Understanding the impact of policy adherence and implementation on streams in the Umlazi River System

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ABSTRACT

Although the national policy landscape is saturated with environmental and surface water management policies, there is limited evidence of successful policy implementation at a local level. This lack of policy adherence can have many economic, environmental, and public health effects in an area; hence measure to improve adherence and implementation are essential. This study, therefore, looked at the lack of stream policy adherence and implementation by the government at Umlazi Township, which is the second biggest township in South Africa, with a population reported to be about half a million people. The study integrated three approaches: the Health Belief Model (HBM), Adaptive River Management, and Social-Ecological Model (SEM) to evaluate the scientific knowledge regarding river status, and uncertainty levels and finally evaluate the impact of policy implementation and evaluation on surface water quality management in the Umlazi area. Data was collected from local municipality workers and Sibhlanzimvelo Initiative workers, as these two groups are primarily responsible for stream water management in the Umlazi Local. The data were thematically analyzed and revealed three main factors that contribute to the lack of policy adherence and implementation: citizens are not knowledgeable about on-stream management policy standards; policies on stream management are not implemented and enforced; and lastly, implementation and enforcement of these policies are perceived as difficult. Citizen environmental education and stream worker capacity building appear to be key in improving policy adherence and implementation in Umlazi streams.

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Introduction

The global and national policy landscape is saturated with environmental and surface water management policies, aiming to protect water resources and ensure environmental sustainability (McDowell et al., 2017; Veolia/IFPRI (International Food Policy Research Institute), 2015; Hancock et al., 2015). Although these policies exist and act as external catalysts to positively influence individuals’ environmental behaviors. (Harring et al., 2017; Severtson et al., 2006; Tjernström & Tietenberg, 2008), there is still a huge gap in the implementation and enforcement of policies pertaining to surface water quality, especially in the urban areas of the developing countries which are often water-stressed because of urban migration, overpopulation, and infrastructural insufficiency (Awumbila, 2017). In the South African Context, research studies have revealed that there are increasing levels of water pollution of the water resources, these water resources are already low because of the low rainfall in the nation (Nel & Driver, 2015; Rodda et al., 2016). Hence efforts to minimize river pollution must be implemented urgently, through strategic and strict river water management practices that are evidence driven (DEA (Department of Environmental Affairs), 2018; Donnenfeld et al., 2018; McLean, 2016; King, 2016; Strydom & Retief, 2018).

The South African Constitution has long been cognizant of the importance of environmental management, and thus made legal provisions for the protection of the environment. In the South African Constitution, it is stipulated that everyone has a right to live in a clean and safe environment (South Africa, 1996) and that “No person may (a) throw, drop, deposit, spill or in any other way discard

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any litter into or onto any public place, land, vacant erf, stream, watercourse, street or road, or on any place to which the general public has access, except in a container or a place specifically provided for that purpose” (Department of Environmental Affairs (DEA), 2015). Moreover, Chapter two of the bill of rights in section A states: “everyone has the right to an environment that is not harmful to their health or well-being and” section 24(b) states (i- iii) “the environment must be protected through the prevention of pollution, ecological degradation and promoting conservation (South Africa, 1996) “.

One a positive note, policies at the national, regional, and local level have been developed to ensure good surface water management and protection by government in communities (DEA, 2018; Donnenfeld et al., 2018). Unfortunately, the practical implementation of these policies is seemingly lacking, as numerous studies conducted on surface water revealed that there are high pollution levels which present both a serious economic and public health threat. Various industries and communities rely on water from these rivers to work and live (DEA, 2018; Donnenfeld et al., 2018; DWS (Department of Water and Sanitation), 2015a and 2015b). Liefferink et al. (2017) believes that the ongoing environmental degradation in South Africa is due to the over-reliance of the community on government and municipalities to solve all environmental and water management issues by themselves. Such reliance on government is impractical, especially as there is limited evidence of accountability of authorities in relation to the implementation of section 24 in urban areas surface water management due to a lack of functional accountability systems, despite the mandate stipulated in section 24 (b) required to protect the environment (Liefferink et al., 2017).

