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## Translocal Learning for Water Justice: Peri-Urban Pathways in India, Tanzania and Bolivia

### Water Justice City Profile: Dar es Salaam, Tanzania

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Translocal Learning for Water Justice  
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For more information about WatJust and to access other outputs produced by this learning-action alliance please visit: <https://www.bartlett.ucl.ac.uk/dpu/water-justice/>

**Abstract.** *Translocal Learning for Water Justice.* (WatJust) is an action-learning alliance led by Prof. Adriana Allen at the Development Planning Unit (DPU, University College London). Launched in September 2014, WatJust

explores the transformative potential of alternative water supply arrangements—small-scale, low-cost management practices, and new configurations of water governance—undertaken for and by the peri-urban poor in three urban regions: Kolkata (India), Dar es Salaam (Tanzania) and Cochabamba (Bolivia). The documentation and analysis of these practices aims to build the foundations of an innovative, grounded and in-depth exploration of the extent to which such arrangements can enhance water justice in a context where unmet needs are growing fastest, and where conventional centralised networks are unlikely to become the norm any time soon.

Foundational to the project is the establishment of a translocal learning alliance in collaboration with the three project partnerships. This report represents one of three profiles exploring the specific and localized manifestations of water injustices and alternative arrangements, mapping these approaches as a source of dialogue, comparison, and learning.



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## City Profile

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With a population of over four million, the city of Dar es Salaam, Tanzania, is one of the fastest urbanizing in the country. Nearly 80 percent of residents live in informal settlements, with recent trends depicting expansion particularly in peri-urban areas of the city.

This rapid population growth has generated growing challenges for the equitable provision of high quality water and sanitation services for the city's local authorities, the Dar es Salaam Water and Sewerage Authority (DAWASA), Dar es Salaam Water and Sewerage Corporation (DAWASCO), and the Water Utilities Regulatory Authority (EWURA). Municipal investment has primarily focused on planned middle and high income housing areas or on the main institutional, industrial and commercial hubs, leaving most peri-urban areas behind. Subsequently, only 50% of city residents have access to the DAWASA/DAWASCO networked system. Widespread urban sprawl, unregulated densification, and overcrowding in the inner and intermediate city areas have compounded these challenges.

As a result, potable water supply practices in most peri-urban areas are primarily needs-driven rather than policy-driven, and include a range of practices from the use of (expensive and unregulated) private water vendors of varying size, community-managed or privately run boreholes, and the reliance on shallow wells. Similarly, less than 10% of residents are connected to municipal sewer networks, with wastewater in the majority of cases remaining untreated and discharged directly into the sea. As in the case of potable water, poorer residents in Dar pay greater amounts for wastewater disposal than the wealthy. Over 85% of households in informal settlements are reliant upon pit latrines.

In recognition of these challenges, DAWASCO and DAWASA have developed some key strategies to extend municipal service to low-income residents. DAWASA has established a 'Community Liaison Unit', responsible for supporting communities seeking piped water connection

in their settlements. This department has been involved in sinking a number of boreholes which are subsequently managed by community-level structures, accountable to both municipal authorities and local residents. Similarly, NGOs such as Water Aid have also focused on improving water supply and sanitation unconnected communities through the provision of boreholes. These organisations typically work closely with grassroots or community institutions, including representatives of the Tanzanian Federation of the Urban Poor, to manage the operations and maintenance of the boreholes.

These collaborations represent an important set of co-produced practices that have helped address the challenges of water and sanitation provision in these areas. From community-managed boreholes and a simplified sewerage project in the neighbourhood of Kombo, to an innovated decentralised waste treatment system in Tungi, there are a number of lessons that can be drawn from the everyday ways through which residents have mobilized and collaborated with local authorities and external agencies to access and control these critical services.

Nonetheless, the improvement of access to potable water remains costly and technically challenging for the sprawling and densely built informal settlements located far from the city's trunk infrastructure. The use of private water vendors has mushroomed in these areas, locking many residents into uncertain relations at higher prices and with water of uncertain quality. Furthermore, these various community-managed systems—whether operating as an association in collaboration with the municipality, or run through the Federation of the Urban Poor—have their own structures and rules of operation which have generated variable levels of access and control over water and sanitation services. This report begins to outline these issues in greater depth, highlighting in particular those cases which have the potential to scale-up and reach greater numbers of residents, to build towards water justice in the city. (Allen et al., forthcoming)

# 1. Water Injustice in the City

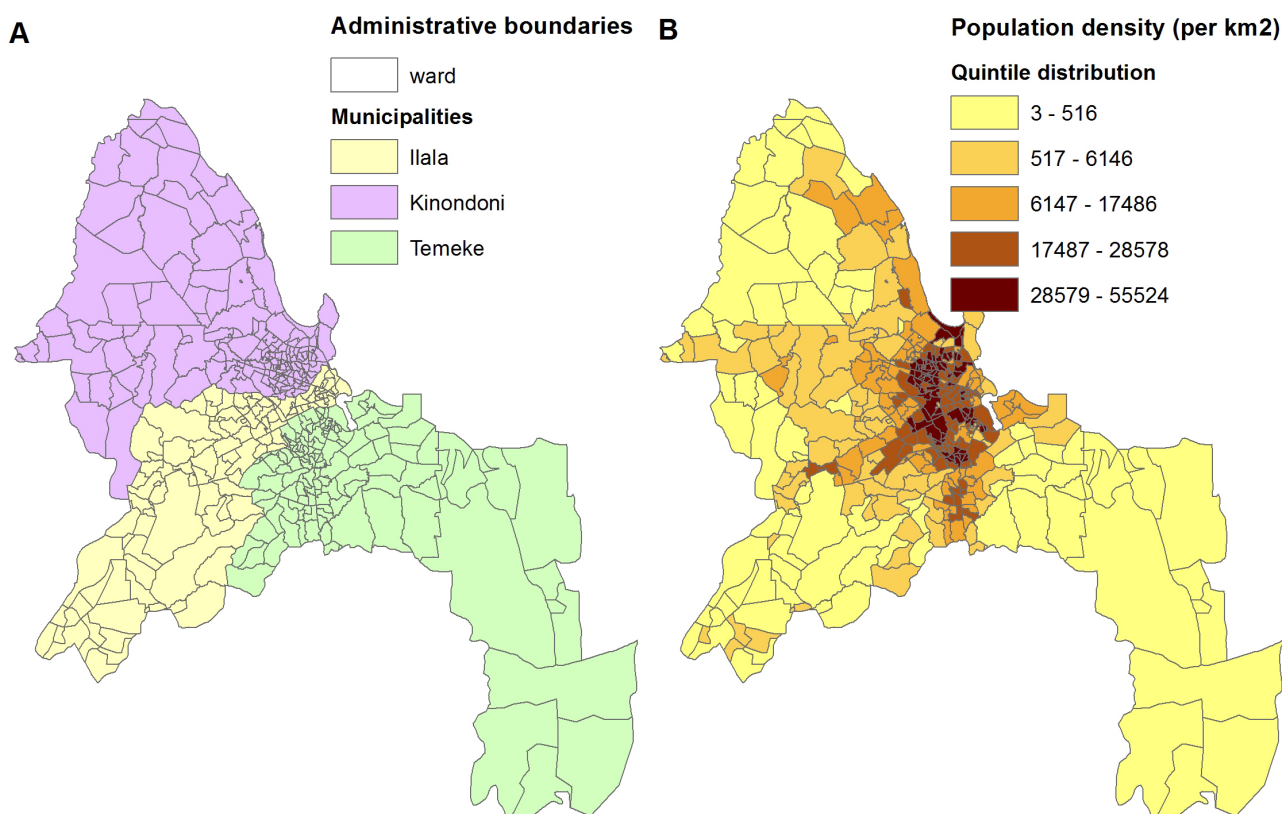
## 1.1 Introduction

In Sub-Saharan Africa the urbanization of poverty is progressing at a rate unprecedented in human history. In Tanzania, informal settlements in most urban areas are rapidly densifying, and new settlements are emerging in peri-urban areas, following the rules of liberal property markets. These areas have largely developed with little or no guidance on land use regulations or consideration for the future provision of basic public services, especially water and sanitation (Kombe and Kreibich, 2006; Kombe and Kyessi, 2007). This has generated significant problems for Dar es Salaam, include increasing informal sector activities, increasing urban poverty and inequality, and a strained capacity of the City Council and its three municipalities to effectively manage growth (Natti, 2014). Dar es Salaam City Council, like many other urban centres, is facing a severe shortage of financial resources,

skilled manpower and equipment (ibid) to effectively address these new realities.

