Community-Managed Water and building social capital in Angola

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Article Summary

Marketing water at the local household level involves significant trading in social capital. A financially sustainable model of community water management that builds on this neighbourhood social capital has been adopted in Angola. Water selling is the largest sub-sector of Luanda's extensive informal economy, involving extractors, transporters and retailers. The majority of Angola's peri-urban population still rely on informal mechanisms for its water supply because the State's post-war reconstruction programmes to provide water to all remain incomplete. Communities have used informal mechanisms to fill the gap. The article is drawn from research using qualitative methods and supply chain monitoring to examine the complexity of Angola's informal water economy. The Government has adopted the community management model MoGeCA for implementation across the country. The article is written from a practitioner point of view based on more than a decade of experimentation in practice and support from USAID in taking MoGeCA to the national scale.

Keywords: *musseque*; water-governance; slum; post-conflict; community management.

Angola's informal water economy in War and Peace

The breadth of the 'informal sector' of Angola—and its ubiquitous role in the lives of most Angolans—is evident in Luanda after the war. Throughout the vast slums of peri-urban Luanda where almost half of the city's population currently resides, basic services such as water and food distribution are primarily provided by private initiative in the informal sector. The informal economy evolved during the conflict years before 2002, when 37% of the entire country's labour force was calculated to be employed - likely an underestimate (Adauta de Sousa 1997), robustly justifying the assessment in a UNDP report (de Mull 2003) that “Luanda had become the largest laboratory for survival strategies in the world.” In Luanda, strategically located urban markets connected to dozens of smaller satellite markets dominated wholesale and retail trade, acting both as a distribution point for agricultural goods and as the primary source of imported and domestic products for both urban buyers and rural traders (Cain 2015).

During the war years, the informal sector provided the only potential source of economic opportunities and development for many Angolan households. The current article is based on studies¹ that aim to provide basic information about the structure of the informal market as well as the knowledge gained from sub-sector studies on peri-urban water market dynamics. The full documentation and analysis of the informal economy in Angola as an integrated whole was required in order to discover how it could be transformed to meet the new challenges and opportunities emerging since the war, and of how these changes could affect the livelihoods of the millions of Angolans who depended on it. The approach required action-focused research to inform the re-design of development projects to account for new post-conflict realities; to foster practices of good governance and civil society capacity-building in Angola and empower local communities through participatory approaches and enlarging the range of stakeholders who participate in public-policy making. Demonstrating to policy-makers the research results provides channels through which the perspectives of the poor gain greater voice in public policy-making. Co-production was key to this; where community associations, academics, and local government are engaged together in the research and data collection. Co-production also means co-ownership of findings and consequently a greater openness by Government to accepting validated data that demonstrates less-than favourable indicators, and feeding it into policy discussions. The research presented in this article was collected by teams made up of members of local residents associations, together with technicians from municipal administrations and university students supervised by Development Workshop members.

Probably the largest sub-sector of Luanda's extensive informal economy is water selling in its various forms, and the interface between transporters and retailers is central to the informal water supply. The overwhelming majority of the peri-urban population of Angola depends upon informal systems for their water supplies. Typically, these systems involve buying water from tank owners who bought their water from lorry owners carrying water from the nearest river. This water is expensive and of poor quality, representing both a significant household expenditure for the urban poor and an increasing health hazard as witnessed by outbreaks of highly transmissible diseases (such as cholera) known to correlate with poor water quality and limited access². Hampered by the limited capacity of the government to maintain the already existing rapidly deteriorating infrastructure, the exponential population growth of Angola's major cities has surpassed progress on the plans to upgrade major supply networks to accommodate peri-urban areas (Cain 2018).

Luanda's water infrastructure built for a colonial population of half a million in the early 1970s could not be stretched out to serve four million people who lived in the capital by the end of the war in 2002. The lack of public investment during the conflict years has meant that the informal sector has emerged as the main supplier of basic services to most urban and peri-urban families, including water (Cain 2017).

The subsequent investments in urban infrastructure that were made as part of post-war rehabilitation programmes extended the water supply network to serve new middle-class condominiums and enhance the central business district infrastructure. Little was spent, however, in improving the basic services of informal *musseques* settlements. By 2020, Luanda, with a population growth of almost 7% annually, had over 8 million people (INE 2020), on-track to becoming one of Africa's fourth or fifth largest metropolitan regions. Post-war measures to boost

water supply in peri-urban areas have focused on installing household connections but failed to adequately maintain the existing network.

