



Barriers to the effective management of water streams in uMlazi township, KwaZulu-Natal Province, South Africa



Ntokozo Amanda Xaba ^(a) Stanley. C. Onwubu ^{(b)*}

^(a)Ph.D., Faculty of Management Sciences, Department of Entrepreneurship Studies and Management, Durban University of Technology, Republic of South Africa

^(b)Ph.D, Department of Chemistry, Durban University of Technology, Republic of South Africa

ARTICLE INFO

Article history:

Received 27 February 2022

Received in rev. form 22 April 2022

Accepted 26 April 2022

Keywords:

Streams; river systems; stakeholders; management barriers

JEL Classification:

H10 H19

ABSTRACT

South Africa is currently facing a water crisis due to low rainfall, climate change, a large population and pollution in freshwater sources. Rivers and streams are polluted despite the legislation and management systems established by the government at the national, provincial, and local levels. The aim of this study was to determine the perceived barriers to the effective management of streams in uMlazi township in KwaZulu-Natal province of South Africa. The study was conducted at a Durban solid waste office in Cator Manor and a community hall in uMlazi township. A qualitative case study design was used. Data was collected through focus group discussions from the two groups who were involved in the management of water streams in uMlazi township, namely Sihlanzimvelo co-operatives and the section of the EThekweni Municipality involved in stream management. Data were recorded, transcribed, coded and thematically analyzed. Four main themes were identified, which revealed that the current barriers to effective stream management were related to attitudes and behavior of the communities and the EThekweni Municipality's working conditions and management practices. The study established that to manage the streams effectively, all stakeholders in communities should be actively involved, and for that to be possible, they should all be educated about the importance of streams and the environment in general. Environmental education was found to be central in promoting accountability and civility in engagements amongst stakeholders, to ensure that there were healthier streams and river systems and an eco-friendly future was secured.

© 2022 by the authors. Licensee SSBFNET, Istanbul, Turkey. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

South Africa has an average annual rainfall level of 464 mm, which is way below the global average of 768 mm which has led to a water crisis, which is compounded by climate change, water pollution and rising populations (Wright *et al.* 2021; Nel & Driver, 2015; Sithebe, 2016; South Africa, Department of Water and Sanitation, 2017; Rodda *et al.*, 2016). Both the quantity and quality of fresh water is quickly diminishing, which has made the management of existing water sources like dams, rivers and streams a prerogative of government (Rodda *et al.*, 2016). The prevailing water crisis is present despite the fact that the South African government has a department that exclusively focuses on managing water supplies and maintaining water sources like rivers and dams (South Africa, Department of Water and Sanitation, 2017). There are water management systems (policies and strategies) at the local, provincial and national levels (South Africa, 1998; DWAF, 1996; DWS, 2017). Some legislation is in place which can be used to for implementation of water management systems and to enforce compliance by relevant stakeholders, which includes the Constitution of the Republic of South Africa (1996); the National Water Act (No. 36 of 1998); and the Water Services Act (No. 108 of 1997).

The literature reveals that various barriers to stream management still exist in urban areas that are associated with poor surface water quality as well as health risks linked to unsafe water, and a loss of biodiversity (Birnie-Gauvin *et al.*, 2017). Some general barriers

* Corresponding author. ORCID ID: 0000-0002-4499-1534

© 2022 by the authors. Hosting by SSBFNET. Peer review under responsibility of Center for Strategic Studies in Business and Finance.

<https://doi.org/10.20525/ijrbs.v11i3.1723>

to management of river systems have been identified in developing nations like South Africa, which include dilapidated infrastructure; overpopulation; socio-economic inequality; and political issues (World Bank, 2019; Department of Water and Sanitation (DWS), 2018b; Sithebe, 2017; Xaba et al., 2016; Awumbila 2017; Adger et al., 2013; Dicken, 2002). These barriers created a social context where there is a general lack of environmental knowledge, poor attitudes and human behaviours that are harmful to ecosystems that nullify efforts to restore stream, especially at local level (Kelly-Quinn et al., 2019, Rodda et al., 2016; Birnie-Gauvin et al., 2017). It has been shown that, when barriers to the management of river systems have been removed, there has been quick recovery of the river biodiversity and the ecosystem around it (Tonra et al., 2015).

In South Africa, there is a need to identify and mitigate the forces and agents of pollution of streams and river systems, to ensure quality and safe water supplies. In addition, to reverse the current water crisis in South Africa, the best contextual management practices should be sought and implemented and the barriers to water management eliminated. The present study sought to identify the barriers to the management of the streams in uMlazi township, as they were reported to contain polluted water and to be in a generally poor state, despite municipal oversight and management (EThekwini municipality, 2015; Xaba et al., 2016). The Perceived barriers were assessed and determined using the Health Belief Model (HBM) as demonstrated by Glanz et al. (2012). According to the HBM, perceived barriers are an individual's opinion of physical and psychological obstacles and difficulties to change their behaviour (Glanz et al., 2002).

