



Assessing Public Participation in Water Conservation and Water Demand Management in Water Stressed Urban Areas: Insights from the City of Gweru, Zimbabwe

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ARTICLE INFO

Received: 04-07-2016
Accepted: 06-08-2016
Available online: 30-08-2016

Keywords:

Awareness;
Compliance;
Urban areas;
User participation;
User perception;
Water conservation;

JEL Classification:

ABSTRACT

Third world municipalities are saddled by a plethora of challenges in service delivery. They also simultaneously have limited capacities at their disposal to solve the problems. However, public participation can reasonably enhance service delivery through conservation of the available limited resources. The paper investigates the level of water user participation in water conservation in the city of Gweru. Data was collected from water users and key informants selected from the local authority and citizen representative groups. A survey of 489 households was carried out in the city. Several water conservation and demand management measures were identified. However, the majority of respondents (98%) was never consulted by the local authority and did not participate in water decisions. Only a few respondents (2%) participated in water conservation and demand management consultation meetings. This indicates that decision-making was a sole prerogative of the local authority. Conservation awareness across residential suburbs was incredibly low despite high literacy levels among the residents recorded in the city. Respondents reported significantly low participation ($p = 0.078$) in water conservation trainings which may have translated into limited conservation literacy. The findings also revealed poor communication channels between the local authority and residents such that water users felt disrespected and disregarded. Unfortunately no initiatives were in place to encourage and enable water user participation in water management. Lack of water user participation will perpetuate water conservation and demand management problems in the city of Gweru. It is therefore recommended that active participation channels be opened for sustainable water utilization and service delivery to be realized in Gweru.

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DOI: <http://dx.doi.org/10.18533/rss.v1i8.51>

ISSN 2378-8569(Print), ISSN 2378-8550(Online)

1.0 Introduction

Water is a scarce resource in most third world cities as a result of its physical unavailability and/or financial incapacity of municipalities to supply water for the growing populations (United Nations 2014; Watkins, 2006). However, Sub-Saharan Africa experiences more of economic rather than physical water scarcity (Kirono et al.,2013; Kusena and Beckedhal, 2016). The situation challenges cities to have a management approach that ensures water security in all its dimensions such as availability, accessibility and quality (Ariyabandu, 2001; Beck and Walker, 2013; Kirono et al.,2013). Municipalities should always have contingency measures in place that involve stakeholders in order to sustain water service delivery and avoid reactive responses in times of

drought only. For effective urban water management, an integrated approach focusing on people's participation is essential (Vasquez 2004) because water is an initial starting point for community development. Nonetheless, urban areas face supply imbalances as a result of population growth and city expansion (Sithole, 2012; Sorokovskyi and Olschewski, 2012). Principally, due to underperforming industrial sectors in developing countries' cities, residents survive on the available water whether rain or municipal for their income generating activities and food security (Chadyiwanebwa, 2012; Hungwe, 2006; Sithole, 2012). Water conservation discourse is therefore pertinent for financially struggling third world cities; especially where efforts to develop new water sources are becoming more expensive and overtaking municipalities' financial capacities (Macy, 1999).

The Department of Water Affairs and Forestry (DWAF) (2004:11) regards Water Conservation (WC) and Water Demand Management (WDM) as interrelated concepts. The former focuses on minimisation of loss or waste, care and protection of water resources whilst the latter is geared at reducing expected water usage through the adaptation and implementation of policies and initiatives by water institutions, in order to meet economic efficiency, social development, social equity and environmental protection, sustainability of water supply and services and political acceptability (DWAF, 2004). Slightly different concepts as they may sound, both WC and WDM can fit under the umbrella term 'conservation' because the ultimate goal is protection of available water resources. Macy, (1999) uses water conservation and demand management interchangeably because both concepts refer to issues of water protection and management. Generically, WDM is a component of WC. This article shall therefore refer to WC and WDM as slightly different but overlapping concepts.

When properly carried out, in the framework of Integrated Water Resource Planning, WC/WDM can positively affect the supply capacities and ultimately improve water supply coverage in cities (Mckenzie, 2014). A big mistake that most third world cities still make is having a supply-oriented management of water (Gumbo and van der Zaag, 2002). They treat WC and WDM as separate campaigns yet conservation affects the supply capacity. Rademeyer et al (1997) reported that using a variety of WC/WDM techniques leads to delays in the implementation and development of new water sources.

However, for WC/WDM to realise the intended goals, stakeholder participation is essential. Woodhill and Van Vugt (2008) encourages approaches that are tailor made to suit a particular situation and avoid the 'right answers' or 'one size fits all' approach which in most cases tend to sideline or discriminate players. Hudson (2001) and Keeley, (2015) posit that answers to problems change with time and place of occurrence. Although general frameworks and typologies of participation (Cornwall, 2008) are available, approaches in developed and developing countries for water conservation are bound to differ because of differences in nature, extent of challenge and capacities to handle them. Aapaoja et al., (2013) state that the involvement of stakeholders contributes to conflict prevention and resolution. The idea of participation requires stakeholders working side by side rather than having a defined hierarchy whereby the organisations at the bottom of the hierarchy are disregarded in decision making (Nkondo, 2013). Arnstein, (1969) and Pretty, (1995) refer to the aforementioned typology of participation as therapy manipulation (non participation) or passive participation, respectively. In both typologies, there is a unilateral announcement of decision by authorities without listening to people's responses (Cornwall, 2008). To ensure incorporation of citizens, target 6b of Sustainable Development Goal number 6 aims to ensure availability and sustainable management of water for all and looks forward to support and strengthen the participation of local communities in water management (Griggs, 2013). Therefore, this article looks at the adequacy of citizen power and control participation typology, as it is explained by Arnstein, (1969) as a form of 'good' participation in water management.