This study looked at the impact of lack of policy adherence by the government at the Umlazi river streams. The research data was collected on government workers who are responsible for Umlazi river management and maintenance, using one-on-one interviews and focus groups. This target population was local governments officials as they are legally mandated to manage the river systems though all stakeholders are morally and logically responsible for contributing to the environmental management of their communities as Section A of the bill of rights explicitly and clearly communicates.

Theoretical Background and Conceptual Framework

Health Belief Model

The Health Belief Model (HBM) can help explain and predict health behaviours by analysing the health beliefs, knowledge, attitudes, and the conditions which people live (White, 2012). The beliefs, knowledge, and attitudes of an individual influence their behaviour and their involvement in different activities and initiatives at a personal and corporate level. According to South Africa Department of Environmental Affairs (2019), there is a general lack of skills and knowledge regarding the surface water management. Stakeholders have been observed to lack knowledge about water resource management and possess negative attitudes towards surface water quality restoration in urban areas. This trend is disconcerting as Mohiuddin et al. (2018) highlights that environmental knowledge has large positive impact on attitudes about environmental care. According to White et al. (2015), it is expected that once the knowledge of a particular threat or susceptibility is known, actions to mitigate the threats are often taken. Cues to action need to be detailed with specific dates and with times to execute a plan, which solidifies the clear intent to take practical actions. A lack of solid intentions and poor attitudes about change decreases the probability of practical actions being taken (Bagozzi & Yi, 1993; Mohiuddin et al., 2018)

From this perspective, the interest of measuring the environmental knowledge of those involved in stream management daily was evaluated using the HBM in this study. This model also measures the intention to cues of action after acknowledging the importance of that knowledge or action required. In this model it is argued that proper intentions lead to attitude improvement. It is believed that sufficient environmental and health knowledge can improve both the attitude and pro-environmental behavior of individuals.

The lack of knowledge, positive attitudes, and beliefs regarding stream restoration through policy implementation and enforcement act as barrier towards positive change. Furthermore, transparency about challenges with all stakeholders can contribute to a lack of all stakeholder’s involvement in policy implementation as they are less informed as previously indicated (Van de Bank & Van de Bank, 2014).

Adaptive river management model

The river management adaptive model argues that policymakers often perceive uncertainty analysis as unnecessary work (Puppenberger & Beven, 2006), though they do affirm that uncertainty occurs naturally in policy making. Adaptive management is noted to be influenced by people’s roles, beliefs and by changes in policy. The HBM adds to the adaptive model by describing the belief, knowledge, and attitude of individuals in the study, however this model lacks the element of context as mentioned by Dreibelbis et al. (2013). A wide range of employees in the municipality and water management services were identified as part of the target population. This broad range of potential participants required that a varied repertoire of participant recruitment strategies be used to minimise the potential for participant non-responsiveness and reduce uncertainties.

There are many issues that relate to the management of natural resources, especially that of surface water. One of the major issues identified by adaptive river management framework is that of uncertainty. There have been various studies conducted by experts regarding this subject, however, scientists still insist that river systems have lots of unknowns which makes it hard to manage them effectively. Scientists must adopt an iterative approach to understand river management because of the multitude of uncertainties.
An iterative approach is believed to be effective if both scientists and community members have continuous feedback regarding the state of the surface water leading to better decision making on appropriate measures to be taken.

For the iterative approach to be effective, citizens need to be equipped with necessary skills and knowledge to help them understand the state of the rivers and in making informed decisions. Citizen’s science in South Africa is still on paper and not implemented effectively.

Social Ecological Model

The Social Ecological Model (SEM) framework considers various levels of constructs, namely: individual; relationship; community; societal; and policy level. Only the community, societal and policy level constructs will be discussed as the individual and relationship level are more succinctly covered in the HBM concepts (White, 2012). The Policy level of the SEM framework is the level where prevention strategies are designed to impact the social and physical environment, for example, by reducing social isolation, improving economic and housing opportunities in neighborhoods, as well as the climate, processes, and policies within school and workplace settings (Dahlberg & Krug, 2002). Ingram et al. (2021) believes that the SEM assesses all the levels that are essential to impact health outcomes, by recognizing the role of social and economic factors in creating and perpetuating health disparities.

