

Community Perceptions and Strategies for Water Conservation in the Bhambayi Informal Settlement, KwaZulu-Natal, South Africa

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Abstract

This study assessed the perceptions of community members in the Bhambayi informal settlement regarding water conservation and issues brought by water shortages in their locality. The study employed a case study design, an interpretivist paradigm, and inductive reasoning for data analysis. Ten participants were selected via purposive sampling for comprehensive interviews: five community leaders and five regular community members. Twelve community members engaged in two focus group discussions. The study demonstrated that infrastructure-oriented solutions, including the installation of in-yard taps equipped with water-saving devices, alongside traditional methods such as retrieving water from rivers and boreholes, as well as rainwater collection, might mitigate water scarcity in this community. The land issue is a significant obstacle for the government in constructing adequate housing and installing in-yard taps and toilets for community residents. The absence of community engagement in decision-making was perceived as an obstacle to water provision due to varying political affiliations among community members. This study advances understanding by exploring the efficacy of infrastructure-based and indigenous strategies for mitigating water shortages in the Bhambayi informal settlement, emphasising local viewpoints and systemic obstacles. The findings highlight the need for the government to adopt participatory operations, diversified strategies, and anti-corruption initiatives to guarantee equitable and sustainable access to water.

Keywords: water conservation, indigenous strategies, infrastructure-based strategies, water shortages, informal settlement

Introduction

Water shortages is a global issue that adversely affects numerous nations, including both industrialised and developing countries. Water shortages are prevalent worldwide, even in nations recognised for substantial rainfall. Water scarcities in arid countries such as Africa induces famine amidst unstable economic growth (Glantz 2019; Ahmed *et al.* 2018). In certain regions of South Africa (SA), water shortages have resulted in numerous issues, including starvation and diseases due to diminished agricultural output and livestock loss (Besada & Werner 2015). This adversely affects the South African economy and engenders socioeconomic issues, especially for underprivileged individuals, including the residents of Bhambayi, KwaZulu-Natal. Binns *et al.* (2001) and Cole *et al.* (2018) assert that this phenomenon arises due to 70% of SA receiving no more than 600 mm of precipitation annually.

The Umgeni River system, which provides water to several regions of Durban, is experiencing reduced water levels due to lessened precipitation (Summerton *et al.* 2009). Climate change is resulting in a heightened frequency of natural disasters, including droughts, storms, floods, and rising sea levels, which can promote the transmission of waterborne infections. As the planet warms, issues such as water shortages are exacerbating. Like numerous other South African towns, Durban and its surrounds rely on water that flows into streams. Water Governance Facility (2012) mentioned that, despite frequent rainfall in SA, water supply is inadequate for the dams to reach their maximum capacities. Residents are advised to conserve water due to the potential for drought-induced shortages (Chen *et al.* 2016). This, however, leads to the erroneous belief among certain community members that rainfall guarantees sufficient water inflow into dams and streams.

Water shortages have compelled the government, through municipalities, to implement numerous steps to mitigate this situation, including the repair of water leaks to save unnecessary water losses (Thakur *et al.* 2019). Multiple municipalities, notably eThekweni Metropolitan Municipality, have formulated plans to mitigate water misuse by residents. Consequently, it is essential to comprehend the perspectives of community members concerning efforts to mitigate water shortages. The Bhambayi community is facing issues of water scarcity, characterised by significant economic and physical constraints of water. Inhabitants obtain water from communal standpipes or faucets. There are five taps for a population exceeding 4,000, resulting in a ratio of 1 tap to 800 people. This has resulted in residents of the informal settlement

resorting to illicit methods to access water nearer to their settlement.

Kahil *et al.* (2019), Pereira *et al.* (2009), and Prathapar (2000) contend that water scarcity was a significant problem in numerous countries during the 20th century, but it has deteriorated in the 21st century. In 2014, the United Nations projected that over 700 million individuals globally resided in areas marked by water scarcity, a situation anticipated to deteriorate due to climate change and the increasing global population. While numerous studies focus on water shortages, there is a paucity of research regarding measures to mitigate water shortages in informal settlements. One can also not presume that a study executed in suburban or township environments will produce analogous results to those undertaken in dissimilar contexts. So, the study aimed to obtain suggestions to minimise water shortages directly from the Bhambayi locals, as they are crucial in preventing or alleviating the contributing elements to these shortages.