In 2007 the program "Water for All" of the Angolan president was initiated to achieve the Millennium Development Goals (MDGs) for water supply. The plan aimed at building new water systems from groundwater extraction as well as surface sources (river or lake) to ensure an improved source of drinking water for 80 per cent of peri-urban and rural communities and guarantee a minimum daily intake of 40 litres of water per capita. The proposed infrastructure would include networks for storage, treatment and distribution as well as a network of peri-urban supply standpoints. MDG goals were not reached by 2015, and the program's own government assessment found that it did not meet the quality and efficacy objectives and that only 50.3 percent of the target population was achieved. The fact is that many of the installed systems (mostly diesel-powered generators, submersible pumps, and expensive treatment systems) remain non-functional and communities therefore still rely on conventional unimproved water sources (Cain 2017).

During that post-war period, much of the peri-urban population of Angola continued to rely on informal systems for their water supplies. Sometimes lorry drivers could fill up at official stations (colloquially known as *girafas*) in a few urban districts where treated water comes from the piped supply. In inland cities of Angola other informal sources of water are available such as hand-dug wells, improved wells, and boreholes with hand-pumps but in Luanda the water table is too deep to extract ground water economically (Cain 2017).

While the informal water market continues to respond to the demand for basic services that the State can still not satisfy, the Government sees these vendors as the enemy of modern development, branding them profiteers or "water traffickers" and criminal exploiters. However, the Government should not criminalize the informal market but view the operators as allies (Seminário Angolense 2011, O País 2015)³, at least until their own capacity has been extended to serve all urban citizens. Understanding the informal water supply market was important to see if and how it could be adjusted to function in conjunction with the official supply system and help fill the gaps until all urban users were reached by the public utility.. Figure 1 shows the trajectory of the growth of formal water supply systems in urban areas of Angola during the years of war and peace. Improved water systems include household connections but also community standposts and public protected wells that are within 100 meters of households. The graph (Ministry of Urbanisation and Housing 2016 p140) demonstrates that about one third on all city dwellers representing a large majority of *musseque* dwellers still depend on the informal market for their water.

Figure 1. Evolution of better potable water supplies in war and peace.

Research to affect pro-poor public policy and practice

Water supplied by the informal market in Luanda, while partially filling a gap left by the State, is insufficient, expensive, and often contaminated. However, local communities, depending on informal water markets, have shown how their social solidarity has taught us how to develop a water management system in the slums of Luanda. While not fully meeting the human right standard for equitable access to water by all⁴, the interim system discussed in this paper demonstrates how an affordable and sustainable model was established in which the communities accepted maintenance responsibility and the payment of service fees through the management of public standposts.

Informal water research began in the mid-1980s when the authors were invited by the Angolan Women's Organization (OMA) to assemble a team to work with them on the topic that was an overwhelming concern of their members, who often spent hours searching and transporting water to their homes every day (Development Workshop 1989). Improving access to water was a key to empowering women for OMA and helping free girls from carting water servitude, giving them more time to go to school. In the 1990s the World Bank commissioned in-depth studies on water markets in Luanda and other cities as part of the feasibility-study phase prior to making major infrastructure investments (Development Workshop 1995, 1998), aimed at understanding the informal economy's contribution to Angola's post-war development. This research employed a variety of approaches to understand the functioning of water markets including micro-economic supply chain analyses, water price monitoring using GIS and institutional study of actors and their sub-sector roles.

Qualitative tools and sampling surveys of water sellers and consumers in the informal sector were employed to analyze scope of the informal water economy in Luanda. An analysis of the principal informal supply chains of the sub-sector was implemented in Luanda and built on and compared with previous research that carried out in over more than two decades. Geographic Information Systems were used to map the spatial and economic results of the research on an urban-neighbourhood “bairro” basis in a way that was illustrative and understandable to local officials and community leaders. (Development Workshop 2009, 2011, 2014)

Some of the key questions that were asked included: has the informal water economy changed from the survival mode to a livelihoods development mode in the post-conflict period? How does the informal water economy work? Who are the key actors? What are their relationships? What is relationship between formal and informal systems and institutions? How does the price for water vary across the city and what are those factors that affect the prices?

The analysis of the water market permitted the development of a better understanding of how informal markets evolved to provide the access to water for communities in informal settlements. The understanding of the sector and evidence from findings were used to feed policy advocacy and promote pro-poor access to better services.

Water costs were found to vary significantly across districts depending on the type of supply and supply difficulties. Water costs in Luanda were high due to the huge demand and the distance from the rivers in the north and south of the city to the surface sources. It has been found that the average household spends over 4 percent of the household budget on water, and there are a large number of households that spend more than 5 percent of the household budget on water. The very poorest households had to pay 15 to 20 percent of their household incomes on water (Development Workshop 2009). The high cost of water invariably had the effect in many households to reduce family water use or divert household funds to other basic needs, such as food and medical expenses. The main determinant of the water price in Luanda is whether or not one lives in the city's urbanized and serviced part, or in the peri-urban informal settlements ‘*musseques*’ (Cain 2018).