Integration of HBM, Adaptive River Management and SEM framework

The adaptive river management model and the SEM at the policy level lack a certain degree of specificity about the most important hypothesized influences but focus more on health promotion professionals’ role in identifying critical factors for each behavioural application (Dahlberg & Krug, 2002). Therefore, this paper also includes the concepts of HBM. The SEM, HBM and adaptive management models’ constructs form a triangulated approach which allows for greater validity without a critical understanding of how different datasets interact, instead of using one theory.

It is not only citizens that are uncertain about state of their resources, but scientists have also indicated their doubts regarding river management. Scientists view river management as a difficult task. According to the HBM, such perception can be categorized as a perceived barrier whereas individual perceive a task as an obstacle even if they have acknowledged the benefits of that task. Yet, scientific knowledge and skills are necessary to inform these policies that protect nature and improve its sustainability.

Therefore, this study integrated all three approaches: the HBM, Adaptive River Management and SEM, to evaluate the scientific knowledge regarding river status, uncertainty levels (due the lack of communication and collaboration between community and academic), intentions of cues to action (citizens science and policy implementation and evaluation) and finally evaluate the impact of policy implementation and evaluation on surface water quality management in the urban areas from municipality departments involved in these streams management and those who manage these streams on a daily basis.

Research and Methodology

A case study design using qualitative the approach was used in this study. The case study method was used as its tailored to obtaining in-depth knowledge of an organization or structure like the Sihlanzimvelo Initiative. 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 the nation.

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 are the eThekwini Coastal Stormwater 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 who 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 groundwork, that is, the cleaning of streams.

Purposive sampling was used for the data collection in this study, with the presumption that the people chosen for group discussions are familiar with the research subject and have similar research interests (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’. Sihlanzimvelo co-operatives observations and perceptions on what can be the barriers in keeping the streams clean in Umlazi. The second group consisted of 7 participants in total. Four 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 focus on addressing Sihlanzimvelo challenges.

Sihlanzimvelo participants’ contribution is essential because they are the individuals that physically work in this area daily and are also part of the community as they stay in the township. The overview of the group would contribute on understanding not only community members, but municipal departments involved in streams management. While Sihlanzimvelo assessors’ contribution was more on assessing Sihlanzimvelo workers daily work, to confirm if the workers are really doing their job or just blaming the citizens for their own shortcomings.
The assessors act as the middleman between workers and consultants, forwarding the concerns of the workers to the consultant’s attention. In return, the contribution of consultants as the employees of Sihlanzimvelo workers and assessors was important to share the perceptions of the municipality side. Consultants would generally know the municipality’s challenges and strengths as they work and have regular meetings with the municipal management.

This study used focus group discussions, thus allowing new impressions to shape interpretation in different and unexpected directions by considering all data collected. The focus group data was collected between 18 September 2018 and 8 October 2018.

The researcher organised a focus group discussion with the Sihlanzimvelo co-operatives involved in streams management to discuss the perceived barriers to the maintenance of streams of Umlazi. The second focus group discussion was with the municipality departments involved in streams management. Most of the participants responded in the IsiZulu language, and the findings were later translated by the researcher. The researcher collected data through recording, observations, and field notes during discussions.

The focus group data was recorded, 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 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 in this study will be guaranteed confidentiality and privacy. To certify this, the identity of all participants when reporting was anonymous, with numeric codes used to identify participants.

**Analysis and Findings**

Three themes were identified from the analysis of the data: the relationship between streams management policy and citizens behavior; stakeholders’ perception on stream policy adherence; and cues to action.

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**Theme One**

**Relationship between streams management policy and citizens behaviour**

*Subtheme one: Citizens are knowledgeable about stream conditions but have poor attitudes towards environmental management*

Even if a positive intention exists for a specific behaviour, it is still possible that if an individual lacks the necessary knowledge and skills to adopt a certain behaviour this can prevent an individual from performing the behaviour (Glanz et al., 2015). There were participants that indicated that citizens do not know and do not understand surface water policies

“no they do not know the policies, they say they litter because they are creating job opportunities (Municipality participant 2, focus group).

