way for economic opportunities for women in establishing water-related businesses within the community (Butcher, 2016; Adams & Smiley, 2018). However, community-based water management can easily be undermined if the state uses the arrangement just to withdraw from its responsibility of water supply to the community or to take control over the informal sector rather than to strengthen the capacity of the community (Ahlers *et al.*, 2013). Community-based arrangements often suffer from too little state involvement and support, leaving communities on their own after the initial investment in small-scale infrastructure (Dill, 2010; Allen, 2017; Adams *et al.*, 2018). Studies on the delegated management model has shown that it still needs increased commitment of the state to support the capacity of communities managing their own water systems

to make the model sustainable (Schwartz & Sanga, 2010; Butcher, 2016). The assumption underpinning the represented problem in this case, that increased involvement leads to stronger commitment to upholding water services, seem to be right. But if the policy truly seeks out to build a sustainable community-based water supply model, it cannot be taken further to assume that communities can manage water services by themselves, completely without state support.

Regarding the fifth question in the WPR approach (what effects are produced by this representation of the problem?), the repercussions of representing a lack of community involvement and participation are potentially enormous in both Kenya and Tanzania, but especially in Tanzania where the whole rural water supply system is envisioned to rest on a community-based management model. It is easy to imagine a wide range of positive outcomes from involving communities in planning, development and management of water systems, but there is always the risk of communities being left on their own without sufficient state support, in which case the ambitious bottom-up approach mainly works as a justification for the state to neglect difficult communities where the formal utility cannot sustain a cost-effective water system. On a more theoretical level though, the effects produced by representing a lack of community involvement as the problem are that water policies are approached from the water users point of view, which is totally in line with the call for states to acknowledge and support the informal water sector in pursuit of providing safe water for all (Ahlers *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018).

### The problem of informality

The National Water Services Strategy (NWSS, 2007) of Kenya is the analysed document that most explicitly addresses the informal water sector. The 38 pages long document mentions informal service providers as a problem several times, including in the introduction (NWSS, 2007, 2) and in a sub-section dedicated to water supply in poor urban areas (NWSS, 2007, 16–18). The main policy targets and responses relating to the informal water sector is to “formalise” it, by linking informal providers to the formal WSPs (Water Service Providers) and forcing informal providers to comply with regulation. The represented problem in this policy proposal is that the informal water sector is a problem precisely *because* of its informal nature, which in turn is argued to

lead to a lack of water quality control. This representation of the problem is explicitly articulated in the description of challenges relating to water supply in the settlements of the urban poor (NWSS, 2007, 16):

*Recent studies carried out in the settlements of the urban poor indicate that about 80% of the poor in Kenya do not have sustainable access to affordable safe drinking water. The reason is that service provision to the poor is mostly left to the informal service providers not operating under regulation and according to standards. In addition, the ground water sources in urban settlements are highly contaminated and protected wells and boreholes in these areas can no longer be regarded as safe and used for service provision. (NWSS, 2007, 17)*

Here, the Kenyan water sector development strategy, explicitly connects low access to safe water among low-income groups to the lack of regulations and standards in the informal water sector.

To address the second question in the WPR approach (What presuppositions or assumptions underpin this representation of the ‘problem’?) (Bacchi, 2009), this representation of the problem assumes that simply “formalising” informal providers will (a) make them follow rules and regulations on water quality and (b) increase access to water in low-income areas. The first assumption, that formalisation and regulation will lead to a higher quality of services, is debatable, since this tactic to formalise has failed in earlier attempts, for example in Maputo, Mozambique, when it was used only to gain more state control over the informal water sector, without any clear benefit for the water users (Ahlers *et al.*, 2013).

The second assumption about increased access as a consequence of formalisation is even more far-fetched. The assumption that having informal providers “going formal” by complying with regulation and oversight will increase water access is paradoxical since the reason that informality has prevailed in low-income areas in the first place, to a large extent, is the failure of the formal water supply system to provide these areas with safe water (see for example Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018). To connect increased access with formality is misleading, but from policy makers’ point of view it has the benefit providing a justification for the

favoured solution to increasing access, i.e. heavy investment in the piped network system (Table 5, policy 4). This justification is also strengthened by the representation of ground water sources in urban settlements as unsafe, on which I elaborate more in the following section.

Connecting the lack of safe water access in low-income areas to informality also shifts the responsibility, or even the blame, for the failure of water service provision to the informal sector and away from the formal water provider. The question of responsibility for a lack of access to safe water is the main issue that is left silent or unproblematic in the representation of the problem of informality. A different way to think about the “problem” of informality could be to leave out the question of access to water and instead focus on the lack of water quality control and, perhaps, coordination of water services. This would likely lead, not to a total dismissal of informality and a justification for the urban infrastructural ideal (Kooy, 2014), but towards a more constructive approach where informal actors are supported by the state. Interestingly, this comes closer to the representation of the problem of finding the right technology, analysed above.