Wang (2010) determined that water shortages are attributable not only to insufficient rainfall but also to poor water management by both community members and the government. Similarly, Kumar (2013) posits that water shortages can be categorised into two types: physical and economic.

- (i) Physical water shortages arise from an inadequate supply of water to meet demand, often linked to low groundwater levels, poor water distribution, and significant environmental degradation.
- (ii) Economic water shortages manifest in numerous African nations due to insufficient investment and management, hindering impoverished populations from accessing available water resources.

Kumar (2013) reported that in 2013, over 1.2 billion individuals faced physical water scarcity, while 1.6 billion had economic water constraints. This state has likely worsened due to population growth. By 2025, an estimated 1.8 billion individuals are predicted to reside in regions experiencing severe water scarcity (Alcamo *et al.* 2000).

This study is about solutions employed to mitigate water shortages from the community's perspective in the Bhambayi informal settlement, KwaZulu-Natal (KZN). It aimed to inform policies that correspond with the needs of informal settlement communities and their constitutional rights to water and sanitation through exploring local perspectives, as well as how they themselves may improve their access and responsible use of available water.

Theoretical Framework

This study employed a rights-based approach (RBA) to explore community members' perspectives regarding strategies to water shortages and to ascertain the fulfilment of the right to safe water and sanitation. According to Uvin (2007), a Results-Based Approach (RBA) is crucial for community development. It enables the voices of community members to be acknowledged, and their issues and challenges to be addressed by relevant service providers. Yamin (2009) asserts that an RBA posits that the government ought to develop the marginalised, safeguard their rights, and empower them to manage their own lives. By doing so, community members will be empowered, enabling them to contest unjust actions.

Since the Bhambayi informal settlement has historically lacked sufficient water and developed sanitation facilities, the RBA informed this study by positioning water access as an essential human right, highlighting the government's duty to uphold this right for marginalised groups such as Bhambayi community members. Development enhances human well-being, enabling individuals to exercise autonomy and facilitate self-determination, opportunities, and choices (Kindornay *et al.* 2012). The researcher employed RBA to analyse the perspectives of community members in the study, consistent with the values of empowerment, participation, and accountability. This approach guided the qualitative approach, incorporating comprehensive interviews and focus group discussions (FGDs) with community leaders and members, thereby prioritising their viewpoints on water shortages and conservation solutions.

Methods

The Bhambayi informal settlement is in Inanda, a historically marginalised region approximately 20 km from Durban's central business district (CBD). The settlement faces severe socio-economic challenges, including poverty, insufficient housing, and restricted access to basic amenities (Raniga & Ngcobo 2014). It contains residences constructed post-1994 under the Reconstruction and Development Programme (RDP) and additional self-constructed dwellings, including deteriorated shacks. Several RDP houses were constructed in the early 2000s due to a collaborative development initiative by the eThekweni Metropolitan Municipality and Operation Sukuma Sakhe (OSS), formerly referred to as the Bhambayi Reconstruction and Development Committee (BRDC), as noted by Raniga and Simpson (2011).

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Bhambayi was established because of the riots that transpired in the 1980s. A significant number of black Africans inhabited areas surrounding Phoenix and Gandhi settlements due to pull factors like employment and educational opportunities in Durban and its surroundings. These reasons prompted a swift influx of individuals from adjacent provinces and nations, resulting in an increase in informal housing to 1,800 (Raniga 2017). This area is next to the Mahatma Gandhi Museum, and government officials are aware of this settlement since they frequently travel the Bhambayi route to the museum. The primary challenges confronting this community are social issues such as adolescent pregnancy, elevated unemployment rates, overcrowding, insufficient water and sanitation infrastructure (including taps and sewage systems), and HIV/AIDS (Simpson 2003). All these things contribute to a detrimental environment for this marginalised community. The table below presents the demographic statistics of the Bhambayi informal settlement.