In this study, it was uncovered that while some community stakeholders are educated about the water management policies, the poor attitudes by citizens regarding stream management was a major hurdle in the stream restoration efforts.

“the community is being educated but it the laziness of the people, because when it comes to waste, citizens just throw it to the streams as this is the easiest thing to do especially those that live in slums. Also, when it comes to paying for legal sewer connections, people do not want to pay so they dispose on the streams.” (Sihlanzimvelo participant 7, focus group).

UNICEF/WHO (2015) and White et al. (2015) agree that the surface water quality deterioration can be caused by the proliferation of slums, general waste, and sewer pollution.

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Theme Two

Stakeholders perception on stream policy adherence

The function of policy is to promote healthy behaviour on citizens. From Social Ecological Model (SEM) or Social Ecological System (SES) model, local and national government departments and agencies are responsible for the policy implementation and enforcement (DEA, 2019; Dahlberg & Krug, 2002). The research participants were asked if stream management policies are implemented and enforced in the Umlazi river streams.

Subtheme one: Policies on stream management are not implemented and enforced

Several observations were noted and recorded regarding stakeholder’s view regarding the citizens’ behaviour on stream water quality policy and practices adherence. All Sihlanzi mvelo participants said that:

“community members do not believe in the policy because nobody is ever penalised or arrested.”

These findings are in line with observations of Pride and Joy Consultants (2015) from eThekwini Municipality, where citizens perceived eThekwini municipality to have poor performance in mitigating the pollution of rivers and wetlands. The government officials participating in this study admitted that they as the municipality have failed to implement and enforce these laws, as another participant continued to say

” Even if you tell them about the laws or policies, these policies are not a priority to them. As we as municipality are failing to enforce these laws, impacts positive on disbelief that such laws exist.” (Municipality participant 3, focus group).

According to the researcher, the authorities are noted to be failing to enforce policies, which has given citizens free reign not to abide to the laws associated with surface water management.

Subtheme two: Implementation and enforcement of policies is difficult

Stakeholders were further asked what they perceive as barriers in implementing and enforcing these policies. Municipality departments indicated that implementing and enforcing these laws is simply a daunting and difficult task.

“When I summon a fine penalty to houses, which address should I send it to? Unless you see them littering there and there (Municipality participant 4, focus group).

All participants agreed that it difficult to enforce these laws.

Literature reveals that that if individuals perceive barriers to change to be more difficult or costlier than the benefits, the likelihood of action decreases (White et al., 2015). The researcher believes that policymaker perceptions about the difficulty and feasibility of the implementation of these policies is the first hurdle to implementation, and that such beliefs and attitudes need to be changed as a first step towards change.

The stakeholders further highlighted that the current policies and laws can be used on formal houses due to their traceability, but are ineffective in informal houses and settlements, as these are illegal dwellings with no address or accountability. Hence law and policy enforcement are almost impossible in such contexts.

” implementation is easy for built up area, where we know that that house number and the street name. citizens in the slums do not even have roads, so where do we send the letter to?” (Municipality participant 4, focus group).

There was a general view by municipality departments that most of the policies were almost impossible to implement in the current social and geographical landscape of Umlazi. The opinion of the research participants is that citizens are following suite with the lacklustre attitudes of the municipality departments in the river management efforts despite the public rhetoric that sounds pro-environmental.

Theme Three

Cues to action

Subtheme one: Attitudinal change requires citizens to be environmental educated

Educating citizens about the importance of environmental policies will increase knowledge, bring attitudinal and behavioural change about stream management practices. Most participants agreed that municipality engagement and education are the main tools that can improve attitudes about environmental care. Some of the participants were of the view that although educating citizens will bring about attitudinal change, however they believe this will come with time.

” it will take time, as some will learn and some would not instantly” (participant 3, focus group).

Nevertheless, one of the participants vehemently queried the possibilities of changing all citizens. The participant rhetorically asked the following:
“Can you educate someone and tell them that they should not something and they learn from that? Can people from hostel change?” (Municipality participant 3, focus group).