A qualitative case study design was used in this study. The case study method is suited for obtaining in-depth knowledge of an organization or structure like the Sihlanzimvelo Initiative that cleans and manages streams in uMlazi Township. The study was conducted at a Durban Solid Waste (DSW) office in Cator Manor and the Community Hall in uMlazi D section. uMlazi is a township that is under the jurisdiction of the EThekwini Municipality. It spans 47.46 km² and has a population of over 404 811 making it the second biggest and one of the most populated townships in South Africa. Participants were recruited from the sample frame of employees from eThekwini Municipality Departments that are actively involved in running of Sihlanzimvelo project and Sihlanzimvelo workers' members (Sihlanzimvelo) who reside in uMlazi Township. The municipality departments include the eThekwini Coastal Storm-water and Catchment management (Catchment); the eThekwini Roads and Storm-water Maintenance (Roads); and the Durban Solid Waste (DSW) department. These three departments are part of eleven departments that are responsible for managing streams in the EThekwini Municipality, which includes uMlazi township (EThekwini Municipality, 2015). The Sihlanzimvelo Project is a parastatal entity that has workers who do the actual work on the ground, that is, the cleaning of streams.

This study aims to determine the perceived barriers to the effective management of streams in uMlazi township in KwaZulu-Natal province of South Africa. The study was conducted at a Durban solid waste office in Cator Manor and a community hall in uMlazi township. The study continues with research and methodology part that introduces the research and data background. After the methodology part, this study builds implications and themes and finally concludes with key points, future research directions and limitations.

Research and Methodology

Data

Purposive sampling was used for the data collection in this study, with the assumption that the people chosen for group discussions were familiar with the research subject and were interested in the study (Freitas et al., 1998). Two groups were used to hold two separate focus groups. The first group comprised of 10 participants from the Sihlanzimvelo project, namely three assessors; two consultants; and five co-operatives' workers. The second group consisted of 7 participants in total. Four of the participants were from different government departments 1x Roads; Catchment x 2; 1 x Climate Change and; 1x DSW and; 2 consultants from Sihlanzimvelo project representing Sihlanzimvelo workers. This second group discussion focused on addressing Sihlanzimvelo challenges.

The participation of individuals from Sihlanzimvelo was considered essential because they work in this area daily and are also part of the community as they stay in the township. The whole group would contribute to understanding community dynamics and stream management practices. While Sihlanzimvelo assessors' contribution was more on assessing Sihlanzimvelo workers daily work, that is, to confirm if the workers were really doing their job or just blaming the citizens for their own shortfalls. The researcher organised the focus group discussion with the Sihlanzimvelo co-operatives, which were involved in the management of streams. The second focus group discussion was with the municipality departments involved in the uMlazi streams management. The majority of the participants responded in the *IsiZulu* language, and the responses were then translated to English by the researcher. The focus group discussions were facilitated by the researcher, using a discussion guide prepared by the researcher. The focus group discussions were recorded with a Dictaphone.

Focus Group and Semantic Approach

The recorded data then transcribed using the intelligent verbatim method by the researcher. The focus group data was then coded using NVivo Software. Themes were then derived from the codes formulated using the semantic approach, which is an approach that analyses the explicit content of the data.

The use of two different focus group discussion approach allowed for triangulation to ensure trustworthiness.

The Durban University of Technology Faculty Research Ethics Committee of Management Sciences granted ethical clearance level 2 in 2017 (FREC No:19/17 FREC). In line with the DUT ethical requirements, the proposed study adhered to the DUT code of conduct. Consent was obtained from the research participants prior to commencing the study. Most of the participants preferred to answer in *IsiZulu* language, as it is their native language.

The study focused on a range of issues related to water sanitation issues and these involved the discussion of sensitive topics. As portion of the ethical provisions of the study, all participants were guaranteed of confidentiality and privacy. To achieve this, the identity of all participants when reporting was anonymous, with numeric codes used to identify participants.

Focus Group Discussion, Themes and Implications

The research participants from Sihlanzimvelo Initiatives identified three main types of barriers to the management of streams in uMlazi: the behaviour and attitudes of the community members, the working conditions and management practices of municipality departments. These highlighted barriers were validated by municipality departments as part of triangulation in the second focus group discussion. The themes below were identified from the data obtained from both focus groups.

Theme One

Citizens attitudes towards Sihlanzimvelo workers

The Sihlanzimvelo workers reported that many community members often have a condescending attitude towards them. The work they do is generally seen as not important and demeaning. In validating these findings, the participants from the Municipality Roads Department also identified bad attitude as a key barrier to effective management, as community cooperation is essential for the well managed streams.

“This weekend we went to the Hostel to clean the stream and the attitude was bad. They told us” we do not want you here”! they told us that we are here to volunteer. Saying we are driving nice cars and eating their money! They said “You are full of yourself, we hope you get a lover that is infected with HIV.” Can you imagine what challenges Sihlanzimvelo workers go through on a day to day basis?” (Municipality participant 1, focus group).