Table 1: Bhambayi Informal Settlement: Essential Demographic Data

Residents	+4 000 residents
Types of Housing	
Informal structures	65%
RDP houses	25%
Miscellaneous (backyard houses, etc.)	10%
Unemployment rate	62%
Access to Fundamental Services	
Piped water	35%
Flush toilets	12%
Formal sanitation	43%
HIV Prevalence	30%
Typical household size	5-6 people (overcrowding index: 2.5 persons per room)

Source: eThekweni Metropolitan Municipality Integrated Development Plan (2024)

The researcher utilised a case study design, interpretivist framework, and inductive reasoning in the data analysis process. This approach was appropriate for the study as it allowed for an exploration aimed at achieving a comprehensive knowledge of participants' perceptions. It acknowledged the voices of regular community members who engaged directly and indirectly in this case study by listening to their accounts of acquiring drinkable water. The researcher employed a multi-method strategy for data collection, namely utilising interviews and FGDs. The qualitative technique was employed as it enabled individuals to articulate their perspectives and experiences (Du Plooy-Cilliers *et al.* 2014) about collaborative strategies between community members and government to mitigate water shortages in the Bhambayi informal settlement. It enabled the researcher to comprehend the potential partnership between the government and citizens in mitigating water shortages in this region. Creswell (2007) asserts that qualitative research enables the investigator to explore and comprehend the perspectives, concepts, and rationales attributed to a social issue by individuals or groups.

Understanding water shortages impacting nearly every resident of the Bhambayi informal settlement required a qualitative perspective. This study involved 12 community members who participated in 2 FGDs, each comprising 6 participants. Additionally, five community leaders (including the ward councillor and ward committee members) and five ordinary community members, chosen through purposive sampling, were subjected to in-depth interviews. A limitation of non-probability sampling, wherein the researcher selects individuals based on specific traits required for the sample, is its lack of guaranteed representation due to the absence of statistical randomness; thus, it cannot be generalised (Sarantakos 2017). Nonetheless, a benefit of non-probability sampling is its ability to employ a limited sample to get comprehensive and detailed data (Bryman 2016). The study sample included both men and women to explore their differing viewpoints on water scarcity. Participants were adults who had resided in the Bhambayi informal settlement for more than two years. The justification for selecting adult participants was the ease of obtaining consent and their greater familiarity with the topic under investigation. Ethical approval was obtained from the UKZN Humanities and Social Sciences Research Ethics Committee, under protocol reference number HSS/0649/017M. Data were gathered from June to early August 2018.

To streamline communication during FGDs and interviews, data were collected in isiZulu, as all participants were native isiZulu speakers. The researcher transcribed all audio-recorded interviews and FGDs. The data were

evaluated by thematic analysis to identify pertinent themes and uncover patterns within the data. The researcher discerned recurring themes and patterns during data gathering and condensed the material into manageable segments (Corbin & Strauss 2008; Mouton 1996). Following the methodology of Braun and Clarke (2006), the researcher immersed himself in the data by transcribing and subsequently re-engaging with the interview material. Subsequently, he performed initial coding by annotating pertinent data segments, such as indications of ‘illegal connections’ or ‘protest’. The codes were reclassified into overarching themes, including ‘infrastructure-based tactics’ and ‘indigenous strategies.’ The researcher subsequently evaluated these themes against the original data set to confirm their validity prior to further refinement. The ‘Results’ section delineates each theme, substantiated by direct quotations from participants as proof.

These are questions asked during interviews and FGDs: What impact has water shortages had on households or communities? Which strategies do community members implement to secure sufficient water for their daily requirements? Which measures would most effectively address Bhambayi’s water predicament? What is the effect of illegal water connections on the community’s water supply? Do residents perceive that the government is meeting its responsibility to supply water as a fundamental right? What measures may be implemented to combat corruption in water distribution? What enduring solutions might community members propose? In what ways can the community and government collaborate more effectively to address water shortages?

Results

Participants in this study identified two categories of solutions to mitigate water shortages in the Bhambayi informal community. This study identified infrastructure-based and indigenous initiatives as key themes, as numerous participants referenced them throughout data collection. The infrastructure solutions involve the installation of in-yard taps equipped with water-conserving mechanisms, while the indigenous strategies encompass the digging of boreholes, utilisation of river water, and rainfall collection.

Infrastructure-based Strategies

Infrastructure-based strategies denote technical mechanisms designed to avert the misuse of potable water by community members. The installation of in-

yard taps equipped with water-conserving devices is essential (Onyenankeya *et al.* 2021). Implementing these techniques is essential due to significant water loss from leaks in ablution blocks and unauthorised connections of taps and toilets in the Bhambayi informal community.