Observing the interests and priorities of all stakeholders whether poor or rich is vital for social justice (Rasul and Jahir, 2010). Policies and management styles that include engagement of all stakeholders lead to improvements in water management and citizen representation (Ingram and Bradley, 2006). Mckenzie (2014) argues that the involvement of users is critical in the achievement of efficient water use because of perceived self-worthiness. For instance, Stenekes (2006) states that setting of water tariffs should be a participatory exercise whereby all stakeholders involved are actively participating. Consumer involvement should not be used as a stop gap or drought relief measure during times of serious water shortages only (Beck and Walker, 2013), but must always be included in the water service delivery system. The Dublin Principle on stakeholder participation also upholds the involvement of stakeholders at all levels (Solanes and Gonzalez-Villarreal, 1999). However, stakeholder participation is sometimes defeated by neoliberalism. Martinez and García (2000) state that neoliberalism embraces the concept of individuality that casts ordinary citizens aside and regard them as useless (Pretty, 1995). The individual focus means that ethos of public goods management is being discarded (Passas, 2000). Water is a political issue and decentralisation that involves devolution of power from the center to local units must be present in its management. Such management counters concentration of political power

through transfer of responsibilities to sub-systems (Rondinelli et al., 1989). Devolution of power then makes water user participation a distinctive element in water resources management.

WC/WDM perspective requires that all consumers or users adopt conservation culture and ethics. Conservation is a long term goal whereby achievements are realised overtime (Bulawayo City Council 2007). Resource users will always have a preconceived mindset about an existing management system, whether wrong or right. Such people require appropriate education and involvement in order to demystify and clarify issues to necessitate their incorporation (UNESCO 1998). This implies that water conservation and demand management cannot be imposed on water users; it is something that comes over time, primarily as a result of awareness and participation. The World Bank Institute (2010) also makes reference to the importance of user participation and pointed to the results that were realised in Honduras as a result of changes in behaviour. User participation in Puerto Cortés municipality in Honduras resulted in significant accountability and transparency that brought about sound management of its own water sector. The term 'own' is strategic in conservation issues. When users possess ownership of processes and decisions, success in water conservation will be inevitable. An active involvement of the water users in the planning and provision of water services in Ghana contributed to water conservation and financial viability. User involvement brought about subsequent change in perception and behaviour towards water conservation (Osumanu, 2010). This paper incorporates the critical aspect of user perception that drives behaviour. According to Audi (1999), perception is a belief or opinion, often held by many people and based on how things seem. Although necessarily based on incomplete and unverified (or unreliable) information, perception is equated with reality for most practical purposes and guides human behaviour. Water conservation can only be successful when user behaviours and attitudes are transformed. Human behaviour is such that their actions are guided by what they believe in or what they perceive or prefer to be wise at a given point (Gilbertson, 2011). Nonetheless, provision of incentives and appropriate education to save water is also instrumental in making the poor water users more willing and conscious about water conservation (Adebayo, 2002; Narsiah, 2007).

The current body of literature in Zimbabwe is mainly on water shortages and service delivery limitations. Majority of research efforts to date focus on water supply challenges that bedevil municipalities and impressively articulate the effects of the discrepancies in terms of health and coverage (Gumbo and van de Zaag, 2002; Mangizvo and Kapungu, 2010, Matsa, 2012; Kusena and Beckedhal, 2016; Muranda, 2011). For Gweru, research findings also show supply challenges and shortages (Kusena et al, in review; Matsa, 2012; Madebwe and Madebwe, 2012) However, no research has attempted to assess the role of public participation as a panacea to the supply challenges. Literature outside Zimbabwe points to non-participation and lack of awareness as causes of deviant behaviours in resource management (Rondinelli et al., 1989; World Bank Institute 2010; Rosenberg-Kjelds, 2008; Ray, 2008). For example, as a result of non-participation in decision making processes; South Africans devised strategies that protected their space during apartheid. In places such as Soweto, users engaged professional plumbers who lived in the area to reconnect themselves to water supply illegally as counter-strategies to hegemonic systems (Narsiah, 2007). Despite availability of evidence that public participation is indisputably indispensable in water conservation and service delivery; no research has been carried out to that effect in Gweru. There is dearth of information on the participation of citizens in the water service delivery system of Zimbabwe although potential worthy is known. Thus to address the reiterated gap in the current body of literature, the study used a household survey to earth citizen perceptions regarding the space they occupied in water decisions. This was done through questionnaires to find out the forms and levels of participation in the water challenges problem solving process. The thrust of this paper is on the assessment of water user incorporation and participation in the WC/WDM strategies for better service delivery in the city of Gweru. The study findings suggest a knowledge base that informs urban water management policy through full incorporation of citizens at every stage for short and long term benefits. Recommendations have been proffered to enhance urban water security and for future studies in urban water management.