It is important to note though, that a few of the Sihlanzimvelo workers did report that not all the citizen share hostile towards them, and mentioned instances where some citizens even offered them juice while they work as a token of appreciation for the tough and vital job they do in the streams.

Theme Two

Citizen’s mindset about the importance of environmental management

All Sihlanzimvelo workers reported that the streams are being used by some community members as dumping sites for things like nappies and human excreta in plastics. There had even been cases where community members threw garbage at them.

...” They put faeces into plastics and throwing it into the stream. There is another lady who is sick and uses pampers daily then they throw these used pampers to streams, sometimes while cleaning, and every day we have to pick this up”. (Sihlanzimvelo participant 6, focus group)

The consultants reported that they evaluated the Sihlanzimvelo work regarding the cleaning of streams every Monday and Wednesday, reporting that it was often like the Sihlanzimvelo co-operatives had not done anything at all, even though the co-operatives worked 8 hours a day, from Monday to Friday. It is from this discussion that the Catchment and Roads Municipality Department participants indicated that citizens’ mind-set was another barrier, and the participants believe that the local citizens need education to change their mind-set and develop pro-environment attitudes.

“As my colleague said, most people are not interested in the environment and feel environment issues are a waste of their time but rather houses, electricity and water. They also say environment projects do not have money, they prefer electricity or housing projects that have large stipends. Hence education can instil a culture that can change mind-sets that assist in environmental management.” (Municipality participant 2, focus group).

A lot of citizens did not see environmental degradation as a serious issue that required their attention or sympathy. One municipal worker in the discussions even mentioned how some citizens viewed their pollution as acts of generosity or philanthropy.

“they say they litter because they are creating job opportunities and say we will come and pick it up because there are people allocated for these jobs, not knowing that the budget could be used for other projects in the ward but now it constantly used for clean streams.” (Municipality participant 2, focus group).

There was a consensus among the research participants that citizens have poor understanding of the importance of clean river streams, and that it is not only the responsibility of the municipality to keep the streams clean.

Theme Three

Working Conditions Are Not Safe

Sihlanzimvelo workers perceived the working conditions as another key barrier towards stream management. They have sadly found dead bodies of children and dangerous animals such as snakes near and in the streams. Another prevalent issue is the frequent sewer bursts that have led to a putrid smell that is now endemic to the streams.

Sihlanzimvelo workers also complained that citizens in the areas near streams make executing their jobs very difficult, and even dangerous at times. They made shocking reports of how citizens threaten to harm them with knives if they try to vocalise their indignation about the disposal of litter in the streams by community members. The Sihlanzimvelo workers also mentioned frequent occasions when there were municipal strikes, community members demanded that they remove solid waste in their communities, which is waste that the Durban Solid Waste (DSW) department is responsible for. When they refuse to do so, they are insulted and threatened.

Many of the workers have also been mugged by criminals and drug addicts who smoke by the streams, and now need to be guarded by police while they are doing their jobs. One municipality worker gives a description of the working context of stream workers in the following words:

” The main problem is the working condition the co-operatives workers face when they are working in these communities for example, the guys that are drug addicts ‘Whoonga’. These guys go and stay by the streams and making co-operatives workers unsafe as they mark them, threaten them and rob them of their working tools.” (Municipality participant 1, focus group).

Thus, the streams are perceived as a centre of disease and potential physical harm for both Sihlanzimvelo workers and communities, instead of being viewed as a recreational area. Municipality participants perceived Sihlanzimvelo workers to be exposed to even more hazards than them as municipal workers, as the co-operatives face such challenges daily as stated below by a municipal participant

” So this thing is deeper than cleaning of streams but now substance abuse. Now issues of substance abuse must be addressed. These addicts now need to be told not to go to streams and rob co-operatives workers.” (Municipality participant 4, focus group).

Another major barrier to stream management that was mentioned was the fact that stream workers do not only work in unsafe conditions but are under-resourced. A simple example is the fact that trucks for wet waste collection are not provided, meaning stream workers must carry the wet waste manually, which is not all highly physically strenuous, but is also a health hazard. Furthermore, the stream workers are also not provided with sufficient Personal Protective Equipment (PPE).

In response to the concerns raised in the focus group discussions, all municipal departments acknowledged that the scope and budget provisioned to the Sihlanzimvelo Project should be increased, and that all the concerns of the Sihlanzimvelo workers are genuine.

Sihlanzimvelo participants also indicated they have a problem of accessing the streams at times, often resorting to either hiring a tractor that will remove the stream bank sand that has collapsed due to these heavy waste materials or remove it with their bare hands.

“we are not provided with trucks to transport this wet waste, the budget allocated to us is very small, we have to get transport and transport it for ourselves. Also, sand blocks channels, and we have to remove it as it prevents the stream water flow. Can the municipality remove this sand for us please?” (Sihlanzimvelo participant 10, focus group).