In-yard Taps with Water-conserving Devices

The municipality has not installed in-yard taps with water-conserving mechanisms in the Bhambayi informal community; however, numerous illegally connected taps are leaking due to the substandard materials employed by locals for water supply connections. Ablution facilities constructed by the government require enhancement in numerous informal settlements in SA, such as Bhambayi (Dickson-Gomez *et al.* 2023), due to extensive lineups of residents awaiting access to communal taps for water retrieval. This indicates their restricted access to water and adequate sanitation. Several participants believe that the provision of sufficient water to community members is the government's lowest priority in this area. A participant remarked:

We need in-yard taps in every household because water is a basic need for every person. Government officials should ensure that people's needs are met, as they usually do during elections. They must stop giving empty promises because they only need our votes during elections. **(Female, aged 26)**

These thoughts exhibit a sense of entitlement towards service delivery. The RBA asserts that the government must deliver services to fulfil fundamental needs and prioritise the urgent need of individuals at the grassroots level (Fantini 2020). The majority of Bhambayi residents inhabit shacks, rendering water sourced from common taps susceptible to pollution, particularly when stored in open containers within their households. In many regions of KwaZulu-Natal, adequate housing and facilities are lacking, resulting in the limited water supply being susceptible to contamination. This results in water wastage as community members retrieve new water and discard it after their supplies become tainted. During the FGD, it was proposed that the government should install water-conserving in-yard taps equipped with meters in every household, enabling residents to access water as needed. One participant remarked:

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The government should install the in-yard taps in our premises since such taps have meter boxes that record the amount of water consumed. People would start using water wisely because they will have to pay for it since a meter measures the volume of water used in a property. **(Female, aged 35)**

A community leader concurred with the proposal to install in-yard taps, as it would restrict water consumption and hold water wasters accountable for their excess usage. A participant who is a community leader stated:

The government is in the process of building proper houses with water and sanitation for Bhambayi community members. When that has been done, each household will be charged tariffs and rates; this would reduce the misuse of water as it usually happens at standpipes and ablution blocks because people use these facilities anyhow. Eventually, this will be addressed as we are still in negotiation with the owner of the land that shack dwellers invaded ...we do not want to put the in-yard water and sanitation in shacks that were illegally and poorly built. In the meantime, people must continue using ablution blocks while we try to expedite the building process. **(Male, aged 51)**

Despite the necessity of installing in-yard taps in Bhambayi, the government is unable to initiate the process due to the presence of unlawfully constructed shacks that are unsuitable for habitation. The land is held by a private trust. The government safeguards and assists its citizens, preventing landowners from displacing them, and is devising a lasting solution, as articulated in subsections 24 and 26 of Chapter 2 of the South African Bill of Rights.

Everyone has the right to an environment that is not harmful to their health or well-being Everyone has the right to have access to adequate housing No one may be evicted from their home or have their home demolished without an order of court made after considering all the relevant circumstances...No legislation may permit arbitrary evictions **(Constitution of South Africa 1996)**.

Upon the construction of adequate housing, community members will incur charges for water and sanitation services if their consumption exceeds the allocated free basic water for indigents. Temporarily, they must persist in

utilising ablution blocks until enough housing is constructed. Installing in-yard taps may encourage residents to conserve water, as the municipality would hold households accountable for the water consumed, reflected by the meter box readings. This would mitigate confrontations resulting in physical, verbal, and emotional abuse at communal taps during the long waits sometimes observed at ablution blocks and diminish the unsanitary habits of community members who discharge wastewater onto the ground. The community must effectively oversee communal taps and toilets; nonetheless, it remains ambiguous who is responsible for their maintenance. Residents must be consulted prior to any development to establish a partnership, as their involvement is crucial for the success of a project (Cirolia *et al.* 2017). Certain participants believed that the government should safeguard and uphold the infrastructure. A community leader stated:

People employed to look after the communal taps should be more accountable. They come late to work and leave early. No one supervises them, so there are stagnant queues at the communal taps and toilets. Specifically, municipal workers who should ensure that community members use this infrastructure correctly need to be more competent. The residents also ought to protect their infrastructure; they must learn to meet the government halfway and stop complaining... people who steal copper pipes are known by some community members, yet they keep quiet. **(Male, aged 39)**

Young participants added:

We have recently not looked after communal taps; we are not united as a community. We need to be responsible because these taps are for us. Even if someone sees a tap leaking or junkies destroying it, that person does not report or try other means to save water; that is not right. If there were in-yard taps, we were going to use water responsibly. **(Male, aged 25)**