The remainder of this paper is organized as follows: Section 2 describes the conceptual framework that informs the study. Section 3 describes the study of the area and the methodology used to conduct the study. Section 4 presents the study results and their discussion. Finally, section 5 presents our conclusion, implications for policy and suggestions for future research.

2.0 Conceptual framework

This article is embedded on political ecology theory, neoliberalism and Citizen Science. Political ecology theory emphasises power struggles and inequalities in environmental management (Wolf, 1972). Peet and Watts (1996) resuscitated the vibrancy and momentum of political ecology theory in the 1980s when they focused on the role of grassroots actors and social movements. The theory highlights the importance of social and political dimensions that are rarely considered, especially by natural scientists in environmental solutions.

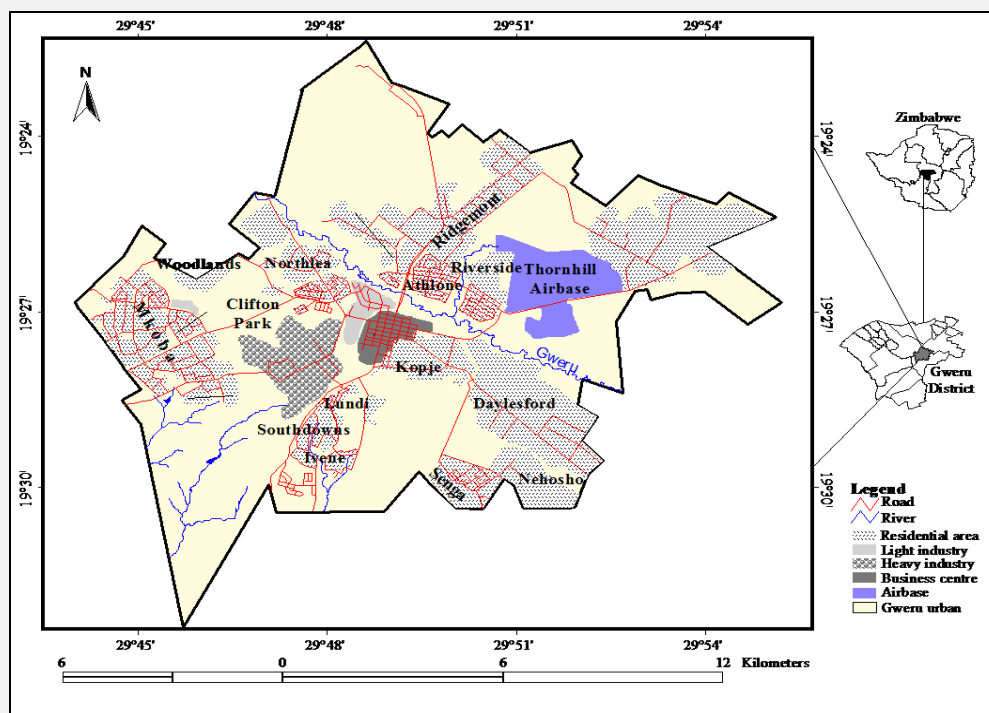
Environmental challenges are usually viewed with a scientific eye, but political ecology then places them in an integrated approach context across spatial scales that include the economic, political and ecological dimensions (Blaikie and Brookfield, 1987; Bryant and Bailey, 1997). This theory gives visibility to marginalised socio-environmental actors, revealing often ignored connections and relations of power. In order to bring out all the latent causes of conflict, political ecology embraces an anthropological dimension that normally works through ethnographic methods; in order to understand the decisions that communities make about the environment in the context of their political environment, economic pressure, and societal regulations. Information from the general public, in this case water users may even promote the questioning of existing public policies and the proposal of new forms of action and public control (Little, 2007).

Political ecology theory suggests that some stakeholders may be more powerful and more equal than others depending on their economic and political power (Carney and Watts 1991; Blaikie, 1999). Nonetheless, whether perceived or proven, political dimension of power struggle always exists. However, political ecology explains how marginalisation or non-participation of some stakeholders leads to degradation of resources as citizens will be disgruntled. The power of individuals or organisations echoes the systems of neoliberalism (Desai, 2003). Neoliberalism and individuality are actually an extension of colonialism. However, citizens always come up with counter-hegemony instruments (Narsiah, 2007) as they feel prejudiced, undermined and disrespected. Citizens then organise themselves into strategies that will help them survive in the midst of externalised challenges of public service to citizens. Citizens do that as they will be trying to protect their space. From analysis, the scenario created under political ecology and neoliberalism; where a complex of superiority manifests, brew a lot of resistance from citizens. The problem could be redressed through a citizen science paradigm. Citizen Science according to Bonney et al., (2009) respects participation of all interested parties in the management of resources, both from the public and professional fraternities. Supporting the concept of citizen science, Adebayo (2002) adds that development should recognise the needs of entire population regardless of their political affiliation or territorial locations. It is against the given conceptual framework that the paper assesses the forms and level of user participation in WC/WDM discourse in a bid to achieve sustainable city water management. This article therefore attempts to take a simultaneous account of economic, political and environmental dialectics of Gweru water conservation system. Politically, is the user voice paid attention to? Economically, do the financial circumstances permit and does the environment still have the capacity to sustain demand and for how long can the *status quo* continue?