Critically, Tanzania is facing growing challenges with the equitable provision of high quality water services. Over the past 25 years, rapid population growth and increased urban sprawl has generated new requirements for residents of the city (see Map 1). Demands for water have intensified with the increase in population and concurrent growth of economic activities requiring water as an input, including hydropower generation, large scale irrigated agriculture, industries, tourism, mining, raising livestock, domestic uses, fisheries, and wildlife and forestry activities. Further factors contributing to stress on local water resources include degradation due to pollution, over-extraction, poor land use practices, and the encroachment of land for agriculture, urbanization and industrial development (URT, 2012).

**Map 1:** Dar es Salaam administrative boundaries and population density. Source: produced by Pascale Hofmann





Compounding these challenges are the questions of urban poverty and informality. Presently, about 80 per cent of Dar es Salaam residents live in informal settlements. Recent trends depict the rapid expansion of informal settlements in peri-urban areas, particularly along the four main arterial roads (Cluva, 2013; Msangi, 2014). While low-income households settle in peri-urban areas because land is cheaper, they also face many problems associated with the lack of basic services and limited access to livelihood activities. Injustices in water provision and access appear to be growing with the rapid urbanization and peri-urbanization of poverty, and studies undertaken on household water budget expenditures reveal that disparities in household water access across the city are increasing towards informal peri-urban areas. Inhabitants in these peri-urban areas often pay more for potable water in direct and indirect terms (e.g. money and time) compared to those in other zones of the city.

Despite these realities, formal water supply systems and authorities in Dar es Salaam have not prioritized low-income peri-urban areas in their water supply and improvement plans and programmes. Instead, the focus is often on planned middle and high income housing areas (such as Regent Estate, Mbezi Beach & Mikocheni) or the main institutional, industrial and commercial hubs (Kombe and Kreibich, 2006). These factors have generated a large gap between the demand and the supply of water in the city of Dar es Salaam. It is estimated that the city's demand for water is between 350 to 400 million litres per day: 60% for domestic use, 10% for commercial purposes, 10% for industrial activities and 20% for institutional use. However, the Dar es Salaam Water and Sewerage Corporation (DAWASCO) supplies only 300 million litres of water per day. Water loss due to leakages and illegal connections has resulted in the proportion of unmet supply. Although the government has taken initiatives to increase the supply to 710 million litres per day by 2013 (Water Aid & Tearfund, 2003; Theodory, 2009) rapid unregulated urbanization, characterized by urban sprawl, has thus far hindered the poor in peri-urban areas from being served by the public piped system.

Despite the challenges related to the poor or inadequate provision of basic services, including potable water supply, peri-urban areas in most cities of Tanzania continue to grow. Furthermore, within these settlements residents have engaged in a range of practices—from the policy-driven to the needs-driven—to meet these basic requirements related to clean and safe water provision (Simone, 2004; Kombe 2015). These co-produced practices will be explored throughout the bulk of this report, highlighting in particular those practices which demonstrate the potential to generate pathways towards greater water justice in the city.

## 1.2 Water injustice and emerging urban development trends

Rapid urban population growth in Dar es Salaam has outpaced the capacities of the national and local institutions responsible for water supply to provide inhabitants with reliable potable water services (Kombe and Kyessi, 2007). Widespread informality—characterised by predominantly sprawling housing—unregulated densification, and overcrowding in the inner and intermediate city areas have compounded the problems of water injustice (see Map 2).

Improvement of access to potable water is costly and technically challenging in sprawling or densely built informal settlements. Problems are worse in situations where informal low-income settlements have developed at higher altitudes, and where the delivery of piped water requires pumping, such as in the neighbourhoods of Makongo and Salasala. Furthermore, contamination may occur in areas which are predominantly served by pit latrines and subject to salt water intrusion. There are also increasing cases of pollution due to the untreated/crude dumping of industrial and domestic waste. Despite these challenges, low priority is given to peri-urban areas. The public institutions (DAWASA/DAWASCO) responsible for extending water networks and supplying potable water in the city perceive peri-urban areas as unprofitable. Unlike other built up areas such as institutional, industrial or high/middle income housing areas, the majority of settlers in peri-urban areas cannot afford the high costs of improving potable water supply. The public water supply agencies therefore find it too costly to provide potable water to the often sparsely built peri-urban settlements.

For low-income residents of peri-urban areas in Dar es Salaam, water injustices have manifested in the following ways:

- **Unrealistically high prices, particularly for the urban poor:** In most cases the urban poor, especially those living in peri-urban areas, pay far more for water than affluent households. This is primarily because they largely depend on the unregulated informal water services providers, whilst the affluent tend to have access to the piped system, which offers the cheapest option.
- **Widespread water-stress and excessive time burdens:** Many low income households, and especially women and children, spend long periods searching for and fetching water for domestic use, generating increased time burdens.
- **Inadequate consumption:** Consumption of fresh water among most households is far below minimum

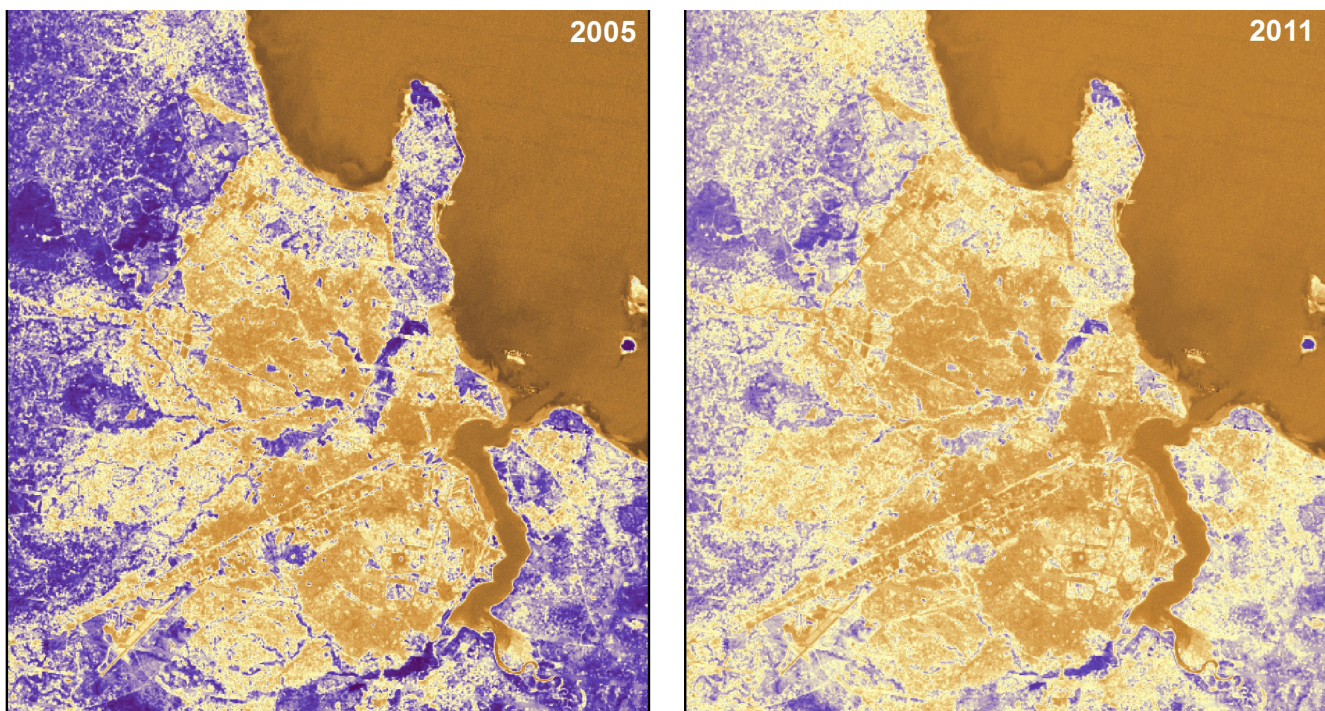
standards, and especially for domestic uses like drinking, cooking washing and cleaning. Most poor urban households use only a few litres of water per day as they either cannot afford to buy more, or do not have access to adequate water supplies.

- **Extensive mushrooming of informal and unregulated water vendors:** Water scarcity and the deficient utility supply has generated a highly commercialized market for informal private vendors. In recent years, the number of water vendors in Dar es Salaam has been increasing remarkably, including both small and bulk suppliers of water. Water scarcity in the city is a result of a combination of an inadequate supply from the main surface water sources, deficient infrastructure, and poor management— almost 50% of water pumped from the sources is lost before it reaches consumers/users.
- **Lack of piped network:** Most low income households are unable to access piped water supply network from the utility. The main supply lines are far away from most low-income settlements, particularly those in Temeke municipality. In cases where there are networks, the supply is very erratic and unpredictable (Kombe and Kyessi, 2007).