If something is not yours, you use it anyhow! These communal taps are stolen by junkies who are from Bhambayi and surrounding areas. It would be better if each household had its in-yard tap and toilet than sharing because no one monitors how residents use communal taps and toilets. **(Male, aged 31)**

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There should not be a reason for failure to save water because saving water is like saving anything you have. Water plays an integral part in a person's life. When you cook, you need water; when you bathe, you also need water. Community members do not save water because they are not paying water tariffs, and their communal taps are not locked at night and end up stolen. **(Female, aged 23)**

The South African Constitution advocates for the provision of essential infrastructure and services, asserting that access to basic needs, such as water, is a fundamental human right accompanied by corresponding responsibilities (Gleick 1998). During the conversations, the tendency to assign blame was apparent about the protection and maintenance of the infrastructure in Bhambayi. There was a propensity to emphasise rights while neglecting the responsibilities that the community ought to uphold. This was observed during discussions when the topic of in-yard taps frequently emerged, as the majority of participants contended that the government failed to uphold their right to get sufficient water. The following statements were made by participants:

The right to water is not yet realised as the municipality still needs to put taps in our yards yet. Moreover, it hardly brings water to us during water restrictions. I never thought I would wake up every day and experience dry taps. I thought water cuts were from 22h00 to 4h00. However, they go beyond 4h00. This is literally frustrating. **(Male, aged 48)**

A community member raised the following:

As much as the community must work with the government to address this problem, the government should accelerate the process of putting the in-yard taps to ensure that the right to water and sanitation is realised. Government officials must not make decisions for us because they do not stay here and do not experience and know our struggles because they live in elegant houses in Umhlanga, Bluff, North Beach, and La Lucia. When our shacks get burnt, we will not have water to extinguish the fire... those officials who delay the installation of the in-yard taps will enjoy life in their posh houses and come with food parcels and cameras the next day Communal taps that they say we

must use are far from our premises; we are desperate for in-yard taps.
(Female, aged 33)

Due to the government's failure to address several issues raised by community members in previous years, they perceive protesting as the sole means to compel the government to acknowledge their demands for sufficient water in Bhambayi. A link frequently exists between service delivery and civil society protests (Joseph & Williams 2022). A community member expressed her feelings:

Community members should be united, establish a civil society movement, and engage with the government; if needed, the community must protest because the South African government only listens when you act violently. Every resident should participate in every action taken by the community... Residents are not invited to serious meetings when issues such as water shortages are discussed... just to know what is going on and have an input on measures to address this problem. **(Female, aged 60)**

Similarly, another participant had this to say:

In 2006, those who connected water illegally were disciplined and charged of corruption. I know someone who was even charged in court. Police and soldiers used to accompany municipality officials to close illegally connected taps. But the community protested and demanded proper infrastructure so that they would start to pay for water. Since then, the government has never disciplined those connecting water illegally ... we do as we please now (laughs).
(Female, aged 31)

Most community members thought that demonstrating was the sole means to compel the government to fulfil their demands, including the installation of in-yard taps. Installing in-yard taps may reduce illicit water connections and enable the government to regulate water usage inside the Bhambayi informal settlement. Community engagement is deficient, particularly with decisions made at the local level.

Indigenous Strategies

The indigenous techniques focus on the natural resources in Bhambayi that locals can utilise to mitigate water shortages, specifically groundwater, river water, and rainwater.

Drilling of Boreholes

Bhambayi is one of the places in the eThekweni region that possesses underground water. Consequently, participants contended that due to the limited rainfall in the area, there is a need for intervention by the state, parastatals, and non-governmental organisations (NGOs) to drill boreholes, as communal taps fail to supply sufficient water. Individuals may extract water from boreholes during periods of water restrictions (Chaminuka and Nyatsanza 2013). The boreholes should be linked to the communal taps to prevent reliance on water trucks during limitations. One of the participants stated the following:

As a community, we need to come together and request the ward councillor to urge the municipality to come and drill for underground water for us. We do not mind using it when we wash our clothes and water our gardens... Sadly, our suggestions are not considered, and we are sidelined when decisions are taken by municipal officials. **(Female, aged 35)**

One participant in an FGD claimed that his home had built a borehole to endure water limitations. This borehole helps other community members, at no cost, especially those who lack other water sources during water restrictions. This family executes regulations about access to water from their borehole, stipulating a maximum collection of 20 litres per household. A participant remarked:

We also use water from boreholes as there is underground water in Bhambayi informal settlement. A family with a private borehole here allows us to collect water from there, although this borehole cannot cater for every community member. It is high time that the community works with the government and other stakeholders to maintain and take care of their natural assets, such as boreholes and rivers. **(Female, aged 59)**

This family assists community members lacking alternative water sources during municipal restrictions on communal taps. These restrictions entail scheduled or unexpected interruptions of water access or limited supply pressure, compelling residents to depend on other alternatives to get water (Mottelson 2023). A religious organisation situated in the community of Phoenix, adjacent to the Bhambayi informal settlement, supplies water to the residents of Bhambayi during periods of water shortages. Non-governmental organisations (NGOs) assist in mitigating water shortages in numerous regions confronting this issue (Rugemalila & Gibbs 2015). The population is advised to boil this water prior to consumption, as it is untreated. One participant remarked:

It is hard; electricity load-shedding is better than water shedding. God created water for a reason. Water is a basic need; one cannot survive without water. I am grateful for what the NGO does; as a faith-based organisation, it provides potable water in safe containers during water shedding. **(Female, aged 56)**

Another participant added:

We usually wait for water trucks from the eThekweni Municipality... sometimes end up not receiving water from them if we do not have a bribe. If it does not come, we wait. Luckily, there is a mosque where I stay, and its leadership gives us boiled water from boreholes. Why the government does not collaborate with religious organisations to distribute water during restrictions because corruption is rife between the municipal officials and private companies that get tenders to deliver water during restrictions? **(Male, aged 63)**

Corruption was apparent among tenderpreneurs and municipal officials responsible for distributing water via trucks during water shedding. A commitment must be extended to faith-based organisations as they have commenced providing water to individuals pro gratis. Boreholes were predominantly required in the dry season when water shortages were prevalent, as the Bhambayi inhabitants collected rainwater during the wet season. Given the drought conditions in KwaZulu-Natal, boreholes may be a viable way to guarantee water access for all residents, notwithstanding the depletion of dams and rivers. Tapela (2012) contends that borehole water is unreliable due to the seasonal fluctuations in groundwater availability, particularly in regions

susceptible to drought. The government should establish water tanks adjacent to the boreholes and replenish them with water when subterranean water is unavailable in such boreholes. A borehole should be accompanied with a water tank, supplied with municipal water as a contingency measure. Certain people contend that borehole water may possess superior quality compared to seawater, as seawater is saline and can induce diarrhoea when ingested, as well as dermatological issues when utilised for bathing.

Use of Water from the River

Bhambayi possesses a natural water supply that many locals neglect due to land and water pollution originating from the village itself. A non-perennial river is in this hamlet, adjacent to the Kasturba Gandhi Primary School and Nanda Newtown Comprehensive High School. A participant, who is a community leader, remarked:

We should not only depend on the government for some things; we have rivers in Bhambayi. Let us come up with ways to use water from the river that we have because some communities are desperate for such sources. We must learn to do things for ourselves and seek help after we have tried our level best **(Female, aged 45)**

Nonetheless, residents can only utilise river water for laundering garments, as certain individuals regard this stream as unprotected and susceptible to contamination due to the disposal of solid waste by some community members. The rivers of Durban are contaminated due to multiple factors, including a malfunctioning sewer system (Mdluli *et al.* 2023). A participant stated:

We cannot rely on the river that we have because, in winter, it has little water. In summer, it is more polluted because the heap of waste next to it gets eroded and deposited inside. I prefer to drink and cook using rainwater because it is cleaner than river water, but I would not mind washing my clothes with water from the river. **(Female, aged 49)**

The expressed perspectives indicate that certain individuals deem harvested rainwater suitable for culinary and potable use, whereas river water is deemed suited solely for washing purposes. This may occur due to occasional sewage overflow into the river and reduced water levels during winter. Collect-

ing water from this stream is labour-intensive, and animals contaminating the river renders the water turbid, perhaps posing health risks to the locals. Consequently, it is imperative to enhance community awareness to inform individuals about diverse methods of safeguarding this resource, as it can be crucial amid water limitations. “A person who embodies ethical and moral values, values other living beings, and behaves in a manner that honours their right to life can attain a sustainable environment” (Kılıç 2020: 240). A member in the FGD stated the following:

I get water from a river, and we ensure that we boil it; although I am allergic to it, I do not have another alternative. I cannot afford to buy still water because it is expensive for me as I do not have a proper job. **(Male, aged 54)**

In addition, another participant mentioned:

There is a stream we get water from down the road when there is water shedding. My mom had an operation on her shoulder because of lifting heavy buckets of water from the stream. This could be handled accordingly, as waking up and finding taps dry for a few days is painful. **(Female, aged 32)**

A considerable proportion of Bhambayi residents obtain water from a nearby stream. Retrieving water from the river has resulted in health issues, including bodily pain and arthritis, particularly among the elderly, as community members often transport many litres of water and must ascend a slope on their return home.