3.0 Study area

Gweru is Zimbabwe's third largest city, with a total population of 158 233 (Zimstat 2012). It is located at 19°25'S 29°50'E and lies about 285 km south west of the capital city Harare (Fig 1). The city has three domestic water supply dams namely Whitewaters, Gwenhoro and Amapongokwe.

Figure 1: Map showing Gweru residential areas



3.1 Methods and materials

The article used an emerging research approach of Citizen Science (Bonney et al., 2009). A combination of water user voice and official position from the municipality was used to solicit data for the study. Citizen science respects both public and professional participation in issues of service delivery and policy making (Bonney et al., 2009). Collaborations between scientists and volunteers have the potential to broaden the scope of research and enhance the ability to collect scientific data (Cohn, 2008). Therefore, the study deliberately paid attention to the officials and citizens voice through interviews and household survey in order to establish the level of user participation in the city’s water management system.

Household respondents for questionnaires were selected using a stratified sampling technique. Gweru has 49 residential suburbs with a total of 29 973 housing units, classified as high, medium and low density areas. 20% of these residential suburbs were randomly selected as Primary Sampling Units (PSU). A sample of 489 housing units (representing 10% of the PSU population) was proportionally distributed across residential areas as shown on Table 1. Household questionnaires were administered using a drop and pick method in order to give consenting participants enough time to complete the questions. The questionnaire gathered data on existing water conservation measures and levels of water user awareness and participation in water issues. Compliance was measured using three aspects and indicators (Table 2). Questionnaires were used because they cover a large number of respondents within a reasonable time frame.

Table 1: Sample size determination

Classes of residential areas	Names and number of suburbs in each class	Number of housing units in each selected PSU.	Sample size of households (10% of total population in each suburb)
High density suburbs	32 (Mkoba1,2,3,4,5,6,7,9,10,11,13,14,15,16,17,18,19, 20; Senga; Mutasa/CliftonPark; Mambo; Ascot; Nehosho; Woodlands; Mutapa, Garikai, Shamrock; Montrose)	6 (Mkoba 1- 347 Mkoba 12- 405 Mkoba 19- 755 Senga- 1540 Shamrock-25 Mutapa 3 and 7- 489)= 3561	6 (Mkoba 1- 35 Mkoba 12- 41 Mkoba 19- 76 Senga- 154 Shamrock- 3 Mutapa- 49)= 358
Medium density suburbs	3 (Ivene; Nashville; and Northlea)	1 (Ivene- 370)= 370	1 (Ivene- 37)= 37
Low density suburbs	14 (Kopje; Athlone; Clonsilla; Harben Park; Dalysford; Windsor Park; Ridgemont; Riverside; Kingstone Park; Mimosa; City center; Lundi Park; Southdowns’/Extension; Christmas Gift)	3 (Harben Park- 79 Southdowns/Extension- 737 Dalysford- 124 = 940	3 (Harben Park- 8 Southdowns/Extension- 74 Dalysford- 12)= 94
Total	49	4871	489

The researcher also used a social media platform to collect data for the study by joining a Gweru Residents and Rates Association (GRRRA) WhatsApp group. A WhatsApp Chat topic on water decisions and participation level was initiated in order to collect data on residents’ (users) opinions. Participation was rated using meeting attendance and conservation training. Participation in any of the two or both implied active participation in city water issues. However, the use of social media presents challenges on the reliability of collected data. In most cases it is unknown whether those commenting represent the views of all water users because some of them might be of a different viewpoint but not commenting (Kolb, 2015). To counter this limitation, the collected data was validated through interviews with GRRRA representative, ward councillors and officials from the municipality together with questionnaire survey across suburbs.

Table 2: Aspects and indicators of compliance

WC/WDM Strategy	Indicator of Compliance
High monthly water charges	-Payment -Reduced usage
Fines in the event of abuse	-Payment -Following prescribed water use
Whistle blowing	-Citizen reports to the authorities

Compliance percentages were then calculated against the total sample rather than on users' awareness because some would be found complying by default without the requisite knowledge. Reasons for non-compliance were assessed based on residents' opinion. Though not scientific and hardly validated on their own, public opinion surveys are a potential valuable source of information, particularly in conservation efforts (Bennett and Dearden, 2014; Mahler et al, 2008).

3.2 Data analysis

Household survey data were coded and analysed in SPSS Statistics 20 at 95% confidence interval. Kruskal Wallis test was used to determine whether sentiments towards 'municipal relations with residents' vary significantly across different categories of residential areas (high, medium and low density suburbs). The perceptions were measured on a 5 point Likert scale from very poor to very good (Very poor = 1, Poor = 2, Not sure = 3, Good = 4 and Very Good = 5); hence generating ordinal data. Chi-Square was used to test for association between level of education and monthly income; bill payment and place of residence; consultation in water decisions and place of residence; and between area of residence and participation in WC training. ANOVA was also used to test for differences in income across residential areas. Interview responses and WhatsApp chat contributions were organised into sub themes for results reporting and discussion using descriptive statistics.