Many people have to buy water from water vendors in the peri-urban areas, and the price can be as high as 10 times the official rate paid by those who have domestic connections to their homes. Water rates at the water tanks are influenced by the availability or proximity of water from the piped system. Water from a tank supplied by a lorry is always much higher than in a tank supplied by the piped system (even in the same bairro or street). In general, water prices rise as a function of distance from the piped supply and from the Bengo River (the primary source of water). Difficult road conditions especially in the rainy season, preventing easy access to water trucks often affect the price. The overall average water consumption in Luanda was only 22 litres per person per day, which is relatively low but comparable to the other African cities where water is costly and scarce as well. (Development Workshop 2009, Cain 2017).

A value or supply chain analysis proved to be an effective tool for understanding the complexity of water markets in Luanda and intersections of both the formal and informal sectors. It was useful to subdivide the market segments into three main components; sourcing, distributing, and consuming, and looks at values added and costs attributed. The main sources that fed the city,

their locations, and the cost of water at the points of origin were identified. The formal and informal chain of water distributors was mapped along with their costs to make deliveries. The consumer is the end-point of the chain and has to pay the accumulated cost of water. Access, satisfaction, affordability, and willingness to pay were all measured. The value chain was used to chart the sequence of material transactions where water resources could be unbundled into the different components of the distribution chain—from output to customers and sometimes disposal. The majority of the water is supplied in the informal sector through a series of transactions. The services provided in the supply chain encompass all the stages from river extraction to water sales to consumers (Cain 2017).

Figure 2. Value chain model of Luanda's water supply system

The chain of market players includes: the Government of Angola represented by the National Water Directorate (DNA), which sets only policy; EPAL-is the public company responsible for water production and distribution in Luanda; water truck operators and home tank owners are key players in the informal sector. Local community water associations are new actors in the market that beginning to bridge the formal and informal.

The truck operators take on the task of transporting water to unconnected consumers, while the owners of home tanks provide water from underground tanks for retail sale. Two-thirds of the population in the *musseques* of Luanda is supplied by water truck operators and stand-posts.

The remainder have irregular supply from piped household connections that the Government installed at the time of the Water-for-All Program. Rapid population growth has meant that the proportion of those families with formal piped connections in their own residence has increased only slowly since the end of the war. The standpost system built off of the rudimentary piped network carrying treated water is becoming increasingly important and is being developed to serve a larger percentage of unconnected consumers in peri-urban areas. Standposts are considered an interim solution before water pipes can be installed to individual households. End-consumers in the formal piped delivery system, who are lucky enough to have household

connections, may be treated as passive actors on the receiving end of the chain and are only obliged to pay their water bills to the water utility company.

The informal peri-urban water market in Luanda generated more than US\$ 250 million per annum. In 2008 it only provided about 20 litres of water per person per day to approximately 4 million people living in peri-urban districts at an average price of about US\$ 0.01 per litre. (Cain & Mulenga 2009).

Water service providers in the formal sector

The provincial water company - EPAL, is the only public sector service provider. If working at full capacity, EPAL could provide 57 litres per person per day for every inhabitant in Luanda. Nevertheless, it supplied just 37 litres per day at the time of the study (Cain & Mulenga 2009), to the households with domestic connections due to leakage in distribution systems and other technological and managerial issues⁵. Unconnected customers must use public stand-posts, water truck operators and home tank owners to access water⁶ (Cain 2018).

Figure 3. Map of Lunada showing the variation of water prices per 20 litre jerry-can

As a short-term solution to the water distribution problem, EPAL has built water truck filling stations *girafas* to supply the underserved peri-urban areas of the city to help serve off - the-network consumers. Operators of water trucks buy treated water at filling stations and then resell it to unconnected households. Most of the filling stations were installed next to the city's EPAL water treatment centres⁷ where the water pressures were higher and EPAL felt they could be monitored more easily.

For the water that is transported by truck operators, the further away a household is from the filling station the more it costs, even if from the subsidized filling station at EPAL. Households are supplied by tanker trucks from the filling stations up to a distance of 20 Km. Water delivery trucks that have to circulate in the crowded city centre add to the problems of traffic congestion in Luanda.

New water systems serving individual households were built to serve the new high-income greenfield commercial areas in the city's southern suburb, Luanda Sul. Such new systems also bypass low-income communities with high density on the route. Water supply to the newly developed subdivisions significantly increases the value of land plots for the private benefit of industrial developers but brings little revenue to EPAL, which sells water at the official subsidized price to a relatively small number of customers residing in these low density housing areas (Cain 2017). The official subsidised price for water is US\$ 0.25 (ExportGov 2017), compared to the informal market price averaging about US\$ 10.00 per cubic meter, forty times more.