These injustices in water access have had many adverse effects in Dar es Salaam and in many other urban centres in the country, and have contributed to widening socio-spatial inequalities amongst the city inhabitants. The economically, socially and politically influential are generally favoured by the formal water supply regime and enjoy better services at lower charges. This is reflected by the relatively better supply networks and stable water flow to affluent residential areas, as well as the comparatively lower prices per unit when connected to the formal water supply system. This stratification is reinforced by many implemented and planned policy interventions to improve services (e.g. past World Bank projects, the proposed upstream dam project, and desalination plants).

Apart from having poor accessibility and road infrastructure, most densely built informal settlements are also characterised by poor sanitation and inadequate solid waste management systems. In the long run, these environmental problems may adversely affect and limit opportunities for tapping groundwater sources. That is, widespread informal urbanization characterized by unregulated housing densification and over-crowding, contributes to contamination and pollution and threatens the water cycle and quality of groundwater resources in many informal settlements.

**Map 2:** Increasing population densities from 2005-2011. Source: produced by Pascale Hofmann based on satellite imagery from GLCF.



These injustices have generated a wide range of social sufferings amongst the urban poor. For instance, without a safe and reliable water supply many low income inhabitants, and especially women, cannot engage in income and employment generation activities which require water inputs, including food vending (mama mtile), vegetable gardening, boutique-making, and the preparation and selling of local brew. (Kombe and Kyessi, 2007). The time spent collecting safe and potable water tends to overburden women and children in particular. This lack of unreliable and adequate potable water is likely to influence and change the priorities of households regarding water use. Moreover, residents of especially peri-urban settlements are also at risk of increased health burdens. Cases where boreholes were dug too close to pit latrines are very common, and can lead to the contamination of water sources and outbreaks of waterborne diseases, as was revealed in Tungi/Ferry area, in Kigamboni in Dar es Salaam.

### 1.3 Institutional landscape for urban water and sanitation supply

The main policy instruments for the Tanzanian water sector are the Water Policy of 2002 and the national Water Sector Reform Programme, put in place in early 2000. The main objective of reforms being coordinated through the Water Sector Development Programme (WSDP) is to strengthen sector institutions for integrated water resources management, for the improvement of access to clean and safe water and sanitation services. Key among the instruments to achieve these aims include: the National Water Sector Development Strategy (2006 – 2015); the Water Resources Management Act No. 11 of 2009; and the Water Supply and Sanitation Act No. 12 of 2009. In the long-term, WSDP aims to achieve the Tanzania Development Vision (2025) targets of increasing access to clean and safe water in rural areas to 90% and universal access in urban areas by 2025. On sanitation, the targets include increasing the coverage of sewerage services from 18% in 2010 to 22% in 2015; and increasing basic sanitation from 86% in 2010 to 95% in 2015 (URT, 2012). However, the city is still far from these levels.

Water supply in Dar es Salaam is managed by three organizations working closely together: The Dar es Salaam Water and Sewerage Authority (DAWASA), the Dar es Salaam Water and Sewerage Corporation (DAWASCO), a subsidiary of DAWASA, and the Energy and Water Utilities Regulatory Authority (EWURA). DAWASA and DAWASCO are parastatal organizations under the Ministry of Water, whereas EWURA is the regulatory authority under the Ministry of Minerals and Energy.

DAWASA is also responsible for waste water (sewerage) management in Dar es Salaam, Kibaha and Bagamoyo towns. It owns and manages the entire infrastructure for water supply and sewerage services on behalf of the

Government. It also has the mandate to work with other stakeholders, including private sector actors, to improve its performance and deliver efficient water services to inhabitants of the city. DAWASCO is the sole formal distributor of potable water supply and sewerage services in Dar es Salaam. The organisation is also responsible for the management, operations and maintenance of water supply and waste water disposal services. Its functions also include the distribution of water and collection of revenues. However, the areas actually served by the formal water supply network system is small, and at present only 50% of the city residents have access to the DAWASA/DAWASCO piped system.

Nonetheless, the utility has developed some efforts to extend water supply for low-income residents. DAWASA has a 'Community Liaison Unit' which is responsible for supporting communities seeking piped water connection in their settlements. This unit has been involved in establishing a number of boreholes with community-managed water supply schemes. In areas of the city where formal water supply is nonexistent, NGOs such as Water Aid have focused on improving water supply and sanitation for poor and marginalised communities. These organisations typically work with grassroots or community institutions such as community water committees or community associations in the project area. Similarly, DAWASCO recently established a pro-poor unit to specifically deal with services in low-income areas.

EWURA is the regulatory authority responsible for monitoring and controlling tariffs, monitoring service quality, ensuring compliance with performance standards and assessing environmental impacts. It also institutes standards and codes of conduct governing the water utility sector. It is worth noting that EWURA only regulates registered urban water supply and sewerage authorities (like DAWASA/DAWASCO), but not other service providers.

In so far as land-use planning in Dar es Salaam is concerned, there is generally little or no coordination between urban land use plans and the provision of public services such as water and electricity supply. Municipalities and local communities are free to engage or collaborate with the private sector (companies and individuals) to provide or improve access to potable water supply. Individuals or groups in communities can also engage or contract private companies, individuals or organized groups to supply water.

In an attempt to improve water supply in the city, the Government, through the Ministry of Water, plans to embark on a large groundwater extraction project at Kimbiji, over 60km from the city center, to draw water from the large underground water reservoir. However, the project is yet to commence due to lack of funding. Moreover, it is unlikely that this project will significantly improve water supply among the poor in the peri-urban areas, as the rapidly sprawling city structure has generated prohibitive costs of providing piped water to the peri-urban areas.

## 1.4 Water injustice in Dar es Salaam: challenges and opportunities

As discussed above, the rapid (unregulated) peri-urbanization, outstripping the capacity of the municipality to respond, has been the major factor driving challenges for the equitable supply of potable water. Nonetheless, this report also identifies a number of entry points which might support initiatives to address the inequitable access and control over water resources. Both are addressed here.

### Main challenges:

- **Decline and intrusion of seawater in ground water sources:** Groundwater sources are declining as a result of the excessive extraction of water. Subsequently there is increasing intrusion of seawater into groundwater, especially during the dry season. Encroachment on aquifer recharge areas are also destabilising ground and surface water sources.
- **Unregulated small and large scale water vendors:** In recent years water supply has been widely commercialized. As a result, in many low-income settlements such as Tungi/Ferry, the sale of potable water by private sector vendors has become an important business and employment generation activity for middle and low-income households alike. In the Tungi/Ferry area, small vendors who use push carts and bicycles are the most common water vendors, with only a few bulk water suppliers who use large trucks and water boozers. In total there over 150 small water vendors who are engaged in selling water. Informal service providers however, are currently not supervised or regulated. EWURA, the utilities regulatory authority, together with GIZ, has produced guidelines for informal service providers and intends to regulate vendors operating private boreholes and water tankers. However, effective implementation of these guidelines would require collaboration from DAWASCO, and funding challenges may continue to be an impediment. The lack of institutional mechanisms to regulate and monitor water vendors means that the quality and sources of water supplied to most households cannot be guaranteed.
- **Lack of regulatory frameworks:** Since their establishment, the public water supply institutions DAWASA and DAWASCO have never been part of the local government institutional frameworks. As such, these organisations are not directly accountable to local government authorities.
- **Social perceptions on rainwater harvesting:** Although Dar es Salaam receives over 1000mm of rainfall per year, there are limited initiatives to harvest rainwater at present. Over 60% of households depend on water from boreholes. Even in areas experiencing severe

shortages of water, including settlements on high altitudes, only a few households have erected large tanks to collect rainwater. Most households perceive rainwater harvesting as a short term measure and an unreliable and inappropriate solution to water shortages. At the same time, many urban poor households find the costs of constructing water reservoir tanks unaffordable. As such, when it rains, most of those households harvesting rainwater use small containers and buckets measuring less than 50 litres.

- **Illegal connections and leakage:** Illegal water connections greatly contribute to water losses from the utility. There are also cases where water distribution pipes are vandalized or tampered with leading to leakage. This often occurs where main water supply networks run through housing areas which do not receive piped service. Such acts of vandalism are therefore often taken out of desperation, and are by and large outcomes of unequal distribution. There have also been reports of incidences where employees working for the public water supply authority (DAWASA) collude with households to engage in illegal connections. According to Chinyele (2008), since 2005 more than 70 DAWASA/DAWASCO employees have been dismissed because they were implicated in illegal water connections. Frequent campaigns conducted by DAWASA/DAWASCO to discourage illegal connections seems to have reduced the problem, but as long as water injustices and inequalities continue, it is likely that such practices will continue.