4.0 Results and discussion

4.1 Socio-demographic characteristics of respondents

Four hundred and eleven respondents out of 489 completed and returned questionnaires. This response rate corresponds to more than half of the total questionnaires, a percentage that is acceptable for analysis and reporting (Babbie and Mouton, 2001). Fifty five percent females and 45% males completed and returned the questionnaires. Most respondents' (70%) income ranged from USD 101 to USD 500. These included teachers (26%), nurses (9%), security forces (7%), secretaries (4%), pensioners (5%) and self employed (19%). Only 3% of the respondents earned more than USD500 per month. The remaining 27% (111) were found to be unemployed. ANOVA results show that there were no significant differences ($p = 0.231$) in monthly incomes across residential suburbs. The Zimbabwe National Statistics Agency (2015) states that the Poverty Datum Line for Midlands in July 2015 was USD510, 42 for an average family of 5. This shows that most residents of Gweru are living in poverty with the exception of 3% who earn a monthly income that is above USD500. The situation in Gweru refutes the assumption of political ecology theory that disparities in income could be based on affluence of an area (Robbins, 2004).

In terms of level of education, 81% of the respondents had acquired tertiary education. The sample had a relatively high literacy rate. Desai (2012) states that literacy reduces economic disparities and increases income, but, to the contrary, Gweru recorded a high literacy rate accompanied by low income that was below the Zimbabwe Poverty Datum Line, across the residential suburbs. Chi-Square test results confirmed that there was no association ($p = 0.084$) between level of education and monthly income across suburbs.

4.2 Water conservation and demand management strategies

Gweru municipality and residents pointed out several measures that were used in the city to save water as shown on table 3 and 4. However, local authority officials revealed that the city does not have a clearly communicated proactive water conservation and demand management policy. Gweru city resorted to *ad hoc* water conservation and demand measures that included fixing leaks or bursts and reducing water pressure only during drought periods. Gumbo and van der Zaag (2002) also lamented the reactive behaviour of municipalities in Zimbabwe; where water conservation and demand management is engaged as a last and desperate resort during water shortages. Water Demand Management strategies were obtained from the key informants through interviews because they were facilitated from the service provider whilst conservation strategies were identified from both interviews and household survey. Table 3 contains strategies that were randomly enforced and exercised in the city.

Table 3: Water conservation strategies revealed from the household survey

Water conservation strategies	Percentage Responses across residential areas
Morning or evening garden watering	23%
Water reuse	35%
Replace worn tap washers and leak fixing	29%
Not leaving the tap running while brushing teeth	8%

Keeping a bottle of water in the fridge to avoid running water till it gets cold for drinking in hot summer	12%
Use of buckets to wash cars instead of hosepipes	27%
Shower rather than filling bath tubs	31%
Low water pressure and water cuts by local authority	21%
Whistle blowing	5%

Respondents indicated multiple conservation measures from the provided options. However, 21% of them added water cuts and low pressure as conservation measures that were initiated from the local authority's side. Only 5% indicated whistle blowing as a conservation measure whilst the rest did not find the need to cooperate with the municipality because the service was poor and at the same time they were never consulted in decision making.

Table 4: Water demand management strategies by the municipality

Water demand management strategies
<ul style="list-style-type: none"> ▪ Lower water pressure ▪ Water cuts particularly during the day ▪ Increasing monthly water charges ▪ Deterrent fines in the event of abuse ▪ Whistle blowing

Due to poor communication between the municipality and residents, respondents thought that water cuts and low water pressure were done in order to limit usage and conserve water. Although true to an extent, the City Engineer revealed that in most cases water cuts were not as a result of demand management. The experienced water cuts and low pressure were actually a result of low pumping capacity and power outages. This concurs with the findings by [Matsa \(2012\)](#) that water supply can be a problem as a result of low pumping capacity. [Vijayalaksm and Babu \(2015\)](#) also observed that it is hard to achieve supply of expected quantity of water to the consumer with adequate pressure head, particularly under circumstances like water loss and inadequate hydraulic capacity of the distribution system. In relation to that, other studies show that frequent water cuts attracted hostility from residents especially when communication is poor ([Pereira, 2002](#); [Ellen and Kellogg, 2013](#); [Roushdy et al, 2012](#)).

However, the only challenge is that residents were not in a position to know whether low pressure was deliberate or as a result of low pumping capacity. The local authority indicated that efforts to notify residents about disruptions in service were done but were limited due to financial constraints. The municipality would sometimes use a loud speaker to notify residents. Nonetheless, failure to communicate with residents created misinformed citizens and that worked against water conservation efforts. In South Africa notices are given for maintenance schedules ([Mangaung Metropolitan Municipality 2016](#)). Communication is critical because it gives users sense of importance. It also gives them an opportunity to make necessary arrangements in preparation for the disruptions.