Informal providers of water services

Unable to meet all of the city's water needs, especially in new informal settlements, the provincial government came to recognize the role of water truck operators who have helped in bridging the gap in water supply chain. The principal water truck operators supplying the informal water market have registered themselves as an association called ANGOMENHA⁸. The distinction between the formal and the informal is not clearly defined. In the water sector, the informal can often be seen as an extension of the formal—making up for the lack of formal sector ability to expand the services beyond the official household connection network. Informal water operators, some of whom are military officers or members of government functionaries' families, prefer to see themselves as government partner - allies, and government officials have often given them due recognition. In reality, they are significant and critical actors in the market chain (Cain 2017). They struggle to project their legitimacy as operators with the National Water Directorate, EPAL and the Municipalities.

The principal river-water pumping station is owned by water truck operators, members of ANGOMENHA. This filling station is the main source of water supplied by trucks in Luanda and is located adjacent to the Bengo River in Kifangondo (Cacuaco). The water filling station at Kifangondo serves around 550 trucks per day with capacity ranging from 5m³ to 25m³.

ANGOMENHA has the most reliable filling system and drivers need not wait in long queues (see Figure 4). The system ensures that water flows continuously each day⁹. Every ANGOMENHA pump owner member along with the water truck operators contributes to

monthly system maintenance and a monthly tax payable to the Ministry of Finance of 1 per cent. The members of ANGOMENHA are effectively all individually informal operators. The organization itself is being developed as an effort to formalize and rationalize a key part of the supply chain. The ability of the informal operators to pay taxes and water fees is a proof of their embracing some degree of control. These taxes and other expenses incurred within the supply chain are passed on to the end consumer by water truck operators. Consequently, customers indirectly pay tax for the often poor quality river water they purchase (Cain 2017).

Figure 4. Photo of tanker-trucks filling up from River Bengo

Water sales are exceptionally profitable for pump operators who can start earning a profit on their investment in two years or less, but are less lucrative for truck operators who have high driver and fuel labour costs, exacerbated by long-wasted hours spent on overcrowded roads in Luanda. The average income for 10 cubic meter tanker-truck operators is just over US\$ 900 per week, though the driver's wage, the vehicle's depreciation and the owner's benefit have to come from this. The most significant cost is the lorry's depreciation rate, calculated to be more than half the cost of running a tanker-truck. The tanker-truck operational cost contributes to a high water price to the customer rather than any unfair profits of the owners (Cain 2017).

The water sold at the filling station of ANGOMENHA is untreated at source-posing potentially serious health risks. The association did provide for water treatment, however. For chlorination, all drivers are expected to stop in a small water treatment station nearby. While chlorine

treatment costs just US\$ 0.12/m³, there is no mechanism for forcing truck drivers to stop or ensuring that the water has been decontaminated successfully¹⁰ (Cain 2018).

Informal home-based water retailers

The link between the transporters and the seller is a critical point in the informal water supply chain. This is where prices are determined and the amount of water available to the household-based re-seller is determined. Water truck operators bring water from the main filling stations to unconnected household retailers who enter the retail sector to an estimated 70% of the peri-urban population of Luanda who are not connected directly or indirectly to the formal network through standposts (Cain 2017).

The wholesale price is negotiated between the household-based reseller and the trucker, and will depend on distance and other supply and demand factors. The water purchased is stored in householder's yard tanks that are usually underground¹¹. Water is purchased for both family consumption and neighbourhood re-sale. The underground tanks are made of concrete blocks with a storage capacity of 5 m³ to 15 m³. Water retail prices are set by home-based resellers. When they can buy bulk water cheaply, these savings are normally passed on to consumer neighbours. Vendors seldom sell for profit but instead cover their own cost of water consumption (Cain 2018). When interviewed, their neighbours said that they rarely felt that they were being exploited by the water vendors. (Development Workshop 1995 and Lindblom 2010).

Figure 5. Photo of water being resold to neighbours from underground household tanks

Water availability and its cost in the neighbourhood are not decided by commercial considerations alone. Social relations and solidarity with neighbours play an important role. Social solidarity is complex in cities in post-conflict Angola where most peri-urban residents are former internally displaced persons. Urban populations tend to be heterogeneous with a mixture of old and new settlers, often from different ethnic groups (Robson & Roque 2001). Neighbourhood *bairro* relationships are built on closeness, common local issues and shared privation. Householders with a water tank can choose not only the amount, but also which neighbours they want to sell to. Water prices also differ, depending on the relationship between tank owner and water buyer. The owners of water tanks often sell water for a lower price to people with whom they have or built a relationship or mutual solidarity (Lindblom 2010).