### Main opportunities:

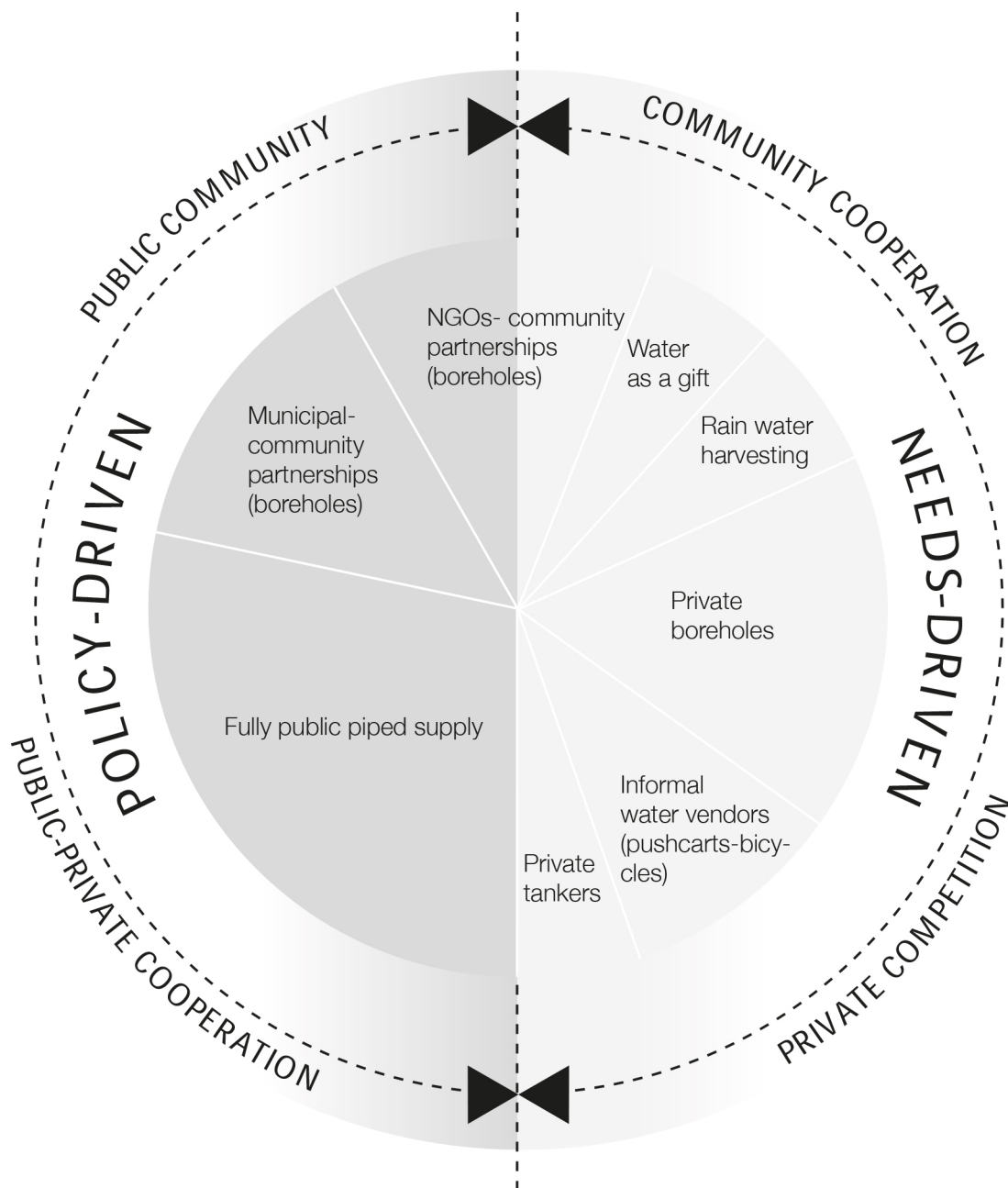
- **Strong and experienced community-based institutions and private water vendors:** As a response to the chronic shortage of potable water in peri-urban areas, local communities have adopted a number of collective strategies. This includes well-organized community water committees, water associations and numerous small and large-scale water vendors. It also includes private individuals who have sunk deep wells and offer water at a fee to neighbouring households or vendors. These private individuals—whether operating deep wells or using water tankers, large plastic tanks or light trucks, push carts, bicycles, tricycles or donkeys—have mobilized their own resources and invested in water supply activities as a source of income and employment. In Dar es Salaam, these alternative arrangements are responsible for providing potable water to approximately 50% of the population. The experience held by individuals and community groups involved in water extraction and vending offer potentials that can be explored in the future.
- **Strong and stable local administrative structure at the ward and Mtaa (sub-ward) level:** Although Mtaa and Ward institutions are not directly involved in

water supply activities, they are critical players. This in particular refers to the potential role they may play in regulating and supporting the quality control activities, including the protection of water recharge aquifers. Councillors at the Ward and Mtaa level are instrumental in mobilization and advocacy matters that concern water injustices.

- **Public land ownership:** The fact that land in Tanzania is a public property may offer the opportunity to access land required for public and community use. There is some precedent for private individuals to accept appeals from local communities to donate land for basic services. This was noted in the Kombo sub-ward, where a group of households surrounding an open space freely donated the land for the construction of a public kiosk and an overhead tank, in return for a collective source of water.
- **Social mechanisms to provide free water to the poorest:** It is a common practice amongst borehole owners or persons with stand pipes connected to the public system, to give free water to poorer households or individuals who cannot pay for water. Normally such households get between 20 and 40 litres per day.
- **Efficient communication and trust between vendors and customers:** Normally water vendors and their clients keep each others' mobile phone numbers. In this way, it is very easy for households to contact vendors that regularly supply them when they need water. Often vendors deliver water swiftly on the understanding that payments will be made later, which in most cases happens without problems.

## 2. Water and Sanitation Wheel for Dar es Salaam

### 2.1 Policy-driven and needs-driven practices in water supply



Water supply regimes in Dar es Salaam City comprise both policy-driven and needs-driven practices. As noted earlier, DAWASA and its subsidiary DAWASCO are the sole formal distributors of potable water services in the city. Slightly more than half of the current water supplied to Dar es Salaam City is drawn from Ruvu (about 70 km away) and Mtoni surface water plants, while the rest is extracted from underground sources. In areas where DAWASCO does not provide piped service, it has sunk deep boreholes which are managed and maintained at the community level.

In 2003, the Government engaged a private sector actor (City Water Supplies Company), a British firm, to improve water supply in the city. The aim was to complement DAWASA's capacity. This contract was terminated in 2005 however, primarily because the Company performed far below the level that DAWASA had achieved prior to the private sector engagement. It was following this termination of the City Water Supplies Company that DAWASCO was established as a subsidiary of DAWASA.

However, the bulk of city inhabitants, particularly the peri-urban poor, do not have access to the public water supply system. Subsequently, potable water supply practices in most areas are needs-driven, and include a range of practices from private water vendors of varying size, community managed or privately run boreholes, or the reliance on shallow wells (Table 1). In particular, the use of groundwater sources for domestic, industrial, commercial and irrigation activities has become increasingly important as a result of diminishing surface water supplies. Mato and Mujwahuzi (2010) estimate that about 69.3 x 10<sup>6</sup> metres cubed of groundwater is extracted per year in Dar es Salaam City alone. This represents the main source of water for the bulk of the peri-urban poor who are deprived of the formal public water supply system. Although there are regulations which require payments to the utility for extracted water, individuals or communities which undertake these alternate arrangements often do not pay the utility for water extracted.