Theme Four

Municipal mismanagement and negligence

Although community members' attitudes and actions are a clear barrier to stream management, the eThekweni municipality to be largely responsible for these poor working conditions for numerous reasons. Some of the stated failures of the municipality include allocating an impractically low budget to run the Sihlanzimvelo project, the municipality was perceived to be lazy in doing its work and uncoordinated in its efforts to manage the streams, and not able to provide necessary equipment for the Sihlanzimvelo project resulting in unsafe working conditions. The stream workers also complained of having too many tasks to do as a small team

Participant 5 indicated during the focus group that:

In other areas we cannot work due to safety and health risks when manhole has busted for example, therefore we cannot access the stream, we have to pick waste using our hands, even if we use proper PPE, sometimes PPE get torn apart because of thorns along the stream but in such areas you cannot even enter. Sometimes we ask the municipality to come and address the houses that do renovations along the streams especially when they are changing roofs and throw asbestos in the streams”. (Sihlanzimvelo participant 5, focus group)

Another participant added

“we have a challenge of changing workers every time due to unsafe working conditions and lack of providing them with PPE every two months, because when these workers decide to leave they take the PPE with them. (Sihlanzimvelo participant 12, focus group).

Everyone agreed with this statement and clapped hands.

All Sihlanzimvelo participants and assessors agreed that they have a challenge of high employee turnover due to working conditions they are working under.

Sihlanzimvelo stakeholders were asked whether the municipality does attend to the enquiries and complaints regarding stream water quality that are reported to them.

“we report these issues to the municipality, but nothing is done” “For example, big trees like banana tree that are found along the streams disturb us when working and need cutting but nothing is done.” (Sihlanzimvelo participant 3, focused group)

These comments are made even though at the beginning of the focus groups all municipality and Sihlanzimvelo participants that they have necessary skills to manage streams. Another challenge highlighted by participants was the failure of the municipality to initiate and improve citizen’s understanding on stream water quality management.

“The first mistake the municipality did was not to engage or inform the citizens that they will be people working in maintain the streams because the community thinks we earn big monies. They need to be told that we are part of the same community and not outsiders cleaning. Even the municipality officials should address the community because community undermines us as co-operatives.” (Municipality participant 1, focus group).

The Municipal department workers also highlighted that individual departments face many hindrances to ensure effective management. The challenges faced by DSW, Roads and Catchment Department were perceived by participants to be similar, these challenges include a lack of human settlement department involvement as the uMlazi population is greater than manhole capacity at present. Other participants viewed the lack of human settlements department involvement in this project is a barrier on its own, as houses built for citizens by the department are often unsafe.

“I have not seen Human Settlement as being part of Sihlanzimvelo. Yet, people will say, “we need housing” or is it going to affect, and certain things will be overlooked for example placement; ecological infrastructure that we have presently. (Sihlanzimvelo participant 1, focus group).

They also noted that the increasing populations and households due to urbanisation have contributed to frequent bursting of manholes, releasing sewage directly into the streams and rivers, and such challenges will not be resolved without the Human Settlement Department. As another participant added

“The manholes were not built for example, 10 households to connect to one manhole. The four roomed houses now have outside buildings connected to the same sewer pipes on that one manhole. You then find another new household in the area also connecting to the same manhole that is why we see these manholes bursting every now and then.” (Sihlanzimvelo Assessor, Participant 8, focus group)

The Silo mentality was another barrier perceived by all municipality departments that makes Sihlanzimvelo project to not be effective. The project is already complex as it includes many departments: Roads; Catchment; Parks; Health and DSW but not all of these departments are active in the project. Climate change department briefly discussed it as their main challenge in running Sihlanzimvelo project. This silo mentality also found the national, regional and local department level, meaning there is no effective cooperation and collaboration.

One participant stated this clearly and explicitly.

” Our problem is Silo mentality. Whatever we do we do it in our own Silo’s and it difficult to communicate because there is no platform where we are able to discuss and align our objectives as departments. Barring in mind that we are equal as departments, so as sister departments therefore we have no powers to tell another department what to do and all another challenge.” (Municipality participant 4, focus group).

Another participant added,

“Moreover, it takes longer to get national involve in such things”. Yes, it takes long. It like the issue of sand mining along the river poses. This is supposed to be Department of Mineral Resources (DMR) who is responsible for that, but DMR is far, it in Pretoria.” (Municipality participant 3, focus group).

Theme Five

The water quality of streams is not known

Participants highlighted that they are not aware of the streams water quality and for this reason they will never advise children to play inside or near the stream waters. Another participant further indicated that they have no clue on stream water quality status as the departments involved in the uMlazi streams management.

“The department of environmental health were to assist in water testing however, no follow-up was done as to when do they test water. Currently water quality we do not know how it would affect them as there are no specific records what is in the water and do

not know the results of the streams that is which ones are clean. Even if clean we do not know what happening upstream". (Sihlanzimvelo participant 3, focus group).