Home tank owners often do not have enough money on hand to buy a full tanker-truck of water on a regular basis once their own tank is dry. Until they can collect a lump sum to purchase a complete load of water, they can become users of water from other neighbourhood tank owners. Social networks evolve locally between neighbours who may at different times be buyers and sellers. It becomes therefore essential for every water consumer in a poor, unserved *bairro* to maintain friendly social relations with a range of water suppliers within walking distance of their homes.

Home water retailers typically did not develop networks outside their neighbourhoods. Despite public health campaigns, aimed at building awareness of the dangers of consuming un-treated water, domestic water-tank owners have not built associations like ANGOMENHA. There are no seller networks that have demonstrated capacity to leverage tanker truck operators to better control the quality of water or guarantee its pre-treatment. Public-health authorities therefore had to promote household water treatment and improved hygienic storage, through radio campaigns and social media.

Water street-sellers

Street vendors who work in the informal market selling water in small containers or plastic bags also perform a secondary level of retailing. Usually these vendors receive their water from home tanks and standposts and sell in half litre units for the equivalent of US\$ 0.05 to 0.10. Water sale on the street and in markets is often performed by ambulant traders who are usually considered to be at one of the water market's lowest rungs and make only marginal incomes.

Water carriers and stevedores

Water transport within neighbourhoods by women and girls, who account for 85 percent of carriers, is rarely factored into the price of water after it is delivered by truck to the owner-reseller of the neighbourhood tank or by pipe to the standpost. Women and girls who carry jerry-cans, basins or buckets, sometimes hundreds of meters, to their homes add significant time and therefore value. Child stevedores are hired to move water carts, typically weighing between 40 and 50 kilograms, for longer distances of up to several kilometres. (see figures 7 and 8)

Figure 6. Photo of street vendors reselling water in plastic bags in the informal market

Figure 7. Labour of women and children is rarely factored into the price of water

Figure 8. Children hauling water carts often weighing 40-50kg

Future of the informal water markets

Angolan cities are likely to continue depending for some time on informal water suppliers. The government has tended to regard informal providers as economic opportunists or worse as black-marketeers and exploiters of the poor, because of the high costs of transport which truckers are obliged to pass on to consumers. Critics claim that small-scale water service providers have poor customer service and fail to meet both technical and quality standards. However, because the state's formal water services sector has been unable to meet the water needs of so many residents in Luanda, officials have been forced to accept the role of informal water truck operators who fill the supply gap while the government is developing its capacity to fulfil its full public obligation (Cain 2018).

Water policy reform

Substantive water sector reform appeared after the signing of the 2002 peace accords, with the approval of the National Water Law. The new Law ushered in key reform elements including an acknowledgement of water as both an economic and social good, the acceptance of alternative models for urban service provision that should take place at the lowest possible level, management and the institution of autonomous water utilities and the development of a comprehensive tariff strategy. The reform of the water sector was necessary before major investments that were eventually provided by the World Bank, the European Union, the African Development Bank, USAID and the Angolan Government in peri-urban Luanda via commercial credit lines, such as those now accessible from China and Brazil (Cain 2017).

In cities richer neighbourhoods with household connections to the water supply network had long benefited from subsidised water prices, Government has introduced a new policy¹² of dismantling subsidies and implementing a cost recovery framework for basic services.

The "Water for All Program" became Angola's showcase program for the development of drinking water launched in 2007 and designed to run until 2012. The program built or rehabilitated 638 water sources (consisting mainly of community water points and hand pumps), and installed or restored 282 small supply systems (basically made up of electrical pumps elevated water reservoirs). The program achieved a coverage to over 50% although it did not meet its ambitious goal of 80% coverage by 2012.

Water for All?

A 2012 study commissioned by the African Development Bank (AFDB) for the National Water Directorate (DNA)¹³ shows that in many communities, the Government's flagship '*Water for All*' programme has failed to ensure effective access to water on a sustainable basis. Beneficiary communities were rarely involved in the evaluation of needs and their desire for a water system, as well as its opinion on the choice of technology and management model. Of the electric pump and water treatment systems installed, only 48% were functional. The main constraint identified during the design of the program was the availability of public utility implementation and private sector capacity. This study also found that local government capacity for water systems operation and maintenance is very low, there is almost no collection of user fees, and local governments and municipalities have a limited sense of local ownership of water systems and therefore have no responsibility to maintain them. One main conclusion of the study was that these technical solutions were seldom discussed with the communities and usually do not respond to user preferences (Cain 2017).

Mindful of the shortcomings of the 'Water for All' programme, the Ministry of Water and Energy (MINEA) took a decision in 2014 to tackle the sustainability problem by implementing the MoGeCA (Community Water Management Model) as part of Angola's water policy reform and roll out the program in several provinces¹⁴ with the aim to ensure affordability of water for consumers while providing for the maintenance of the water infrastructure.