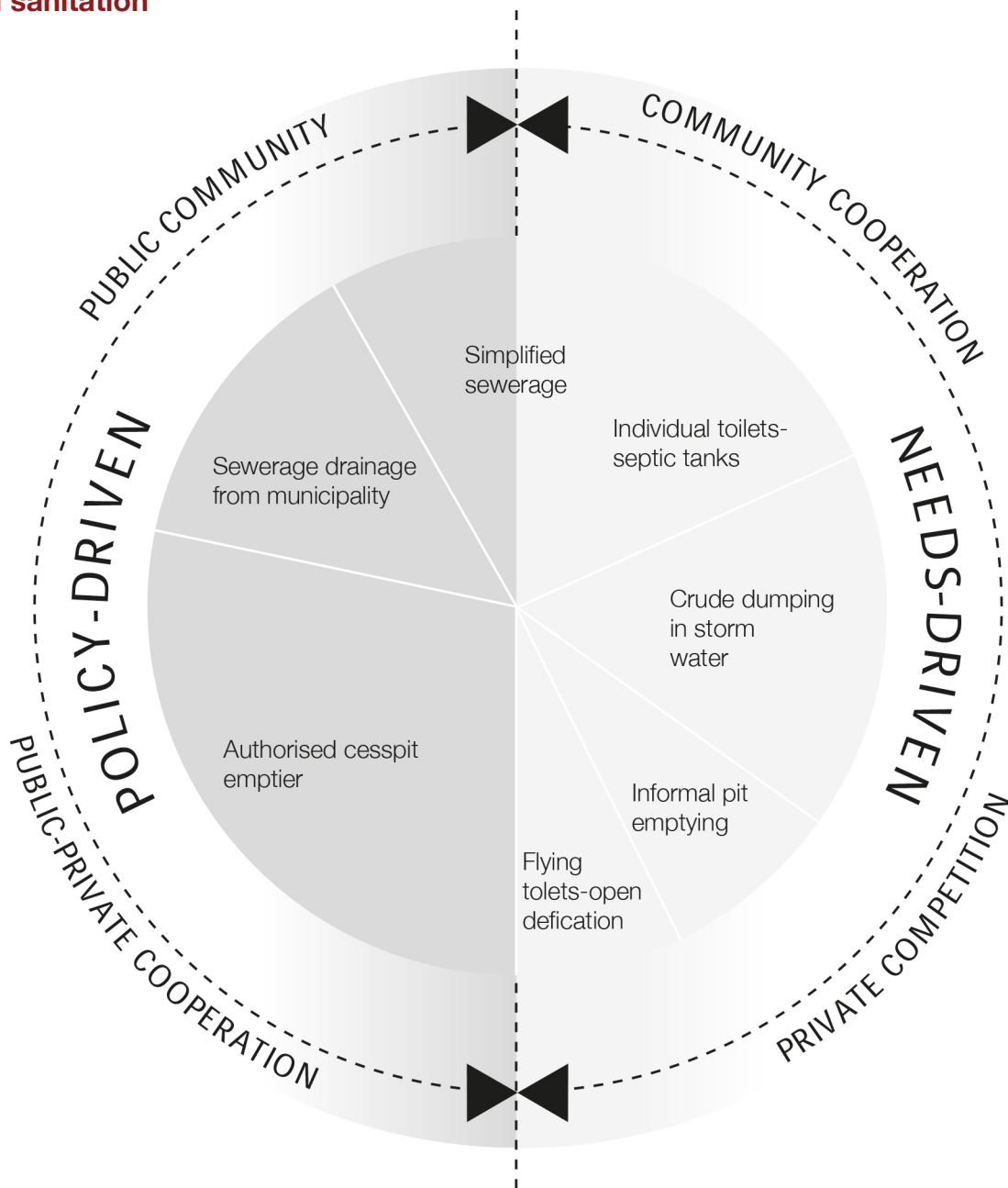
**Table 1:** Water supply systems in Dar es Salaam. Source: Field work studies January 2015, compiled by authors

Practice	Type	Approx. Cost	Characteristics	Further Observations
Municipal (DAWASA) Supply	Policy Driven	Different tariff bands used by DAWASA/DAWASO. Charges by household supply are TShs. 1,119 (£0.4) per m <sup>3</sup> .	Water treated at the source. Supply is generally stable in high and medium income housing areas, in the city centre, industrial and large public institutions. Boiling of drinking water remains necessary. Covers only 50% of the city population.	This represents a limited distribution, largely serving middle and high income groups.
Boreholes/ deep wells (privately owned)	Needs-driven	Between TShs 50 (£0.02) and TShs 500 (£0.2) per 20 litre bucket.	This represents the most common water supply system in the city. Often saline, and in densely built informal areas may be contaminated. Water level diminishes during dry season.	Most people buy drinking water from those supplying sweet water. In Tungi and Kigamboni Wards currently there is only one fresh water source – a privately owned deep borehole.
Boreholes/ wells managed by communities (built by DAWASA and Water Aid/ NGOs)	Varies	The price is generally the same as water supplied by private supply sources.	Saline water. Contamination may occur, though community water committees are required to closely monitor the environment surrounding water kiosks. Supply may decline during dry season.	Deep boreholes are dug by either private individuals who have their own equipment in Tungi /Ferry, or public institutions specialized in such activities. There is evidence of some (informal) ad hoc arrangements to offer free water to particularly vulnerable residents (the elderly, very poor) who cannot afford to pay for water charges. (Between 2-3 buckets per household per day.)

Practice	Type	Approx. Cost	Characteristics	Further Observations
Small water vendors	Needs-driven	Price per bucket varies between TShs. 100 – TShs. 500 depending on whether it is saline or not.	Quality not guaranteed. Operators are largely young people. Prices increase during dry season.	The bulk of the urban poor, including peri-urban settlers have to buy water. There are no arrangements to provide free water to those who cannot afford to pay.
Medium water vendors	Needs-driven	Affordable largely for medium to high income groups.	Generally safe but depends on the source. Not popular in the peri-urban areas.	Consumers buy and store water in large containers (3,000-10,000 litres).
Bulk suppliers	Needs-driven	Largely supplied to high and middle income groups	Often these supply fresh water , though this water still must be boiled. There is often a shortage during the dry season.	Supply is mainly in planned areas, and to a few middle and high income households in unplanned areas occupied by the affluent.
Shallow wells	Needs-driven	Dug largely by the poor who cannot afford to dig deep wells/ boreholes.	Contamination risks are high. Good flow of water, but dries during dry season.	The urban poor use shallow wells for domestic uses, including livelihoods activities. Normally not sold.



## 2.2 Policy-driven and needs-driven practices in sanitation



Source: Elaborated on the basis of Allen et al., 2006a; 2006b

The recent Demographic Health Survey (DHS, 2010) indicates that the coverage of improved toilets in individual households is 9% in urban areas, and 22% in the rural villages throughout Tanzania. In Dar es Salaam, less than 10% of residents are connected to sewer networks. Furthermore, only 3% of wastewater collected through the network is treated, which is done mainly through stabilization ponds. The remaining 7% is discharged directly into the sea (WaterAid/SHARE, 2013). As with water, the Kinondoni municipal Director (Natti, 2011) has highlighted that the poor pay more money

for waste water disposal than the rich, and that the utility has not prioritised sanitation systems for the urban poor. He adds that while water supply and sanitation are the responsibility of one public organization (DAWASA), sanitation has been neglected compared to water services. He concludes that the private sector is doing a commendable job in providing the cesspit emptier services and other sanitary innovations, though prices may be unaffordable for some.

Over 85% of households in informal settlements use pit latrines, and the majority do not have a proper faecal

sludge management system. The most common practice when emptying pits is to open them during rainy season to allow them to flow freely. This has serious implications for the spread of diseases such as cholera, diarrhoea, typhoid and dysentery. Unsurprisingly, 95% of all cholera cases in the city occur in areas where poor people reside, and are served by poor on-site sanitation systems. Medical costs and deaths occurring during cholera outbreaks are hardly taken into account when computing costs of sanitation for the urban poor (ibid).

Waste removal represents a significant challenge for residents. According to survey data exploring options for when pit latrines are full, 72% of residents responded that they desludge them, 23% expect to build a new one and 5% do not know what to do (Natti, 2011). Common methods used include:

- **Cesspit-emptiers:** Vacuum trucks with tankers of 3m<sup>3</sup> – 12m<sup>3</sup> capacities are used to collect, transport and dispose waste water from septic tanks and occasionally from pit latrines. In 2011 there were 82 privately owned cesspit emptiers and 6 Municipal emptiers. There were also 5 emptiers owned by state corporations and departments including the Bank of Tanzania, Tanzania Harbours, the National Housing Corporation and the
- Police Force. These collect waste water from estates and houses owned by their respective institutions.
- **Manual emptying by gulper method:** The contents of pits are emptied through gulper machines, and then stored in 200 litre containers to be transported to waste stabilization ponds through motorcycles or pushcarts. This mode is mainly used in unplanned settlements and areas with difficult terrain which vacuum trucks cannot access. This thus represents an important option for poor communities.
- **Vomiting method:** Pit latrines are also emptied through the so-called vomiting method. This is done by digging a new pit adjacent to the old one and allowing the sludge to flow into the new pit. Thereafter the old pit is covered and decommissioned. This is only possible in areas where a household has enough open land for the new pit.
- **Haphazard emptying and disposal:** Some pits are emptied haphazardly— especially during rainy season— by channelling excreta into running rainwater or connecting pipes to a nearby stream or body of water. This is mainly practiced in low-income areas, and represents a significant safety hazard.

### 3. Selected Case Study Sites

Five potential case study areas were visited and the existing water supply sources profiled. These are Tungji/Ferry, Charambe Yombo Dovya, Nyantira, Kombo and Mbezi Makabe (see Appendix 1). The first three are located in Temeke Municipality in the south of Dar es Salaam, and face the most severe water shortages. The public piped system covers very small areas of this municipality as it far from the water supply mains, most of which are located in Kinondoni Municipality. Kombo and Mbezi Makabe are located in Ilala and Kinondoni Municipalities respectively.