Discussion

This study aimed to determine the perceived barriers to effective stream management in uMlazi, KwaZulu Natal, South Africa. This study identified three main categories of barriers in the management of streams, namely: citizens' actions and attitudes, working conditions, and the EThekweni Municipality's departments mismanagement and negligence. These were highlighted by Sihlanzimvelo workers and validated by municipality department workers from the EThekweni Coastal Stormwater and Catchment Management; EThekweni Roads and Stormwater Maintenance; and Durban Solid Waste Departments.

The attitudes and behaviour of the residents (community members)

The social stigmatization and discrimination of stream workers; environmental practices of citizens, and individual beliefs and demeanor about the importance of environmental sustainability and stream management were reported to be the main barriers of citizens actions towards stream management.

The community members were seen as unfriendly and at times even openly hostile to stream workers. There was general agreement among research participants that the work of Sihlanzimvelo personnel is seen as trivial, demeaning and a waste of resources that can be allocated to more important projects, like housing and the creation of jobs. The mindset of citizens highlighted above are shaped by the prevailing social and economic realities in the polluted urban areas. Citizens were generally observed to be unable to link environmental degradation as a serious issue that requires their attention. According to Swim et al. (2011) and Weber and Stern (2011), even if citizens are consistently provided data on the seasonal variations and levels of pollution due to climate change, urbanisation, and human activities, it is easy for people to push aside such issues when faced with other pressing life issues.

White (2012) asserts that the social actions and behaviour of individuals are influenced by their beliefs, attitudes, and knowledge, as predicted and described by the Health Belief Model. The World Health Organisation (WHO) (2020) noted that there are generally negative public attitudes and perceptions about sanitation work or the waste collector profession entirely, which often result in reduced social functioning and self-isolation of sanitation workers due to communities' negative attitudes, behaviour and the discrimination. Similar findings were observed by Monteiro and Nalini (2021), who indicated that sanitation workers are discriminated due to their low socioeconomic status. Sihlanzimvelo workers noted that they are often stressed and depressed due to the behaviour of citizens, working conditions, and the scope and magnitude of work.

Sanitation work in urban landscapes comes with a lot of social stigma and discrimination, and is reported in nations throughout the developing world, including South Africa and Uganda (World Bank, 2019).

In one study, Patil et al. (2014) reported that 41% adult men or women still practiced daily open defecation amongst the 630 households in the intervention villages that had improved sanitation. The main reasons for daily open defecation despite having interventions were culture, habit, or preference for defecating in open spaces followed by limited water availability. The streams in uMlazi were essentially seen and used as waste disposal sites by many community members perhaps due to habit like the report by Patil et al. (2014).

The current social norms, practices, and culture of the citizens living near streams are a huge impediment to stream and general environmental efforts. Citizen environmental education and the improvement of socioeconomic conditions are key to the progress of the Sihlanzimvelo project and similar environmental efforts.

Working Conditions

The Social Ecological Model (SEM) is used to determine physical barriers, as well as to identify community and organizational barriers to environmental management (Glanz et al., 2008). The early assessment of physical barriers is essential to pre-emptively address health and safety issues stakeholders might face in the future (Glanz et al., 2002), this is done by improving the structural planning and management of areas like townships, thus reducing the diseases that are associated with the rapid urbanisation anticipated in Africa (Neiderud, 2015; Anugwom, 2021).

Numerous physical, community and organisational barriers that affected working conditions were identified in uMlazi using the SEM model. The stream workers reported that the streams have many health and safety hazards. The workers lack sufficient PPE, are exposed to criminal activity as the streams have become a 'den' for drug users, and the poorly maintained sewage systems have polluted the water and created conditions for dangerous animals like snakes to breed and thrive.

The lack of PPE is a serious issue as reports by Gwack et al. (2012) assert that PPE such as masks can decrease the prevalence of acute infectious diseases, heavy metal contamination, and physical injuries. Moreover, as the river system of this area has been reported to be contaminated with high levels of *E. coli* due to sewer mismanagement, 60% of the sewers were damaged (Sithebe, 2017; Xaba et al., 2016; Dicken, 2002).

Poor maintenance of sewage systems that crossover the river systems or are found near the river systems has led to frequent manhole bursts and sewer pipe leakages (Sithebe, 2017). The lack of infrastructure, technology and institutional resources, financing, and the

release of untreated wastewater is still a common practice, particularly in developing countries (WWAP, 2017). These barriers eventually affect surface water quality. Moreover, it has been discovered that WasteWater Treatment Plants (WWTPs) are commonly not licenced and the WWT are commonly near full capacity as all sewage pipes for new developments are connected to same sewage line of the same plant WWTs (Lintern et al., 2018). More than 80 % of wastewater is without proper treatment and is released into the environment (WWAP, 2017).

Findings from the report by the Department of Water and Sanitation (DWS) (2018b) on effluent water samples revealed that only 0.3 % of the samples met required microbial levels, 3.1% met chemical levels and 7.5% met physical compliance levels according to the Green Drop Standards used for auditing all KwaZulu Natal WWTPs.