Self-management - building community social capital

During the war years attempts were made for the supply of basic services, principally water to thousands of displaced families who were fleeing rural conflict zones to the relatively safe city havens. With international humanitarian assistance, water systems based on wells, hand-pumps and standposts were constructed to provide emergency supplies these communities of displaced people. Water-point caretakers were chosen by each community and trained to take over the management of these systems to ensure that water was distributed equitably and to carry out basic maintenance. (see figure 9)

Figure 9. Water-point caretakers were elected by each community as managers

During the protracted years of the war, community self-management of local water supplies had proven to be an effective way of avoiding vandalism, neglect and protecting infrastructure in the interests of displaced communities (Development Workshop 1996). Even in the post-war period when international humanitarian aid was withdrawn, the continued limited capacity of public utilities providers and local authorities meant that management strategies that included customers in the delivery and maintenance of basic services needed to be established. Through affordability and willingness to pay appraisals, it became apparent that low-income households were prepared to pay for a public water supply if they provided reliable service, and the price was less than that charged by private vendors (Development Workshop 1995, 1998, 2008). Local residents generally assume that piped water from standpoints on the public grid has been treated, and the standard is superior to the water sold on the informal market by the bucket (Cain 2018).

Community Water Management through MoGeCA

Based on the experience of building self-sustaining water systems in the war and post-conflict years a model therefore needed to be promoted to provide an expanded service at an affordable price to consumers. The sustainable community water management model called MoGeCA¹⁵ was developed through rigorous practical testing of its components allowing for sufficient time for learning and feedback. This kind of long-term, local institutional testing is not usually supported by most foreign funding agencies. A support for capital investments in time-bound programs is more frequent. International agencies such as the World Bank often promote privatisation as a

solution (World Bank 2006), but the private sector has shown little interest to enter the sector in Angola (Development Workshop 1997). Angola's national private sector is weak, its public institutions are not strong enough to regulate privatization, and Angola's population has incomes too low to be attractive to private enterprises.

The Luanda water company EPAL recognized that while it did not have the capacity to manage water delivery at community level, that it should prioritize the supply of bulk water — that is, improving the process of extracting water from the river, treating it, and distributing it through the municipal networks. Urban district associations of water committees based in *Comunas* were established through which they could share their experiences and work together to seek better services from EPAL and the municipal authorities (Cain 2018). Some standposts date back to before independence in 1975 but most were built by EPAL and Development Workshop with financing from international institutions and the government's Water-for-All Program.

Water committees are eventually to be set up to work at Luanda's 1500 water standposts, to collect revenue, oversee operations and maintenance, track and document the number of water flow days, and ensure records of all payments and expenditures were kept. Water and water-point maintenance costs were recovered from consumers, and EPAL's proceeds could allow it to provide the community water-standposts with a continuous supply. It meant creating community organizations for which users were accountable, something that had no precedent (Cain 2018).

Figure 10. Water Kiosks having six to eight taps have replaced the stand-pipe mode

The traditional two tap open-air standpost was transformed into larger community water kiosks. Kiosks have six to eight taps, are roofed and protected with grating walls, a lockable gate and a soak-away drainage system for overflow water. Clothes wash-stands are often installed under the same roof. (see Figures 10 and 11)

Figure 11. Clothes wash-stands are often installed at the Kiosks

Two hundred committees for water kiosks representing more than one hundred thousand consumers had already been formed by 2018. Each committee managed its own finances and handled conflicts, including enforcing the prohibition on illegal connections. By 2018, seventeen district-based associations had been formed, each representing ten to twenty neighborhood water committees but still covering less than ten per cent of Luanda's stand-post water consumers.

Developing local consumer groups associations provides the legal support needed to register with municipal governments, and trains and supports community residents to help them reach their potential as water services user managers. In this water supply model, users are client-consumers. They make fair payments at an average of US\$ 0.05 per 20 litre jerry can, for the services provided. The money collected is split proportionally to pay for water from EPAL, create a savings fund for the purchase of spare parts, invest in improvements to the standposts and support the association. Maintenance funds are managed by the associations by annually audited bank accounts to ensure the quality and accountability of group money management. This strategy helps to guarantee the financial sustainability of the standposts, helps people to become accustomed to paying for public services, and strengthens the capacity of local structures in management and accountability (Cain 2018).

Co-ownership & demand for the right to water

Collective ownership is the foundation of the viability of MoGeCA. If the community feels it has a share of ownership of the water infrastructure, it will use the system more wisely and take initiatives to maintain and repair it. Consumers with a sense of entitlement are placing more demands on service providers to improve their quality and efficiency. Economic sustainability is supported by customers' willingness to pay fees for this service (Cain 2018).