High and deterrent monthly water charges were sometimes used as a measure to reduce water usage in the city. These were meant to discourage residents from using much water for fear of high bills. However, 70% of the respondents indicated that the bills they receive on a monthly basis were not justifiable. The reason cited was that water was rarely available and residents wondered what the local authority was basing the bills upon. Interestingly, an interview with the city authority revealed that Gweru City Council doubted the accuracy and functionality of their water meters. Therefore, using high monthly rates to deter wasteful use was incongruous with the situation considering the erroneous meters. In contrast, some communities in the USA effectively conserve water as a result of rebates given as economic incentives for efficient water use ([Borisova et al, 2009](#)). Nonetheless, Gweru system was rather combative and punitive.

Whistle blowing was also confirmed as an existing measure by the local authority. Residents were expected to report cases of water abuse, for instance, when hosepipes were used during drought seasons. Whistle blowing was ineffective in Gweru mainly because there were no incentives for whistleblowers. A study that was carried out in South Africa, ([Ntshotsho, 2012](#)) revealed that conservation efforts can be difficult and ineffective when users are only expected to comply with regulations without benefiting or having their full participation in the crafting of the same regulations they are expected to comply with. Therefore, all stakeholders especially water users who are the community entity should be engaged and consulted at all times.

4.3 Residents' awareness and compliance with conservation measures

Table 5 shows that Gweru residents had limited knowledge about water conservation and demand management measures in place. Only one measure (high water charges) recorded an awareness level that is above half across the three categories of residential suburbs surveyed. UNESCO (1998) suggested that appropriate education and public awareness should be organised for sustainability in water conservation. Gweru has a high literacy rate with 81% of the population, across all residential suburbs, having acquired tertiary education. Ironically these people possessed little knowledge about water conservation. The finding suggests that Gweru City council is lacking in the sensitisation of residents concerning efficient use of water. Braus, (2013) argues that it is very important that local authorities increase environmental awareness and literacy in order to avoid unnecessary misunderstandings. High awareness pertaining to high water charges across residential areas was actually as a result of negative reinforcement such as water disconnection due to non-payment. However, the Zambian government facilitated conservation awareness together with significantly subsidised water services to avoid disconnections and conflict (Plummer, 2003)

Unfortunately, in Gweru 78% of the household survey respondents had not gone through any form of water conservation training as a result of the municipality initiative. Ninety one percent of the residents pointed out that they were not familiar with municipality by-laws related to water use and conservation. Undesirably, only the key informants from municipality were conversant with the by-law provisions. The authority confirmed that dissemination of that crucial information to residents was poor due to limited necessary human and financial resources. This implies that even where residents would have wanted to conserve water, limited conservation literacy militated against all efforts.

Table 5: WC/WDM awareness and compliance level in residential suburbs

WC/WDM strategies	User Awareness				User Compliance			
	HD (N=322)	MD (N=26)	LD (N=63)	City awareness level N=411	HD	MD	LD	City compliance Level N=411
Mornings or evenings garden watering	72 (22%)	7 (27%)	18 (29)	97 (23%)	14 (4%)	2 (8%)	8 (13)	24 (6%)
Water reuse	106 (33%)	8 (31%)	29 (46)	143 (35%)	210 (65)	6 (23)	38 (60)	254 (62%)
Replace worn tap washers	168 (52%)	9 (35%)	13 (21)	120 (29%)	12 (4%)	5 (19)	9 (14)	26 (6%)
Not to leave the tap running while brushing teeth	18 (6%)	5 (19%)	11 (17)	34 (8%)	4 (1%)	2 (8%)	4 (6%)	10 (2%)
Keeping a bottle of water in the fridge to avoid running water till it gets cold for drinking	21 (7%)	10 (38%)	21 (33)	52 (12%)	9 (3%)	6 (23)	18 (28)	33 (8%)
Use of buckets to wash cars instead of hosepipes	91 (28%)	7 (26%)	14 (22)	112 (27%)	40 (12)	6 (23)	13 (20)	59 (14%)
Shower rather than use bath tub	102 (32%)	11 (42%)	16 (25)	129 (31%)	76 (23)	5 (19)	19 (30)	100 (24%)
Increasing monthly water charges	210 (65%)	19 (73%)	37 (59)	266 (65%)	62 (19)	9 (34)	12 (19)	83 (20%)
Fines in the event of abuse	37 (11%)	9 (34%)	19 (30)	65 (16%)	8 (2%)	3 (12)	7 (11)	18 (4%)
Whistle blowing	17 (5%)	12 (46%)	21 (33)	50 (12%)	7 (2%)	4 (15%)	10 (16%)	21 (5%)

Key: HD = High Density; MD = Medium Density; LD = Low Density

Compliance level results also show low compliance rate across surveyed residential suburbs (Table 5). Cases that recorded more than half of the respondents' compliance, such as water reuse, were simply a result of water shortages; such that residents were forced to recycle water. Paradoxically, 52% of the high density respondents were aware that fixing tap washers was a conservation strategy, however only 4% complied. Lack of disposable income to replace the washers and fix taps was cited as a hindrance since most residents were living below PDL.