Municipal Mismanagement and Negligence

The EThekweni Municipality was deemed centrally responsible for several issues that act as barriers to stream management. Some are direct and other barriers indirect.

The top issues that directly affect the stream management efforts are insufficient budget allocation, a disjointed and uncoordinated management system, silo mentality, and general dismissiveness and apathy of Sihlanzimvelo workers requests and complaints.

The low budget for the Sihlanzimvelo Project has led to workers being overworked due to insufficient staff and equipment, which affects productivity.

The current management system needs a 'redress', as the municipal departments that that responsible for the various aspects of stream management currently work in silos, with no set communication system for collaboration. There is a lack of coordination, proper oversight and structure.

Nel and Driver (2015) maintains that there are serious challenges in government departments. There are also bureaucratic issues arising from complicated intra-departmental processes, which has led to a lack of communication between chief directorates, inaccessibility of information, an overload of rules, and regulations and a lack of funding in certain areas. These issues limit the capacity of government employees to absorb and use new science products and tools, given the already stressful work environment within which they function, especially regarding the National Freshwater Ecosystem Priority Areas project of South Africa (Nel et al., 2011). Minnaar (2010) maintains that for accountability to occur in an organisation, continuous feedback on individual performance and organization must be determined and this is part of SA Constitution on Transformation of the Public Service (Notice 376 of 1995).

The current stream policies and governance structure act as barriers to effective stream management, as the municipality is solely provisioned to keep the streams clean. This is not feasible in a dynamic geographical context like uMlazi township, which is an area with a large diverse population, informal housing and numerous sociopolitical issues (SSA, 2011). As such, discussions should be initiated and facilitated by government with all parties affected by the stream conditions to develop a governance structure that involves all community stakeholders. This is in line with Hill and Carroll (2009) assertion that water governance represents the negotiation between society and government in effectively implementing socially acceptable allocations and regulations, by mediating behavior through values, norms and laws of both government and society.

As much as the community has been accused of bad behaviour, the municipality has an obligation as civil servants to serve the community according to the Constitution of South Africa (Act 108 of 1996) (South Africa 1996). Section 195 (1) (c) of the Constitution "public administration must be developmental-oriented" and (e) that "people's needs must be responded to, and the public must be encouraged to participate in policy-making". This means that municipalities must be democratic, responsive and accountable to the citizens (South Africa, 1996). Authorities thus have an obligation to ensure that every individual, particularly the poorest of the poor, is part of the decision-making mechanism regarding development due to inherent Constitutional rights that apply (Swanepoel & De Beer, 2011).

Conclusion

This study highlighted that most citizens lack knowledge about the role of environmental projects like Sihlanzimvelo. They also lacked general environmental knowledge, making them less prone to pro-environmental attitudes and behaviours. The current study revealed that socio-economic issues are the primary barriers to stream management in the uMlazi context, to a similar extent that infrastructure has been reported to be the foundational barrier in other contexts. The HBM and SEM was crucial in assessing and identifying perceived barriers. HBM highlighted that individual-level attributes of HBM such as beliefs, knowledge, and attitude of stakeholder's involvement was perceived to have a great influence on the individuals' living conditions. Use of the SEM framework was beneficial in this study as well, because it focuses on physical, community and organizational environment. The SEM highlighted that a stakeholder approach that included members of the community would be the only sustainable strategy for environmental management.

Overcoming environmental damages in the society can be achieved through environmental-based education, as that type of education is a key element in developing a positive attitude needed to cultivate pro-environmental behaviour (Bolderdijk et al., 2018; Liu & Guo, 2018). Thus, it is suggested that public environmental educational campaigns must be used to promote the development of

environmentally friendly social norms and cultural practices. Moreover, the role and purpose of the Sihlanzimvelo Project should be made known explicitly to citizens.

It is also recommended that environmental community-based organization be created that would include ward councilors. That would help both the community and authorities to get a platform to discuss issues in a formal manner. The citizens would be able to report the challenges to the right channel and get a chance to do a follow-up on those issues. Moreover, the involvement of ward councillors would help them to be more hands on the current environmental issues faced by both community members and the municipality. That would in the process change and align the different the perceptions and agendas citizens and municipality had.

The Department of Environmental Health was invited to participate in the study as a member of Sihlanzimvelo project, however, the gatekeeper approval for this study from EThekweni municipality department of Environmental Health was granted. Furthermore, water quality data and the general health status of the streams in uMlazi was not known, according to the other stakeholders of the project. In addition, the study participants were limited to residents of uMlazi township and Sihlanzimvelo Projects stakeholders.

Acknowledgement

The authors would like to acknowledge all participants who shared their experiences on stream management of uMlazi, National Research Fund for awarding a scholarship to study further. and lastly but not least Dr. Senzo Hopewell Mpangase for your assistance in editing the manuscript.