Consumer organisations have shown their ability to monitor reliability and quality of services. By advocating for their "right to water", they have become powerful voices and have been active by ensuring access to better facilities. In the MoGeCA model, it is the community association (ACA) that has responsibility to liaise with the water utility provider (such as EPAL in Luanda). In the case of system failures, however, the communication line proved inefficient and response times were slow. For the system to meet the expectations of the community and respond to emergencies when they occur, a real-time complaint system was needed. Working with the International Association of GSMA Operators (Cohen 2016) and the African Innovations Foundation, a mobile-phone based water monitoring system was piloted called VerAgua, engaging the care-takers at the 200 water points and kiosks¹⁶ who had already been trained in basic book-keeping and maintenance. (see figure 12)

Figure 12. Community water management using the mobile-phone-based VeraAgua monitoring system

The VerAgua program uses mobile services (specifically free missed calls, SMS and data) to relay water-service status information. Mobile phone service providers in Angola do not bill for missed calls which are not picked up. Caretakers of the project have been issued unique telephone numbers that correspond to their specific water standpost location. The caretakers' own

phone numbers were also connected to their water point in the database. This allowed the computer-server linked to the GSMA mobile network to connect the missed calls to different water points and to contact the caretakers assigned to each point by Development Workshop. Caretakers reported by placing a missed call to specific phone numbers that match the precise status: related to the functionality of the water point (functional, partially functional or non-functional). An SMS was automatically sent back to caretakers within 20 minutes confirming confirmed water status. These calls were monitored by the web platform to obtain the status of all water points. A status report was sent to the water supply authority once a week, indicating water point status and information on the operation of stand posts. The pilot aims to use water services information to raise awareness of government and build consumer awareness, thereby driving the water company to improve services. Early results are seen as promising; with consumers and service providers alike remaining enthusiastic about expectations that close-to-real-time water monitoring will result in a more sustainable and efficient service (Cain 2018).

Is community management of water sustainable in Angola?

Academics and professionals in many developing countries debate issues around the community management of water (UNC Water Institute 2017). Those promoting the model argue that community management leads to improved performance as local technicians are able to respond more quickly to breakdowns and users have a direct interest in making financial contributions through fees to ensure their water supply continues to function (Chowns, 2015). Nevertheless, model critics point out that by shifting responsibility for maintaining water systems to communities local and national governments abdicate their long-term responsibility for the delivery of service. International donors support the approach which allows them to invest in relatively short-term projects that can be completed then 'handed over' to communities who are expected to sustain the services (Lockwood & Smits, 2011). A review of the literature on community management concludes that the payment of water user fees is not only essential for sustainability but also leads to the more careful use of water (UNC Water Institute 2017).

Twenty district-based water community associations (ACAs) representing tens of thousands of customers met at the Annual Community Water Conference in Luanda, in 2019. Since external donor support had ceased, each ACA has been self-managed and self-financed for more than a decade. Detailed financial statements were delivered to the members at the annual meeting showing the revenue collected in fees at the standpoints and the funds ultimately forwarded to the water supply company EPAL for the procurement of bulk water, while 30% was retained for maintenance costs and caretaker subsidies.

Throughout Luanda and other urban centres throughout Angola, the informal water market still operates with the supply chains that were largely intact laid out in this paper. Although it is still a parallel market, it is progressively crossing over and connecting at strategic points with the formal supply system (see Figure 2). Despite patronage by the state, Angola's private sector was slow in creating and offering sustainable business models. Innovation in the markets for water supply has largely come from the informal sector. This is evidenced by the group of water-truck operators who founded ANGOMENHA to fill a gap in the water system and reach communities beyond the piped water system. Their business model is sustainable because, along the supply chain, the small profits are distributed and they pay their taxes, essentially entering the formal

market. The delivery of water by lorry, however, is very expensive and wasteful in energy and labour and these high costs are passed on to consumers. Even MoGeCA's peri-urban beneficiaries are burdened with paying close to the real cost of water production, while the economic elites, lucky enough to have running water from the piped network in their homes, have used their political weight to actively resist and postpone enforcing government plans to enforce full cost recovery for municipal services (Cain 2018).

State investment in initiatives such as Water for All should continue, but be phased in such a way that musseque populations at least have access through standpoints before individual household connections are built in middle-class neighbourhoods. Research from the Development Workshop shows that the poor, who normally paid high prices for poor quality water, are the most reliable consumer-clients and the most willing to pay for the services.