Therefore, WC/WDM awareness and financial capacity building is required to avoid water loss. In United States of America leaks account for 14 percent of indoor water use (Grace Communications Foundation 2016). Unfortunately, the city of Gweru is not taking the initiative to capacitate residents to fix pipes and taps. The situation also suggests the reason why there is non-revenue water in the water conveyance system in Gweru [Kusena et al., in review]. In South Africa, national leaders embark on campaigns to fix leaks to save municipal water (Department of Water and Sanitation, 2015). The campaigns were done with the participation of water users in order to cultivate a culture of compliance with conservation strategies.

A number of reasons were suggested as to why compliance with WC/WDM measures in the city was poor. Firstly, the residents did not have conservation information. Secondly, some of them just did not want to conserve water because of lack of ownership of the system. Lastly, residents had lost trust in the municipality because of past experiences to be discussed. This suggests that whenever residents complied, it was mainly by default. Fifty-two percent of the respondents from the survey emphasised that they did not conserve or observe WDM measures because the water was not theirs. The public was not aware that water was not municipality's resource but everyone's responsibility. In the Samoa community in the Pacific Island, demand was controlled and conservation was achieved as a result of attitude change through community participation and empowerment (Grafton et al., 2010). In contrast, Gweru residents did not perceive water as a commodity that belonged to them but to the municipality. In this regard, residents did not view conservation as a civil duty. Interviews with the municipality officials to corroborate findings from residents shifted the blame to councillors. Respondents suggested that councillors were not playing their role of educating and orientating residents about water ownership.

Following interviews carried out with councillors, it was revealed that despite them being expected to educate the community, the councillors actually required water conservation and demand management training themselves. The councillors had no adequate information about water conservation. An interview with municipality informants to find out why there was no in-service training pointed out lack of financial capacity and time as challenges. The authorities indicated that residents were supposed to look for information on their own because residents' ignorance would not be regarded as defence. In cases where there was no compliance prosecution of perpetrators for the benefit of the environment would apply. It was revealed during the interviews that the local authority would sometimes reprimand the guilty party, cause the resident to pay a fine or just disconnect water supply. However, the decision solely lied with the authority and sadly not in consultation with the residents. This finding raises a question of discrimination echoed in political ecology and confirms that even in urban areas some people can face adverse impacts of a system simply because they are less powerful or do not have control over the system (Myers, 1999).

The majority (79%) of Gweru residents did not trust the local authority. Residents felt that they were not in a good relationship with the municipality and found it necessary to rally behind one another in solidarity. This is the reason why measures such as whistle blowing were hardly received in Gweru. Following the use of Kruskal Wallis test, it was obtained that residents shared the same sentiment across residential areas. There was no significant difference ($p = 0.182$) between high, medium and low density users' views with regards to relations between municipality and residents. The Water Services Regulatory Board (2012) revealed that involvement of users instils sense of ownership that translates into trust and behavioural change. Gweru municipality is perceived as a common enemy by the residents because they have a long history of imposing decisions on residents without consultation and in the process creating passive participation (Kusena and Beckethal, 2016 and Pretty, 1995). Therefore, according to the findings cooperation with the municipality would be tantamount to betraying one another. As a result, water demand and conservation measures were rarely complied with by residents.

Sixty nine percent of the respondents cited cases that triggered lack of trust and non compliance. These two cases were prominent; Firstly, residents' efforts to support the local authority through bill payment were previously not acknowledged. For example, a debt cancellation in 2013 did not benefit compliant water users. Water bills were cancelled and no incentive was given to the compliant residents. For that reason residents felt no need to cooperate. Secondly, in 2014 the local authority merged water services and owner's rates accounts without consulting residents. This applied to the low and medium suburbs. The July 2014 water statement was written "*for easy administration, the local authority has merged the owner's and water services rates with immediate effect*". The statement served as communication to the public. Unfortunately, this communication took place simultaneously with water disconnection for non-payment. This affected residents, particularly tenants who had no obligation to pay owner's rates. A study by Kalulu (2015) revealed that trust between and among stakeholders builds good relations, which is a good setting for resource conservation. In this case, the local authority used water as a tool to compel residents to pay other bills not directly related to the precious resource. Noteworthy is the fact that the exercise contravened section 77 of the Zimbabwe constitution which

states that access to water is a human right (Zimbabwe Constitution, 2013). Unfortunately, nothing was done to stop the exercise and residents were compelled to pay using payment plans. This created a disconcerted citizenry that was not willing to conserve water. This clearly manifests a picture portrayed by political ecology and neoliberalism hegemony (Narsiah, 2007), where power is centralised and a system takes advantage of the politically and economically weak (Bonney et al., 2009).

However, in terms of monthly bill payment, Chi-Square test results showed that the number of defaulters varied across residential areas ($p = 0.000$). This is confirmed by the fact that although most people were paying their monthly bills in high density and low density suburbs, the number of defaulters and those who were complying was equal in medium density suburbs (Table 5).

Table 5: Monthly bill payment response

			Residential suburbs			Total
			Low	Medium	High	
Monthly payment	bill	Yes	37	13	204	254
		No	26	13	118	157
Total			63	26	322	411

Bill payment enforcement through disconnections was common in high density suburbs. Respondents attributed this to residents' fear of prosecution. Despite the respondents' high general literacy rate, most of them were not aware of their constitutional rights in relation to water. As a result, high density residents normally responded faster. The results somehow concur with the political ecology theory assumption which states that in societies there are power struggles which are visible and latent. The powerful ones in societies always find ways to externalise adverse effects in every situation (Bryant and Bailey, 1997). However, latent power of citizens manifests itself through non compliance.