Author Contributions: Conceptualization, N.A.; methodology, N.A.; validation, N.A.; formal analysis, N.A.; investigation, N.A.; resources, N.A.; writing—original draft preparation, N.A.; writing—review and editing, S.C.; supervision, S.C; project administration, N.A.; funding acquisition, N.A.

Institutional Review Board Statement: Ethical review and approval were waived for this study, due to that the research does not deal with vulnerable groups or sensitive issues.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

Conflicts of Interest: The authors declare no conflict of interest.

Reference

- Adger, W. N., Barnett, J., Brown, K., Marshall, N., & O'Brien, K. (2013). Cultural dimensions of climate change impacts and adaptation. *Nature Climate Change*, 3,112–117.
- Anugwom, E. (2021). Urbanization and the Increasing Threat of Infectious Diseases in Africa: Preliminary Observations. *Academia Letters*, Article 1537. <https://doi.org/10.20935/AL1537>.
- Awumbila, M. (2017). *Drivers of migration and urbanization in Africa: Key trends and issues*. Centre for Migration Studies: University of Ghana
- Birnie-Gauvin, K., Aarestrup, K., Riis, T.M.O., Jepsen, N., & Koed, A. (2017). Shining a light on the loss of rheophilic fish habitat in lowland rivers as a forgotten consequence of barriers, and its implications for management. *Aquat. Conservat. Mar. Freshwat. Ecosyst.* <http://dx.doi.org/10.1002/aqc.2795> (in press).
- Bolderdijk, J. W., Lehman, P. K., & Geller, E. S. (2018). *Encouraging pro-environmental behaviour with rewards and penalties*. In Environmental Psychology. Virginia. doi: <https://doi.org/10.1002/9781119241072.ch27>
- Cowan, M.K. (2012). *Microbiology a Systematic Approach*. 3Rd Edition. Miami: McGraw-Hill.
- Dickens, C.W.S.,& Graham P.M. (2002). The South African Scoring System (SASS)version 5 rapid bioassessment method for rivers. *African Journal of Aquatic Science*, 27(1), 1–10
- DWS (Department of Water and Sanitation). (2017). *Annual performance plan: 2017/18 to 2019/20 Vote 36*. Department of Water and Sanitation: Pretoria
- DWS (Department of Water and Sanitation). (2018b). *Annual report 2018/19 Vote 36*. Department of Water and Sanitation: Pretoria
- EThekweni municipality. (2015). EThekweni Sihlanzimvelo project operations manual: Roads and Stormwater Maintenance. EThekweni Municipality: Durban, South Africa.
- Freitas, H.; Moscarola, J., & Jenkins, M. (1998, April 9). *Content and lexical analysis: a qualitative practical application*. ISRC, Merrick School of Business, University of Baltimore (MD, EUA), WP ISRC No. 070498,https://www.researchgate.net/publication/228827898_Content_and_lexical_analysis_a_qualitative_practical_application/citations
- Glanz, K., Bader, M. D., & Iyer, S. (2012). Retail grocery store marketing strategies and obesity: An integrative review. *American Journal of Preventive Medicine*, 42 (5),503–512.
- Glanz, K., Rimer, B.K., & Viswanath, K. (2008). *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons, Inc.
- Glanz, K., Rimer, B. K., & Lewis, F. M. (2002). *Health behavior and health education: Theory, research, and practice*. 3rd Edition. San Francisco: Jossey-Bass.