Subtheme two: Attitudinal change will require an incentives approach

The participants suggested a carrot approach to implementation, using incentives to promote pro-environmental behaviour that benefits not only the streams of Umlazi but the entire ecosystem. One participant mentioned that there were two approaches that can be used to gain attitudinal change. The ‘carrot’ and/or ‘stick’ approach. Carrot approach was more about incentives.

“Carrot approach-if you do good that you will get but we discourage that a person gets an incentive for something they should be doing. Because it does not make sense because” I am helping you”? (Municipality participant 4, focus group).

Even though the municipality participants indicated that it everyone’s job to keep the streams clean, the researcher still perceived that municipality feels it is only citizen’s job to keep the streams clean because of lack of accountability from the municipality, lack of community engagement, lack of awareness campaigns and training. However, as mentioned earlier, water governance is the negotiation between society and government in effectively implementing socially acceptable allocation and regulation by mediating behavior through values, norms, and laws of both government and that of society (Hill & Carroll, 2009). Not only does the municipality not provide necessary working material for the Sihlanzimvelo workers, from the researcher’s viewpoint their attitude and mindset also need to change.

Subtheme three: Attitudinal change will require a stick motivational approach

Another participant added that stick approach was another approach that can help change the attitude from bad to good according to the focus group participants.

“the stick approach indicates that if an individual does not change their attitude and behaviour to good, they will face consequences and such law enforcement or natural disasters like floods affecting them”. (Municipality participant 4, focus group).

All stakeholders agreed and believed that the reason why citizens continue to litter is because they are not penalised and are not even scared of not complying. Such insight from stakeholders agrees with Smith and Strand (2008), noting that determinants of behaviour are individual’s attribute that influence behaviour can be positive and negative reinforcements. As stated earlier that, people that have little personal experience with a disaster are less motivated to take the warning seriously or even to seek further information.

**Discussion**

The aim of this study was to determine the impact of poor surface water policy adherence on the stream conditions in Umlazi Township, KwaZulu Natal, South Africa. This study findings revealed that there are 3 main factors that contribute to a lack of surface water policy implementation: citizens are not knowledgeable about on-stream management policy standards; policies on stream management are not implemented and enforced; and lastly, implementation and enforcement of these policies is perceived as difficult. These were highlighted by Sihlanzimvelo workers and validated by municipality department workers from the ETHekwini Coastal Stormwater and Catchment Management; ETHekwini Roads and Stormwater Maintenance; and Durban Solid Waste Departments

**Relationship between streams management policy and citizens behaviour**

As it was highlighted in the research results, certain citizens do not know nor understand the policies, instead only view stream management as an opportunity to create jobs instead of environmental sustainability. Unless the community is well educated about the importance of environmental care, the surface water pollution in South Africa levels will continue to rise and deplete the water supply, even though national policy landscape is saturated with environmental and surface water management policies. Most citizens seem to be unable to connect to link between importance of surface water management policies and environmental sustainability. It is also noted that the lack of transparency of current challenges on surface water management can contribute to poor attitudes around environmental management (Van de Bank & Van de Bank, 2014).

Moreover, such poor attitude towards stream management can put rivers and stream users at risk, as polluted streams and rivers have been associated with health and safety hazards that include diarrhoea; cholera; malaria; tuberculosis (TB); floods; air pollution severities just to mention a few (WHO, 1983; WHO, 2014; Sinanovic et al., 2015). Citizens being more hands-on on implementation of policies at a local level could be useful and give current environmental efforts the need boost they need. As Liefferink et al. (2017) previously indicated, a strong reliance of the community on government and municipalities to solve water management crisis that already exists contributes to the ongoing environmental degradation in South Africa. Allowing citizens to be more involved in policy decision making can also promote a greater sense of commitment by citizens. Citizens must be made aware of both the positive and negative effects of stream pollution and mismanagement and the policies that are advocated to manage streams. Transparency, even on the negative implications such as health and safety risks can build trust between citizens and government, and act as a stimulus to behavioral change (Burke, 2015). Citizen awareness of their health susceptibility involvement is a predictive variable with preventive health steps (White et al., 2015)
Involving citizens in river system management should be a part of any water governance structure, as it promotes the negotiation between society and government in effectively implementing socially acceptable allocation and regulations by mediating behavior through values, norms, and laws that both government and society know and agree on (Hill & Carroll, 2009), as the Constitution of South Africa communicates (South Africa, 1996). Such an approach can be very useful (Williams et al., 2007). The adaptive management of natural resources such as rivers framework and issues, a two-phase process of deliberative and iterative phases in adaptive management with every stakeholder involved is necessary since environmental variation is the most prevalent source of uncertainty and is largely uncontrollable and possibly unrecognized. Otherwise, lack of proper knowledge on surface water policies will result in no behavioral change. Alias (2019) reveals that the exists a positive correlation between knowledge and behaviour with regards to river pollution, that is, the more knowledgeable individuals are the more they practice pro-environmental behaviour. Ajzen et al. (2011) concurs, noting that it is only when are well informed can we then act effectively to produce desired outcomes.