4.4 Form and level of user participation in water conservation and demand management

Findings revealed that of the meetings held between the residents' association representatives and the municipality officials, residents' representatives felt overridden and disregarded. Most of their suggestions were never incorporated into decision making. Initiating a meeting from the residents' side was reported to be difficult since the authorities only convened meeting as per their schedules. Residents from across all residential areas indicated that they were never consulted (98%) and had no control over water decisions. Only less than 1% indicated that they participated in meetings. The remaining 1% did not respond to the question on form and level of participation. This explains why 76% of the residents revealed that most water decisions came as a surprise as they only knew them through enforcements.

The users' representatives such as councillors and GRRRA committee members were also not effectively executing their intermediary role. Residents' representative failed to establish effective feedback channels between the local authority and residents. The findings revealed that 49% of the residents were not even aware of the existence of Gweru Residents and Rate payers Association. An interview with GRRRA committee members revealed a lot of energy and zeal from the representative. Nonetheless, only those on WhatsApp had access to updates. Poor communication between residents and GRRRA members may be attributed to the size and composition of WhatsApp group as well as financial incapacity. In fact, there were 61 members as at 2 February 2016 including former and suspended mayors of the city. Other residents had no clue about how to join the critical platform for information sharing and dissemination. This group was not a true representation of the residents' voice. The composition of the group qualified more as a political pressure group rather than a public platform for all residents. This was consistent with the political polarity of the city (Sithole 2013).

It was ironic that the majority (82%) of the residents across suburbs indicated that the only form of participation they were involved in was payment of water bills. Unfortunately, residents were not engaged in critical decisions such as water rates increase, water cuts, and administrative amendments despite the financial implications the changes posed on residents. Bonney et al., (2009) and Cohn (2008) emphasise the importance of public participation in resources management and conservation. Participation gives the public expressive space in the decision making process which is a pertinent ingredient for conservation and sustainable service delivery.

In terms of water conservation training across residential suburbs, the situation was almost the same. Results show that there were no differences ($p = 0.078$) between low, medium and high density suburbs in terms of water conservation training. Respondents indicated lack of training across all residential areas. Questionnaire survey results further showed that there was no meaningful consultation across all residential suburbs on water conservation and demand management issues, a situation confirmed statistically through Chi-Square test ($p = 0.741$). Findings show that there were no differences in terms of participation in water issues whether one was from low or high density suburbs. Participation was almost absent across suburbs.

5.0 Conclusions and policy implications

The findings exposed that there was lack of dialogue and engagement between municipality and residents. The situation created a fertile ground for strife, disgruntlement and non-compliance. The relationship between municipality and residents was not good. Awareness and participation are essential attributes for water conservation and sustainable water service delivery system in third world cities. In Gweru, users exhibited non-compliance with conservation measures as a result of lack of those crucial prerequisites. Non-participation in water decisions rendered all water conservation and demand management efforts ineffective no matter how effectual they sounded in theory.

Whilst residents are expected to be participating in water conservation, most decisions were merely imposed on them. Gweru residents across all suburbs were not in control. In actual fact, the only stakeholder who had a say in the whole process was the service provider (Gweru City Council) and this concurs with the neoliberalism tenet of individuality. However, the municipality cited limited time and financial incapacity as major hindrances to user participation. The attitude of municipality towards awareness and participation also demonstrate lack of determination and hegemony on their side. For instance, pointing lack of time as a hindrance to engagement and consultation of citizens is not justifiable because it places citizens into passive participation.

No effective voice was heard advocating for urgent change in the city because the platform to be heard was rarely available. Perhaps as a result of a constrained economic environment, nobody really took the initiative to change the situation. Most of the residents were all below the Poverty Datum line. In relation to the findings, only 3% of the residents were not in poverty. Therefore, the majority of the residents were not interested in water conservation issues; instead they were preoccupied with utilising the available water for their livelihood. In the process, this created two stakeholders with parallel agendas.

Evidently, water conservation cannot materialise if there are power struggles between stakeholders. A water service delivery system that is municipality oriented whilst disdaining citizens is bound to fail on account of hostility. Considering water users in decision making circumvents unnecessary conflicts and apathy. The findings therefore suggest policy need that ensures mandatory and comprehensive water user participation. Gweru city council also requires an impermeable policy and institutional framework that safeguards the interests of citizens through rigorous system audit. Municipality, residents and residents representatives must all be actively involved in water issues in order to cultivate trust and ultimate conservation. Citizen water conservation trainings should always be harnessed as an ongoing process in order to foster trust and ethos of conservation. Residents' participation will breed sense of ownership of every decision and willingness to make them effective. Creating a good rapport with the users is therefore suggested as the way forward towards water conservation and sustainable water supply in cities. The findings have clearly shown that citizens are not adequately incorporated in water conservation and demand management. This instigates the need for further research to find out the effects of the revealed water service delivery situation on citizen livelihood.

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