Following transects and the collection of basic data from community leaders in these areas, Tungji/Ferry in Temeke and Kombo in Ilala were chosen as the preferred potential case study areas (see Appendix 1). These two areas were selected because of their diversity and representation of settlements exhibiting water injustices, as well as for their evidence of on-going initiatives to address the problems of poor sanitation and water supply. In particular, these sites demonstrated examples where residents have developed their own internal water management initiatives or organizational and institutional set-ups. The case of Ferry (Tungji) in particular has been lauded as one of the most successful cases of community managed water improvement schemes in the country. Both areas are in an advanced stage of settlement consolidation.

#### 3.1 Tungji

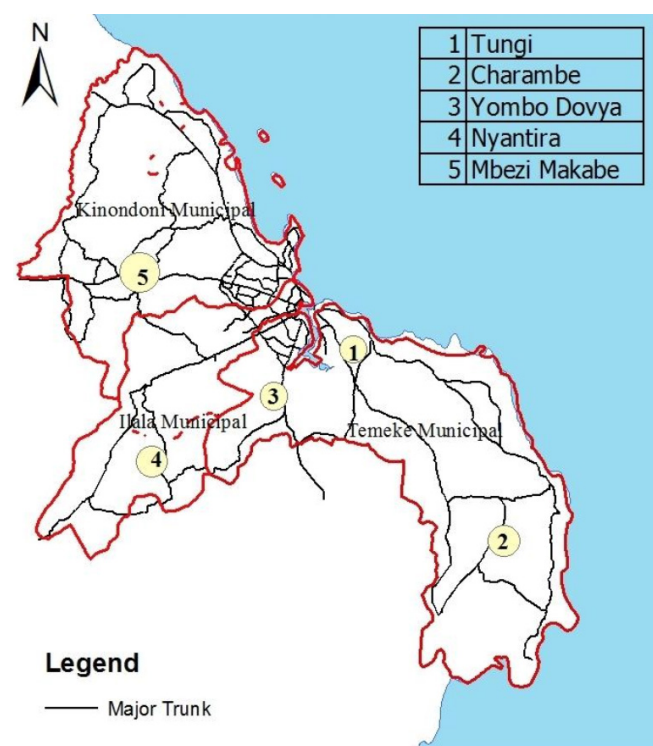
##### Water Supply

There are number of different sources in the Tungji area (see Map 3) through which residents access water services. There are outlined in detail below.

**Private owners of deep wells/boreholes:** In the Tungji/Ferry area, private owners of deep wells/boreholes supply water to individual households either at the source (i.e. through water kiosks constructed close to the well/borehole) or through individual household connections linked to an overhead tank (see Image 1). These investments in pipes and tanks are undertaken by the private borehole owners. Normally, consumers pay upfront for the costs of pipes and fittings for individual house connections, and payment for consumption is done on a monthly basis.

As in other parts of the city, the quality of water supplied by private vendors or operators in Tungji is not regulated. Apart from problems of cleanliness and contamination of the water at the source, facilities such as buckets or other containers which are used to carry and transport water may be contaminated. The owner of the only borehole which supplies fresh water to Kigamboni inhabitants reported that he often requires small water vendors who use bicycles, push carts and donkeys to wash their buckets before they fill in water. He noted that this is intended to ensure that vendors offer good services to their clients, and in turn, helps him protect his clientele. However, on top of this, poor solid waste management and sanitation may adversely affect the quality of groundwater supplied by informal water vendors. There is also evidence of salt water intrusion into groundwater sources in the city as a result of over-pumping of groundwater (Mato and Mujwahuzi, 2010).

**Map 3:** The location of (Tungji) and other potential case study areas



**Small water vendors - push carts and buckets:** The number of domestic water suppliers who use trucks and push carts to deliver water is rapidly growing in the city. This group is comprised of primarily informal small private water vendors, who are particularly crucial for housing areas without water kiosks or connections to the formal piped water supply. Operators are largely young people, and predominantly men. Normally, small water vendors use several small buckets, between 12-30 litres (typically 20 litres), on push carts, bicycles or donkeys (see Image 2). Prices charged vary on the quality of the source, as well as the location of the settlement in relation to the source of water. The price also depends upon whether the vendors are offering home delivery, or work at a collection point. For example, in Tungi, the price per 20 litre bucket varies between TShs. 50 (£0.02) and TShs. 500 (£0.2)<sup>1</sup>. During rationing periods the price may increase up to TShs 1500 (£0.6) per 20 litre bucket. Despite not being regulated, quality controlled or subsidized, water supplied by vendors is filling the large gap created by public deficits or under-performance by DAWASA/DAWASCO.

**Medium water vendors - light trucks, tricycles and sim-tanks:** Medium operators are increasingly becoming popular in peri-urban areas. Most of these own or hire light trucks (i.e. 2-3 tons) and may carry several sim-tanks each with between 500 – 2000 litres capacity. Unlike bulk vendors, these vendors often do not have specific clientele to whom they routinely supply water, or geographical areas (settlements) in which they operate. Mid-sized vendors rely upon private boreholes/deep wells and a few private high pressure water points which are supplied from DAWASCO. The quality of this water depends largely on the upkeep of the water source. Generally, the water from medium suppliers is safer than from smaller vendors as they rely primarily upon sources which

are fairly reliable or well managed (i.e. directly from DAWASA/DAWASCO or private individuals who have piped supply from DAWASCO/DAWASA sources). However, water for drinking still must be boiled. A few households, especially those in middle and high income groups, use water guards to purify water. However, most urban poor households do not use these chemicals to treat their water.

**Image 2:** Informal small water vendors in Tungi settlement



**Image 1:** Privately installed tanks with piped network to individual household in Tungi



**Bulk water suppliers through large tankers and water boozers:** This group represents middle and high income water vendors, many of whom own and operate one or more large water tankers or boozers with a capacity between 5000 – 10,000 litres (see Image 3). Bulk suppliers often work with specific clients (households, business operators of restaurant and guesthouses), and routinely supply water under agreed terms and delivery schedules. A few park their tankers loaded with water at designated locations, where individuals can also purchase water. Like medium suppliers, bulk suppliers have two options from which to access water: either from private boreholes/wells (normally those with sweet water sources), or from individuals who receive a good supply of high pressure water from DAWASCO. Some vendors buy water from designated DAWASCO supply points, though there are very few of these in the city. With the exception of cases where water may be contaminated during the extraction, filling of boozers, or in transit, generally delivery from these bulk suppliers is considered nearly as clean as water delivered through the public system. Still, as with water from other sources, water must be boiled if used for drinking.

**Community-managed water supply systems:** Finally, in many informal settlements in the city organized local community groups and community water committees are involved in water supply. These groups manage (operate, collect revenue, undertake repairs) water supply systems and ensure a good upkeep of the well/borehole and immediately surrounding areas. Amongst these groups are community water committees that manage boreholes/wells constructed by DAWASA, as well as those constructed by NGOs such as Water Aid. There are additionally groups working through the Tanzanian Federation of the Urban Poor which manage community boreholes;

**Image 3:** Private overhead water tanks that feeds bulk suppliers in Tungi/Ferry



these groups often remain more autonomous than those committees attached to DAWASA. In the Tungi/Ferry area there are two types of these community managed water supply systems: a community water committee which oversees the boreholes constructed by DAWASA, and another water committee established by the NGO Centre for Community Initiatives (CCI) and managed by the Tanzania Federation of the Urban Poor. This group is in the process of transforming to a water user association.

## Sanitation

The case of Tungi is also of interest for the innovations in community-managed waste disposal. In Tungi, the majority of households use pit latrines. As a result of the high water table and this predominance of pit latrines there is a high risk of contamination of ground water sources, on which almost all households depend. Through a partnership of Water Aid and CCI together with selected communities (three settlements) in Dar-es-Salaam, the pit emptying project using a Gulper pump machine was introduced as a form of faecal sludge management for residents.

In the Tungi settlement, a community based organization named UMAWA is engaged in the faecal management system using the Gulper pump machine. Operations began in 2010, involving 10 members in the pit emptying business, who worked to mobilize residents to make use of the technology in collaboration with community leaders and health committees. However, initially the group ran into challenges in that it had to transfer the sludge from a transfer station to a waste treatment plant that was nearly 36km away using vacuum trucks. This was done twice per month at a high monthly cost of USD\$302. This challenge led to the idea to construct a transfer station with the capacity of 6,000 litres. Out of these discussions, a decentralized Waste Water Treatment System (DEWATS) was introduced, supported by the German NGO BORDA.

The use of gulper and DEWATS has been successful, with a number of key benefits. Transportation costs have been reduced from more than USD\$302 to only USD\$60 per month. This has allowed more people to be reached, and has increased the acceptance of the technology by local community members. In addition, this system produces a cooking gas which is currently being used by a family of 10 people, with the possibility of connecting two more families and a nearby primary school in the future. It has also provided manure for gardening for an additional family located close by. The project has further become a learning centre for communities, government authorities, academics and other stakeholders, as it is the first project that has incorporated pit emptying, treatment and re-use of faecal sludge, completely operated and implemented at the community level.