Finally, to address what effects are produced by the representation of informality as the problem (question five in the WPR approach), I would argue that this is a strikingly clear example of how the state itself produces informality. To make this argument, informality in the water sector needs to be understood, not only as a label for water systems in poor communities outside state control, but as practices produced by all communities, for example rich neighbourhoods relying on their own boreholes (Liddle, 2016), and even the state (Kooy, 2014). When policy makers suggest that the problem with water access in low-income areas is informality itself, they neglect the informal practices that occurs in all income-groups and on all levels of society. By doing this, the state creates zones of exceptions, where a certain kind of informality is accepted (informal systems in high-income areas) and another is problematized (informal systems in low-income areas) (Kooy, 2014). In this way, the state produces informality specifically in low income areas, (Roy, 2011) and connects it to a lack of water access and poor quality of water. One could argue that by representing informality as the problem of low water access in low-income areas, the state produces

both informality and a justification to pursue its favoured policy responses, i.e. the urban infrastructural ideal.

## Discussion

The idea that state support of the informal water sector is needed to provide safe water for all urban residents in sub-Saharan Africa was the starting argument of this thesis. Previous research has shown little or no evidence of this kind of support, although there have been some positive outcomes of community-public partnerships in SSA (Schwartz & Sanga, 2010; Butcher, 2016). By analysing water policies in Kenya and Tanzania I wanted to find out how these states approach informality, and if there are signs of incorporating informal community and household practices in the formal development plans or if the situation is as grim as portrayed in some of the case studies cited in the introduction, that the state totally neglects informal service providers.

So, what's the takeaway from my results? First and foremost, they are in line with previous research (for example by Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018) in identifying a heavy reliance on the one-size-fits-all model of the urban infrastructural ideal, to reach every urban citizen by a piped water connection, in both Kenya and Tanzania. However, there are signs of careful acknowledgement of informal practices.

The WPR approach to analysing policy proved useful in looking beyond the policy proposals, and asking what the implicit problem with water supply in urban areas is represented to be. This approach yielded a more optimistic result than just looking at the policy proposals would have done, by showing how policy makers in both Kenya and Tanzania do see the “right” problems to truly acknowledge and support the informal water sector, like acknowledging the need for alternative solutions and stakeholder involvement. However, the go-to recipe of large-scale infrastructure as solution for pretty much every urban water supply problem is still the dominating solution.

Interestingly, the support for informal water systems is especially clear in rural settings, where a big proportion of the policy in both countries relies completely on

the establishment and support of community-based “alternative” water supply systems, but the policy strategies also stresses the need for stakeholder involvement and “appropriate” technologies in low-income urban areas. These policies, I would argue, give a more nuanced picture of the state’s approach to informality than the one that is usually portrayed in studies on the informal water sector, were the state is viewed as an indifferent actor that has completely given up on providing informal settlements with safe water. In this aspect, my analysis provides nuance to authors like Kjellén (2006), Kooy (2014) and Smiley (2016) whose studies on certain urban areas in SSA show little or no state support and involvement in improving water services. On the other hand, there are also studies showing successful community-based water management schemes (Schwartz & Sanga, 2010; Butcher, 2016), often working together with the state or NGOs to provide safe water according to the needs and means of the community.

Water urban supply is a complex topic that, depending on the policy maker’s approach, can result in a wide range of conclusions about which policy measures are most suitable and effective in increasing access to safe water. The big question for the future of informal water sector and water access in low-income urban areas seem to be how much weight and attention the state is willing to give to representations of the problem that results in support of the informal sector. If the main problem in water policy on a national, or even global, level is represented to be *access to water*, which is the case in all documents analysed in this thesis, policies will assume that some proportion of the population lacks access to water completely, which of course isn’t the case since access to water is a condition for sustained life. If the main problem, on the other hand is represented as, for example, a water management issue, the general policy might take completely different directions. In both the water sector development plans (NWMP, 2013; WSDP, 2006) water management is at the core of the policy, giving room to stakeholder involvement and community-based management, but the most clearly defined policy measures are still based on the general representation of the problem as low access to water.

Going back to the call for states to acknowledge and support the informal water sector, the biggest reassurance in my results are the state’s approach to rural water supply systems which shows a willingness to support both a mix of “alternative technologies”,

in urban settings often understood as informal practices, and a bottom-up approach to water management. These are precisely the types of policies the usual suspects of scholars cited in this thesis (Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018) have called for states to introduce also in urban and peri-urban settlements. The reassuring bit is that, even though the state apparently is not as willing to introduce these measures in urban settings where the piped network, according to the urban infrastructural ideal, should reach everyone, both Kenya and Tanzania now have these measures in their policy tool-box. If the heavy investment in urban infrastructure fails again, as previous research suggests it probably will, then the step to take the rural approach to urban settlements isolated from formal water services might not be too big.