Rainwater Harvesting

Due to the absence of adequate roofing in most shacks in Bhambayi, people have difficulties utilising the gutter system for water collection in tanks and buckets. Rain-harvested water is sometimes contaminated due to the prevalence of rust and dust on most rooftops. Rainwater is essential for the Bhambayi settlement due to their inadequate water supply. The allocation of water tanks may enable community members to utilise rainwater collected from roofs during the wet season. Consequently, in the absence of tanks, community members are compelled to utilise trenches, buckets, and containers

for rainwater storage. Harvested rainwater might subsequently be utilised for rainfed agriculture or domestic water supply. Regrettably, rainfall may be contaminated with micro-organisms and toxic compounds necessitating purification prior to utilization” (Helmreich & Horn 2009: 118). Participants provided the following statements:

Currently, the government still needs to place water tanks in Bhambayi. There are no tanks for storing rainwater for washing and irrigating gardens. Even when we get much rain, we do not have tanks to harvest it; our buckets need to be bigger and sealable to prevent bacteria as we cannot afford chemicals to treat it. Community members, assisted by community leaders, must seek donations from retail stores and firms around Bhambayi and buy water tanks for the community. (Male, aged 30)

A participant shared her sentiments:

We harvest rainwater by putting drums next to the wall behind our houses. Water would flow into these drums during the rain, and [we] keep those drums for backup when water restrictions occur. I suggest that every household should have water tanks, or a drum placed at the back of every shack. Within the community, only one support group has a water tank to store water for irrigating its garden. That water tank was donated to elderly people by a building hardware shop. (**Female, aged 33**)

The support group is the only organisation possessing a water tank which is connected to the roof and gutters of the Mahatma Gandhi Museum for rainwater harvesting. In this group, the tank water is used for irrigating plants and occasionally for cooking. It is typically secured to avert misuse by children. Water intended for cooking is frequently disinfected with bleach to render it safe for consumption.

Discussion

A significant number of participants express dissatisfaction with the infrastructure in the Bhambayi informal settlement due to inadequate maintenance. They admonish local officials for failing to assist them in

mitigating water problems and facilitating development in the area. Participants require enhanced service delivery in Bhambayi, as the area is underdeveloped. The municipality must respond promptly to issues related to damaged infrastructure, like leaky and ruptured water pipes. They claim that this is lacking because of poor administration in the municipality. Inadequate municipal management results in insufficient service delivery and obstructs development (Reddy 2016). Participants contend that the municipality postpones the repair of leaky pipes in Bhambayi due to the prevalent financial difficulties faced by the residents, attributed to elevated unemployment rates. Consequently, they are unable to remit payments for alternative services. Many municipalities in SA face significant challenges in repairing damaged water pipelines due to insufficient budgeting for such occurrences (Khambule *et al.* 2019). The issue exacerbates with a limited number of ratepayers in that region (Fitchett *et al.* 2016).

Members of the Bhambayi community require equitable access to water supply and sanitation facilities comparable to those in affluent areas such as Umhlanga, La Lucia, and Durban North, notwithstanding their lack of financial means to afford these services. They rely exclusively on complimentary basic water. The municipality fails to sufficiently address the grievances of Bhambayi community members, resulting in conflict between community members and leaders, as individuals have grown disillusioned with collaborating with the government to accelerate development processes, having previously received unfulfilled promises from authorities. Consequently, they protest to articulate their demands and discontent, as the government promptly intervenes when such actions occur. Participants asserted that the municipality must involve citizens in project implementation and permit their participation in decision-making processes. Community members must be notified and encouraged to participate in the water committee meetings when discussing the conditions of water and sanitation in the Bhambayi informal settlement. Only specific individuals are chosen to represent community members at those meetings, and these individuals provide only limited information to the community regarding the municipality's strategies to mitigate water shortages in their area. Facilitating community involvement in decision-making mitigates conflict between the municipality and the public, enhances government transparency, and amplifies public engagement in development (Ife and Tesoriero 2006). Consequently, participants in this study perceive that municipal officials and certain people make decisions on their behalf, thereby disempowering them from engaging in discussions around

water and sanitation. The municipality needs to consider that participatory service delivery also involves the ordinary residents in decision-making.