Poor neighbourhoods have shown that social capital generated by participation in water committees has been used in new municipal government councils to gain recognition and give them a platform to voice their demands for more equitable services. Traditional collaboration in accessing scarce water has employed a micro-enterprise approach to neighbourhood commerce (Cain 2018). MoGeCA has expanded to provide and retain services for an increasing number of communities in Angola on a financially sustainable basis. The Angolan government is promoting the model as a transitional approach to be applied nationwide until piped water can be provided to all individual households.

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Tables and Figures (captions)

Figure 1. Evolution of the access to improved sources of drinking water in war and peace

Source: Angolan National Report for Habitat III 2016 (with permission of author)

Figure 2. Value chain model of Luanda's Water Supply System

Source: A. Cain (2014), *Conflict and Collaboration for Water Resources in Angola's Post-War Cities*

Figure 3. Map of water prices for one 20-litre bucket in metropolitan Luanda, 2014

Source: Cain 2017

Figure 4. Photo of tanker-trucks filling up from River Bengo

Source: Tim Hetherington with permission from photographer 2009

Figure 5. Photo of water being resold from household underground tanks to neighbours

Source: Tim Hetherington with permission from photographer 2009

Figure 6 Photo of street vendors reselling water in plastic bags in the informal market

Source: Tim Hetherington with permission from photographer 2009

Figure 7. Labour of women and children is rarely factored into the price of water

Source: Tim Hetherington with permission from photographer 2009

Figure 8. Photo of children hauling water carts often weighing 40-50kg

Source: Tim Hetherington with permission from photographer 2009

Figure 9. Water-point care-takers were elected by each community to take over the management

Source: Tim Hetherington with permission from photographer 2009

Figure 10. Water Kiosks having six to eight taps have replaced the stand-pipe model

Source: Tim Hetherington with permission from photographer 2009

Figure 11. Clothes wash-stands are often installed at the Kiosks

Source: Tim Hetherington with permission from photographer 2009

Figure 12. Community water management using the mobile-phone-based VeraAgua monitoring system.

Source: Development Workshop, with permission from photographer (2017)

Endnotes

¹ Development Workshop's research through the war and post-conflict years has been supported by the International Development Research Centre, USAID, the World Bank, Bill & Melinda Gates Foundation and the Department for International Development UK.

² There were over 50,000 cholera cases in 2006 and over 5,000 deaths. Cholera and other diarrhoeas are endemic in Luanda and recur in years of heavy rainfall.

³ Interviews on DW's research on urban water markets and equitable basic service fees in Angolan newspapers and radio programs.

⁴ Sustainable Development Goal 6 aims to ensure availability and sustainable management of water and sanitation for all through universal and equitable access to safe, affordable drinking water.

⁵ The amount of water that reaches connected and unconnected consumers cannot be estimated with certainty because there are too many illegal connections to the pipeline in *bairros* without a secondary network distribution system to the households. In addition, intermittent water supply to households with connections means that they also buy water from the informal distributors at various times during the year. Conversely, unconnected households close to the better served urbanised *bairros* that also have the "privilege" of accessing piped water – from clandestine connections to officially served households.

⁶ The majority of the tanks (some 86%) are filled with water supplied by the water truck operators, 11% are connected to a pipeline, and 4% receive water from a combination of trucks and pipeline – depending on availability.

⁷ One of the EPAL sub-systems distributed raw water pumped directly from the Bengo River and treated it in stations within the city.

⁸ ANGONENHA (Associação de Captadores e Transportadores de água de Angola) is the Angolan water pumpers and transporters association. <https://www.facebook.com/Angomenha-590504101055066/>

⁹ Each pump earns between US\$100 and US\$150 per day with trucks paying US\$0.88/m³ of water.

Modest gross revenue for the association can reach close to US\$5,000 – assuming no major breakdowns occur and the official tariff is maintained throughout the month. The pumping station in turn earns annual gross revenue of \$470, 000 to \$700,000 a year against running costs for fuel, operator maintenance and spare-parts.

¹⁰ EPAL the provincial water authority takes weekly samples of water are taken to their labs for chlorine analysis, but only from the cisterns of trucks that have voluntarily stopped for chlorination.

¹¹ The majority of the tanks (some 86%) are filled with water supplied by the water truck operators, 11% are connected to a pipeline, and 4% receive water from a combination of trucks and pipeline – depending on availability.

¹² The collapse of global oil prices in 2014 obliged the Angolan Government to follow recommendations from the World Bank and IMF to progressively remove subsidies from basic services and fuel.

¹³ Development Workshop and CoWater International implemented the study for AFDB between 2013 and 2015.

¹⁴ USAID provide financing to Development Workshop to pilot MoGeCA in Huambo, Cunene, Cuanza Sul and Luanda.

¹⁵ MoGeCA is the Portuguese language acronym for Model of Community Water Management

¹⁶ VerAgua is also being piloted in 150 rural water systems in the province of Huambo serving about 100,000 people.