In hindsight, looking at the water policy of only one of the two countries included could perhaps have yielded more clearer results. Focusing entirely on Tanzania would have opened the door to narrowing down the study to only include water policies in Dar es Salaam which possibly would have given more clear indications on the formal utility's attitude towards the informal water sector. Similarly, focusing only on Kenya would have allowed a narrower policy analysis on the delegated management model, applied in Kisumu (Schwartz & Sanga, 2010). During the analytical process, it also became clearer to me that international donor agencies, specifically the World Bank, have played a significant role in constructing the narrative of formalising the informal sector. An alternative approach to the same research problem laid out in this thesis would have been to focus on the discourse on informality among international donors, this approach would likely have yielded sturdier results better applicable to other situations.

## Conclusions

This thesis set out to analyse how the Kenyan and Tanzanian state approach the informal water sector in their water development plans, programmes and strategies leading up to 2025 and 2030. This approach was informed by previous research papers, mainly case studies, on the informal water sector in sub-Saharan Africa that often arrived at the same conclusion or recommendation: That the state should do more to acknowledge and support informal practices as viable alternatives to the failed project of providing safe water to all urban residents by the formally managed piped water network (Kjellén, 2006; Allen *et al.*, 2006; Chakava *et al.*, 2014; Kooy, 2014; Liddle *et al.*, 2016; Mapunda *et al.*, 2018).

Tanzania and Kenya were chosen as subject countries in this attempt because of their plans to reform their water sectors to face the challenge of urbanisation and population growth with policy goals set to the end of the coming decade, and because of the rich research on the informal water sector in each country. To approach this research problem, an applied version of Carol Bacchi's (2009) poststructuralist approach to analysing policy was used. The WPR approach (What's The Problem Represented To Be) proved useful in examining the represented problems underpinning policy proposals for the water sector in each country. By first identifying key policy proposals relating to the informal water sector, and urban water supply systems in general, and then working backwards to identify the implicit representations of the problem the policies sought out to solve, I identified four main problem-narratives that drive policy making in relation to the urban informal water sector.

A closer analysis of these narratives exposed an interesting contradiction in both the formulated problems underpinning policies and in the policies, themselves. On one hand, Kenyan and Tanzanian water policies represents the problem of urban water supply as a lack of investment in infrastructure and poorly maintained water systems, resulting in policy proposals to invest heavily in large-scale water system infrastructure. On the other hand, competing representations of the problem as a lack of stakeholder involvement and cost-effective solutions for low-income urban settlements was also identified, resulting in proposals to support communities in managing their own water supplies.

One of the most interesting findings my analysis was the different approaches to rural and urban informality present in both Kenyan and Tanzanian water policies. The development plans mainly proposed heavy investment in large-scale infrastructure as the go-to solution for improving access to safely managed water in urban areas, almost completely neglecting urban informal practices, apart from brief mentions in the water sector development strategies. Regarding rural informality, on the other hand, the policies expressed a completely different approach by acknowledging the need for communities to take control of their own water management and technologies while the state's role would be one of a supporting actor.

The national water policies of Kenya and Tanzania still do not fully acknowledge, let alone, support the urban informal water sector. The move to more down-up solutions for rural water supply systems, however, act as a reassuring sign of how the representations of the problem as the piped network not being a one-size-fits-all model has gained some ground in the national water policies. If the problematisation of the urban infrastructural ideal has led to a more flexible and case-based approach in rural settings, it is not unthinkable that the same representation of the problem will be applied to urban settings in the future, paving the ground for promoting similar community-based solutions on a larger scale in unserved urban areas that lack access to safely managed water.

This conclusion, that Kenya and Tanzania in the future have the option of looking to their rural water supply policies to solve a lack of safe urban water access, opens up for some other interesting research-projects on the informal water sector. Future research on the topic could focus on the implementation of community based water management in rural Kenya and Tanzania, the implementation of similar community based models in urban settings as well as differences between community based water management in rural and urban areas. These kinds of research attempts could give clearer answers to the possibility of applying the rural water policies analysed in this thesis in an urban context, specifically in places the piped water network does not reach.

The supportive stance towards informality in rural water systems also opens up for interesting opportunities for the Finnish development cooperation in SSA. Finnish

development aid is heavily focused on education and capacity building, which could include looking into community capacity building in the water sector by supporting and researching community based water management models in both rural and urban areas. This would potentially benefit the development of sustainable water solutions in SSA. Here, the development community could also benefit from Finland's own experience of the use of water cooperatives as a management model to bring water to remote areas, unserved by municipal water schemes, like the Finnish archipelago.

Finally, I would like to return to the question in the title of this thesis: Informal urban water systems – sustainable development or a temporary problem? The results in my study suggests that informal urban water systems are still to a large extent seen as a temporary problem that will fade away as soon as the grand vision of the urban infrastructural ideal is realized. However, both Kenyan and Tanzanian water policy has opened the door to supporting informal practices as sustainable solutions, as a way to achieve the ambitious goal of safe water for all, stated both in the countries' national development visions and in the UNs Sustainable Development Goals for 2030.

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