- Gwack, J., Lee, J.H., Kang, Y.A., Chang, K.J., Lee, M.S. & Hong, J.Y. (2012). Acute health effects among military personnel participating in the cleanup of the Hebei spirit oil spill, 2007, in taean country, Korea. *Osong Public Health Res Perspect*, 3(4),206-212
- Hill, M., & Carroll, S. (2009). Health promotion, health education, and the public's health. In: Detels R, Beaglehole R, Lansang MA, Gulliford M (eds.). *Oxford Textbook of Public Health*. Vol 2.5th ed. New York, NY: Oxford University Press; 2009; 752–766. https://www.susana.org/_resources/documents/default/3-3719-7-1573727097.pdf
- Kelly-Quinn, M., Bruen, M., Carlsson, J., Gurnell, A., Jarvie, H., & Piggott, J. (2019). Managing the small stream network for improved water quality, biodiversity and ecosystem services protection (SSNet). *Research Ideas and Outcomes*, 5, 1-17.
- Lintern, A., Webb, J.A., Ryu, D., Liu, S., Bende-Michl, U., Waters, D., Leahy, P., Wilson, P., & Western, A.W. (2018). Key factors influencing differences in stream water quality across space. *WIREs Water*,5,1-31
- Liu, S., & Guo, L. (2018). Based on environmental education to study the correlation between environmental knowledge and environmental value. *EURASIA Journal of Mathematics, Science and Technology Education*, 14 (7), 1-9.
- McMillan, J. H., & Schumacher, S. (2010). *Research in education: evidence-based inquiry*. 7th edition. Boston: Pearson.
- Minnaar, F. (2010). *Strategic and Performance Management in the Public Sector*. Pretoria: Van Schaik Publishers.
- Monteiro, T. S., & Nalini, R. (2021). Mental health at the intersections of marginalization: A conceptual model to explore the mental health concerns of women sanitation workers in India. *Asian Social Work and Policy Review*
- Neiderud, C.J. (2015). How urbanization affects the epidemiology of emerging infectious diseases. *Infection Ecology and Epidemiology*, 5 (1).
- Nel, J. & Driver, A. (2015). *National river ecosystem accounts for South Africa discussion document October 2015*. <http://www.statssa.gov.za/wp-content/uploads/2016/08/National-River-Ecosystem-Accounts-Discussion-Documents-FINAL.pdf>
- Nel, J.L., Turak, E., Linke, S., & Brown, C. (2011). Integration of environmental flow assessment and freshwater conservation planning: a new era in catchment management. *Marine and Freshwater Research*, 62, 290-299.
- Patil, S.R., Arnold, B.F., Salvatore, A.L., Briceno, B., Ganguly, S., Colford Jr., J.M., & Gertler, P.J. (2014). The Effect of India's Total Sanitation Campaign on Defecation Behaviours and Child Health in Rural Madhya Pradesh: A Cluster Randomised Controlled Trial. *PLOS Medicine*, 11(8), 1-2. <https://doi.org/10.1371/journal.pmed.1001709>
- Polit, D.F., & Beck, C.T. (2012). *Nursing research: Generating and assessing evidence for nursing practice*. 9th edition. Philadelphia: Lippincott Williams and Wilkins.
- Rodda, S.N., Stenström, T.A., Schmidt, S., Dent, M., Bux, F., Hanke, N., Buckley, C.A., & Fennemore, C. (2016). Water security in South Africa: perceptions on public expectations and municipal obligations, governance and water re-use. *Water SA*, 42 (3),456-465.
- Sithebe, A., Singh, G., Amoah, I., & Stenstorm, T. (2016). *A comparative microbiological assessment of the Isipingo River and Palmiet River in Kwa-Zulu Natal province to elucidate health risks*. In: MÉNDEZ-VILAS, A. (ed.) *Microbes in the Spotlight: Recent Progress in the Understanding of Beneficial and Harmful Microorganisms*. Brown Walker Press.
- Sithebe, A. (2017). *A comparative microbiological assessment of river basin sites to elucidate fecal impact and the corresponding risks*. Master of Applied Sciences in Biotechnology: Durban University of Technology.
- South Africa.(1996). *The Constitution of the Republic of South Africa, Bill of Rights Chapter 24*. Pretoria: Government Printers.
- SSA (South Africa Statistics), (2011). *Statistical release (Revised) census 2011*.P0301.4<http://www.statssa.gov.za/publications/P03014/P030142011.pdf>
- Swanepoel, H., & De Beer, F. (eds.) (2011). *Community development : breaking the cycle of poverty*. (5th edition). Cape Town : Juta.
- Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., Gifford, R., & Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American Psychologist*, 66(4), 241–250. <https://doi.org/10.1037/a0023220>
- Tonra, C.M., Sager-Fradkin, K., Morley, S.A., Duda, J.J., & Marra, P.P. (2015). The rapid return of marine-derived nutrients to a freshwater food web following dam removal. *Biological Conservation*, 192, 130-134.
- Weber E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. *American Psychologist*, 66, 315–328. doi: 10.1037/a0023253, ISSN: 1935-990X, 0003–066X.
- WHO (World Health Organisation). (2020). *Mental health of people with neglected tropical diseases: Towards a person-centred approach*. World Health Organization: Geneva
- World Bank. (2019). *Health, safety and dignity of sanitation workers: An initial assessment*. International Bank for Reconstruction and Development / The World Bank: Washington. https://www.susana.org/_resources/documents/default/3-3719-7-1573727097.pdf
- Wright, C.Y., Kapwata, T., Preez, D.J., Wernecke, B., Garland, R.M., Nkosi, V., Landman, W.A., Dyson, L. & Norval, M. (2021). Major climate change-induced risks to human health in South Africa. *Environmental Research*, 196,1-12.
- WWAP (United Nations World Water Assessment Programme). (2017). *The United Nations world water development report 2018: Wastewater: The untapped resource*. Paris: UNESCO

Xaba, N. A., Chetty, N., & Karodia, A. M. (2016). The management of water quality along the Umlazi L section stream (Kwazulu – Natal Province – Republic of South Africa). *Singaporean Journal of Business Economics, and Management Studies*, 4 (10), 76-104.

Publisher's Note: SSBFNET stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



© 2022 by the authors. Licensee SSBFNET, Istanbul, Turkey. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

International Journal of Research in Business and Social Science (2147-4478) by SSBFNET is licensed under a Creative Commons Attribution 4.0 International License.