**Lack of skills in implementation and enforcement**

Policymakers and administrator attitudes towards policy implementation and enforcement is a barrier that can hinder likelihood of policy adherence and was highlighted as a challenge faced by authorities in this study. As previously discussed, according to HBM, if an individual perceived the barriers to be more difficult or costlier than the benefits, the likelihood of action is decreases (White et al., 2018). Individuals need attitudinal and up-skillling to overcome the mental and practical challenges that are currently inhibiting from fulfilling their duties, that is, implementing and enforcing policy.

The lack of in implementation and enforcement skills of these policies by authorities can also be due to lack of environmental knowledge. As Mohiuddin et al. (2018) asserts, “environmental knowledge has positive impact on attitude”. The attitude of the municipality participants regarding enforcement of these policies was observed to be negative, as they indicated enforcement to be an impossible mission due to informal settlements and citizens’ attitude.

Poor infrastructure is another contributor to poor policy adherence according to the participants. According to Sutherland et al. (2014) and Sim et al. (2015), whilst Umlazi is within Urban Development Line (UDL), it has however a combination of formal houses, low-income housing projects and informal settlements which increases management complexity in different spheres. Low-income housing projects have access to free basic water or full pressure-metered systems and waterborne sanitation and flush toilets. While those that live in the informal settlement are not on the priority list for resettlement into formal housing, they will have access to communal ablation blocks that provide water and flush sanitation (Sutherland et al., 2015).

Therefore, unless ordinary citizens living in urban areas are actively involved and allowed to challenge policy making decision process, there will always be a gap in effective policy implementation and enforcement. Such strategy of involving citizens was observed in the increase in the amount of free basic water provided in Durban, from 6000 liters to 9000 liters per household per month, provides an example of how knowledge travels in these networks. The continues feedback Durban in return resulted in lowered the risk of cholera, which had become a reality with the outbreak in the city between 2000 and 2001 (Gounden et al., 2006).

Liefverink et al., (2017) has previously indicated that the over-reliance of the community on government and municipalities to solve water management crisis contributes to the ongoing environmental degradation in South Africa. A more hands-on approach by citizens at a local level would bring substantial change. Therefore, allowing citizens to be more involved in policy decision making could be a tactic in equipping them with environmental education thus minimizing barriers regarding surface water policy adherence. Citizens know their own community and they understand their culture, and therefore, can be able to help enforce these laws. Otherwise, as previously indicated, even if a positive intention exists about taking certain actions, it is still possible that if an individual lacks the necessary knowledge and skills to perform that behaviour and this can prevent an individual from performing the behaviour (Glanz et al., 2015).

**No intention from authorities to implement and enforce river management policies**

Unfortunately, not even the current increasing occurrence and exposure to natural disasters and diseases has motivated authorities to take environmental management more seriously and fervently. This action agrees with observations by Bagozzi and Yi (1993) and Mohiuddin et al. (2018) about government workers in general, that noted the case of police, observing that when there is poor intention by police to enforce law or a disparity in what police say and do, then citizens perception on how important the law is will determine if that will be abiding by it or not (Bagozzi and Yi, 1993; Mohiuddin et al., 2018). The practical implementation of these policies is seemingly lacking, as numerous studies conducted on river surface water revealed high pollution levels which present both a serious economic and public health problem, as various industries and communities rely on water from these rivers to work and live (DSW, 2018b).