Though highly successful, one of the remaining challenges of this system is the variation in the quality of the effluent. This has generated the idea of using a wetland system to make further improvements, though this has yet to be implemented. Other challenges include the lack of appropriate policies, finance, and regulatory and institutional frameworks to support the scale up and delivery of appropriate and affordable sanitation solutions in the informal settlements. Nonetheless, this represents an important example of local innovation and management which has significantly impacted sanitation practices in the area in which it is operating.

### 3.2 Kombo (Vingunguti)

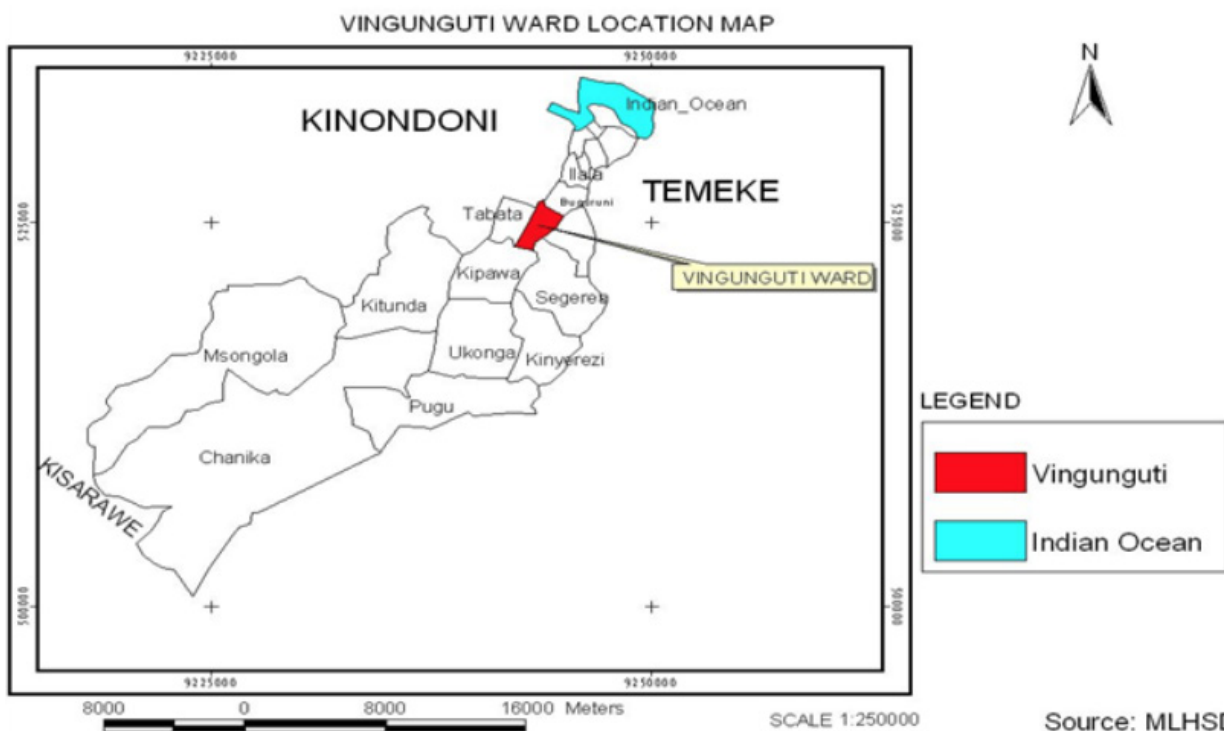
The Kombo subward is located in Ilala Municipality (Map 4), and Vingunguti Ward. Accessibility to the site is through the Buguruni – Mnyamani road or the Vingunguti Tabata road. It is comprised of two parts: a low lying area named ‘Kombo Chini’, bordering the oxidation ponds, and the upper area or ‘Kombo Juu’. Historically, Vingunguti was designated as an industrial area. However, in the early 1970’s its location along the main road (Pugu/Nyerere) and proximity to large industries attracted migrants from the nearby densely built inner city settlements such as Buguruni, Kariakoo and KeKo Mwanga. At this time, the majority of migrants acquired land in this area through purchase. However, at present, nearly two thirds of the inhabitants are homeowners whilst the rest are tenants.

The Kombo subward accommodates 20% of the Vingunguti population, for a total of 16,485 people (9,335/females and 7,130/males). The average number of people per household is six. Studies conducted by Ardhi University students in 2013 revealed high levels of unemployment and limited livelihoods options, with most households unable to meet their basic needs such as food, school fees for children, or medication. The primary source of employment is petty trading.

### Water Supply

Water supply in Kombo Mtaa is primarily needs-driven. While there is a public piped DAWASA/DAWASCO system in a small low-lying area of Kombo Chini, it is generally unreliable. Water flows only once a week, and the pressure is often low. Private water tankers and smaller water vendors also supply fresh water in the area, including a private company based in Tegeta (Kinondoni Municipality, about 15 kilometres away) which operates a fleet of water tankers. This company both operates a borehole from which it extracts water, and buys water from the public piped supply DAWASCO system. However, there are fewer users of this water source as the price is unaffordable for the majority of inhabitants. For example, while water from boreholes in the area is sold at approximately TShs. 100.00 (£0.04) per 20 litre bucket, private tankers sell water at between TShs. 500.00 and TShs. 700.00 per 20 litre bucket, dependent on the location of the set-

Map 4: Location of Kombo Subward in Vingunguti Ward



Source: MLHSD

tlement. Similarly, small water vendors sell water at TShs. 500 per 20 litre bucket, and households located far away from the main roads normally pay more.

As a result of these limitations, households in Kombo Chini report that they depend primarily on borehole sources, even though it is often saline and poor quality for drinking. There are three distinct management systems for boreholes operating in Kombo:

- **Federation of the Urban Poor managed water committee:** This borehole was financed by the NGO CCI, in collaboration with members of the local Federation of the Urban Poor that had been active in a micro-finance (SACCOS) project in the area. The Federation supported the establishment of a water committee to manage the borehole, which is in turn answerable to the Mtaa leaders. Its core functions include the selling of water and collection of revenues, maintenance and up-keep of the area surrounding the boreholes and public kiosks. They also make decisions on requests for water for community members who cannot afford to pay.
- **Private individuals:** Some boreholes in Kombo are financed by individuals, to support their income gen-

eration initiatives. There is little communal involvement in the management of these boreholes.

- **Community water committees:** In total there are three boreholes (one of which is out of order) funded by the NGO Plan International. These were handed over to Ilala Municipality, but are now managed by community water committees comprised of members from the local community (see Image 4). The committee was established by the Mtaa government level, and therefore works in close collaboration with local authorities.

In the case of the two community-managed systems, the boreholes are connected to public water kiosks and standpipes where individual households and water vendors can buy water. In addition, there are a few households with piped connections hooked directly to the boreholes. In total, there are 70 household connections and 20 public water points under the government support boreholes, whilst the Federation managed borehole has 60 household connections and 13 public water kiosks and taps. Most households buy water from either water vendors or from public/private water kiosks; very few buy water from private tankers (Images 4 and 5).