Given the presence of subsurface water supplies in the Bhambayi informal settlement, numerous participants proposed drilling boreholes as a contingency measure when water from communal taps is inaccessible. Certain individuals have excavated their own boreholes, thereby alleviating water shortages. Nevertheless, several locals question the quality of the subterranean water due to its susceptibility to pollution and lack of treatment. Numerous participants noted that certain community members neglect to safeguard the infrastructure, since ablution blocks are frequently vandalised, and stolen copper taps and pipes are sold at scrapyards. Individuals may hesitate to safeguard infrastructure, such as ablution facilities, because of their perception that the government has excluded them from the decision-making process. As some residents sustain themselves by selling stolen metal to scrapyards (Bezuidenhout 2011). This suggests that certain community members are attributing their criminal behaviour to poverty. Such individuals are negligent and obstruct progress. Moreover, fail to protect their infrastructure. Most participants recommended the installation of in-yard taps to provide a regular water supply. They contend that the definitive remedy for water scarcity in Bhambayi is for the government to provide enough housing equipped with in-yard taps and toilets.

Illicit water connections impede service delivery (Uys 2004). Due to illicit water connections, participants report regular water shortages in Bhambayi, resulting in conflict over the limited supply, as it fails to meet their home requirements. Moreover, participants express dissatisfaction with the condition of ablution facilities (toilets and showers), which are unavailable during nighttime and weekends. The researcher identified a sewage leak along the roadway, mostly due to the absence of a professionally designed drainage system, which presents significant health risks to neighbourhood people. Informal settlements lack adequate government provision of water and sanitation, leading to health issues such as diarrhoeal infections (Richards *et al.* 2007). Not all people of the community engage in water saving practices. Nonetheless, the majority of elderly people demonstrated diverse methods of water conservation, including rainwater gathering and under groundwater usage. They urged young individuals to initiate water conservation efforts, including washing vehicles and irrigating gardens with river water. The younger generation must recognise indigenous water conservation methods as instructed by the older generations (Ward *et al.* 2007). Enhanced education on water conservation measures is

essential to ensure that community members effectively preserve water.

Moreover, the allocation of water by municipal tankers requires proper regulation, as some participants said that the municipality dispatches only a limited number of water trucks to serve a large population under water shortages. Not all community residents have access to water, while certain dishonest truck drivers are profiting from its demand. Consequently, the installation of water tanks on each street was a solution to guarantee equitable water distribution during the water restrictions. Many people oppose water restrictions due to their imposition and the municipality's failure to communicate the timing of these limitations. It is problematic for residents returning home late from work to discover taps devoid of water.

It is presumed that municipal authorities claim to know community members' needs without engaging in with them. This method engenders distrust and discord between the government and the broader community; thus, community involvement in decision-making is essential for achieving good outcomes in any local initiative (Swanepoel & De Beer 2006). The water supply and sanitation services should have been more efficient, as the majority of community members utilise pit toilets and share merely two ablution blocks and five standpipes. There is a continued necessity for adequate housing to guarantee the realisation of individuals' rights to safe shelter, water, and sanitation. While the government needs to deliver services to fulfil fundamental requirements, individuals must promote self-reliance, such as in the procurement of funds for water tanks. Although most of the residents in Bhambayi informal settlement are unemployed, those who can afford should pay for some services to ensure that the government provides these services consistently and does not face financial constraints due to a lack of cost recovery.

Conclusion

This study explored the perceptions of Bhambayi residents regarding strategies to mitigate water shortages in their area. It establishes that infrastructure-oriented and indigenous approaches can be employed to mitigate water scarcity. These findings enhance existing knowledge in this research domain by elucidating the challenges that Bhambayi residents presently encounter in acquiring water. The Bhambayi community's efforts to tackle water shortages require development from the government and other parties, including the corporate sector. This study indicated that the majority of individuals must engage in water conservation due to the persistent water shortages in this area.

The research revealed that members of this community are only marginally involved in municipal decision-making about the development of this area.

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