**Image 4:** Water tank installed by Plan International  
Source: URP, 2013



**Image 5:** Water Tanker/trucks and pushcart used by water vendors



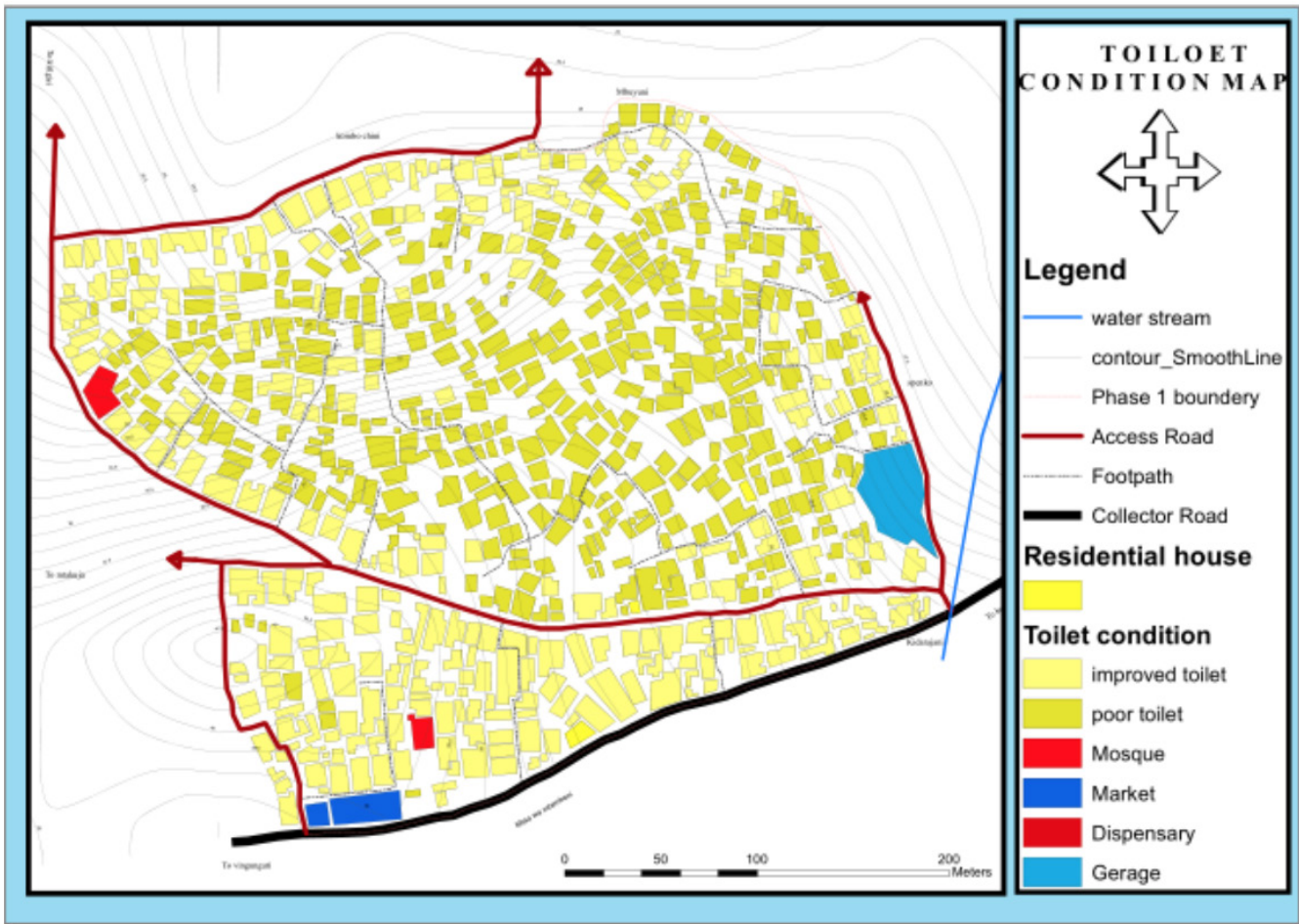
**Sanitation**

85 percent of the households in Kombo use traditional pit latrines. Despite the fact that the Kombo settlement is adjacent to one of the 4 major waste ponds which are used to treat sewage, until 2014 none of these low income households in the ward were connected to the wastewater treatment system. Residents have been coping with very poor sanitation facilities, resulting in frequent outbreaks of cholera (see Map 5 and Images 7 and 8).

Since 2014 however, the Centre for Community Initiatives (CCI), in collaboration with Cambridge Develop-

ment Initiatives (CDI), has initiated a pilot simplified sewerage system (what is termed condominal sewerage in Brazil) in Kombo. This system reduces investment costs by up to 50 percent in comparison to conventional sewerage systems, and emphasises the importance of local community participation (ARU, 2013). The first phase has seen the connection of 20 homesteads, comprising 220 people (Image 6). In response to demand, CCI is planning to extend the system to an additional 22 houses, which will bring services to an additional 250 people. The second phase is expected to commence in March 2015, with further plans to cover more houses in the settlement.

**Map 5:** Toilet conditions in Kombo Subward. Source: URP, 2013





**Image 6:** Improved toilet in Kombo



**Image 7 and 8:** Traditional Pit Latrine in Kombo  
Source: URP, 2013



### *NOTES TO CHAPTER 3*

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1. The charge of TShs 50 per 20 litre bucket refers to a situation in which individuals/households buy water at private/ or community managed kiosks.

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## 4. Conclusion

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Conditions in the selected case study sites remain a challenge for the provision of safe water supply and dignified sanitation options, particularly where considering the potential for policy-led interventions to address some of these enduring challenges. Nonetheless, there is evidence of a rich set of community-led (and NGO supported) interventions which are working in various ways to fill the gaps of state-led provision. From simplified sewerage and Federation managed boreholes in Kombo, to the

DEWAT system in Tungi, there are a number of lessons that can be drawn from the everyday ways through which residents have mobilized to access their basic needs. While these co-produced systems have demonstrated significant gains for many residents of Dar es Salaam, exploring these options for their potential to scale-up and reach greater numbers of residents, as well as interact with other key actors in the private sector and with local authorities, becomes a crucial space of future research.

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# Appendix

## Appendix 1: Profile of potential case studies

Settlement	Characteristics
Tungi /Ferry (Temeke Municipality)	<ul style="list-style-type: none"> <li>• Mixed income settlement but many low income households. Not connected to public piped DAWASCO/DAWASA system.</li> <li>• Three major water supply management systems in Tungi: community water committees (working with local authorities), Federation of the Urban Poor collectives, and privately managed boreholes.</li> <li>• Dominance of informal water supply actors (water supply governed largely outside the formal system).</li> <li>• Most households buy water from small water vendors and/or at public kiosks connected to the boreholes.</li> <li>• In Ferry there are 12 boreholes: 2 privatized (rented to private individuals), 9 operational community-managed systems, and one that is out of order. Community managed boreholes are initially dug by an NGO (i.e. Water Aid), but handed over to the community to manage. Residents hooked to the borehole have an upfront private connection fee payment.</li> <li>• Water table is generally high, suggesting the potential for the contamination of ground water sources, especially in shallow wells.</li> <li>• Limited (small scale) rainwater harvesting.</li> <li>• Water used for small-scale income generation activities – such as food vending, washing/laundry and vegetable vending and limited gardening.</li> <li>• Low water consumption per household: on average one bucket (20 litres) of sweet water per day.</li> <li>• Low quality/saline water, with only one private/supplier of sweet water.</li> </ul>
Kombo - Vingunguti Ward (Ilala municipality)	<ul style="list-style-type: none"> <li>• DAWASCO piped system in the lower housing area (Kombo Chini), but supply intermittent – once a week.</li> <li>• Simplified improved toilets is integrated with water supply improvement.</li> <li>• Former peri-urban areas gradually densifying in informal settlement areas.</li> <li>• Mixed public, private and community managed water supply regimes.</li> <li>• Active Federation of the Urban Poor, with membership fee.</li> <li>• Water used for income generation in bars, restaurants and by food vendors, amongst others.</li> <li>• Combined water and sanitation improvements, but still 85% of households use pit latrines.</li> <li>• Evidence of internal social arrangements to access land for public facilities – i.e. public water kiosk as well as free water provided to the poorest in the community.</li> </ul>

Settlement	Characteristics
Yombo Dovyva (Temeke Municipality)	<ul style="list-style-type: none"> <li>• No water supply from DAWASA/ DAWASCO distribution system.</li> <li>• Private deep boreholes are the main sources of potable water.</li> <li>• Many water kiosks built by private individuals, these provide (saline) water to individual households.</li> <li>• Price of water ranges between TShs100 – TShs500 per 20 litre bucket</li> <li>• Not an appropriate case– unlike other neighbourhoods, there are not multiple initiatives to improve water supply, no initiatives to improve sanitation, and hardly any community managed systems.</li> </ul>
Nyantira (Temeke Municipality)	<ul style="list-style-type: none"> <li>• No DAWASA/DAWASCO supply in the area; private boreholes supply water to individuals, many have also installed meters the households connected to water.</li> <li>• Several privately owned water kiosks.</li> <li>• Water supply from boreholes and deep wells is saline.</li> <li>• There are no water vendors primarily because of low housing density (sparsely developed area).</li> <li>• Not an appropriate case –no multiple initiatives to improve water supply, no initiatives to improve sanitation.</li> </ul>
Mbezi Makabe (Kinondoni Municipality)	<ul style="list-style-type: none"> <li>• DAWASA/ DAWASCO supply in the housing area along the main road (Morogoro Road).</li> <li>• No potable supply in the inner densely populated areas.</li> <li>• Water vendors are common, trucks are largely used to supply water. Hilly topography makes it difficult for small water vendors (push carts).</li> <li>• Boreholes drilled by expert/ firms supply fairly good/sweet water while most of the local drilled boreholes supply saline water.</li> <li>• Majority of households rely on locally drilled boreholes.</li> <li>• High income households depend on water from bulk suppliers.</li> <li>• Limited rainwater harvesting.</li> <li>• Not an appropriate case – multiple initiatives to improve water supply, but no initiatives to improve sanitation; declining number of low-income social groups –displaced/bought by middle and high income residents.</li> </ul>

**Source:** compiled by authors



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