Although reasons for poor adherence on surface water policy were mentioned to be due to poor knowledge, attitude, and behaviour towards surface water policy adherence. However, if there is no intention from authorities to implement and enforce river management policies and in developing water conservation programs, encouraging community based environmental programmes, then policies as a predictor will not be able to predict behavioural outcomes (Aarts et al., 1998; Fielding et al., 2012; Gregory & Di Leo, 2003; Ouellette & Wood, 1998).
Bagozzi and Yi (1993); Mohiuddin et al. (2018) maintains proper formulation of intentions by proper planning, accurate details, and indication of proper start date of that action can decrease gap between intention and actual actions. From these findings, South Africa needs to improve their implementation strategies regarding surface water management. Through regular collection of site-specific data will provide valuable information for modeling purposes, influence decision making and help promote relevant revisions of policies in surface water management.

**Strategic Ignorance**

Overall, strategic ignorance was observed to be practised by municipality regarding implementing and enforcing surface water policies. Findings highlighted citizens were to continue with illegal dumping on streams as this is the easiest thing to do and practising legal sewer connections and less costly. Although authorities are aware of countries surface water scarcity and climate change crisis and illegal practices on surface water in urban areas, however, nothing has been done to mitigate these challenges regarding environmental education on the community and there is lack law enforcement on policies. According to Thunström et al. (2014), people decide on strategic ignorance of environmental harm and social norms even if they are negatively affected by environmental harm but instead some people use ignorance as an excuse to reduce pro-environmental behaviour, strategic ignorance significantly decreases guilt of social pressure.

According to Department of Health Province of KwaZulu-Natal (2015), a diarrhoeal outbreak was reported in Umlazi in 2015 which was caused by water contamination due to poor sewage infrastructure and remains a reason for worry with the peak number of deaths that arose in the Southwest Sub-district of KwaZulu-Natal according to the report from R K Khan Hospital. Hence, Ingram et al. (2021) believes the SEM illustrates that all levels are essential for impact health outcomes by recognizing the role of social and economic factors in creating and perpetuating health disparities. From the findings of this study though, EThekwini municipality has not implemented and evaluated these policies. Yet Discourses of Water Governance of EWS aims to focuses on the value of critical environmental services in the face of climate change impacts and water scarcity in the municipality (Sutherland & Roberts, 2014) making citizens of this area prone to natural disasters and diseases.

Suggestion to consider SEM framework approach on policy level to determine the impact the social and physical environment with the aim of reducing social isolation, improving economic and housing opportunities in neighborhoods, as well as the climate, processes, and policies within school and workplace settings (Dahlberg & Krug, 2002). Therefore, combination of iterative approach and SEM framework approach can be effective in Umlazi, as citizens need to be equipped with necessary skills and knowledge to help them understand the state of the rivers and in making informed decisions. Especially because urban area like Umlazi Township that lack the specificity about the most important hypothesized influences, but instead puts a greater burden on health promotion professionals to identify critical factors for each behavioural application (Dahlberg & Krug, 2002).

**Conclusions**

This study focused on the impact of policy adherence by government at the Umlazi river streams. The analysis of the data obtained clearly revealed that policy is hardly ever implemented in Umlazi Streams. The results revealed that there are 3 factors that contribute to a lack of surface water policy implementation: citizens are not knowledgeable on-stream management policy standards; policies on stream management are not implemented and enforced; lastly, implementation and enforcement of these policies is perceived as difficult. With such findings, measures to increase accountability of municipality workers in policy implementation and enforcement are a necessity, considering that Umlazi is in an urban area that is already affected by climate change impacts, with drought and floods being experienced more frequently.

According to White (2012), policies are known as a predictor of behavioral outcomes and prevention strategies that impact the social and physical environment. Hence lack of intention on implementation and enforcement of these policies from authorities can result or even promote further degradation of the surface water at a local level. Therefore, unless citizens are educated on the importance of stream management and are encouraged to be actively involved decision making regarding environmental issues and authorities are capacitated regarding policy implementation and enforcement policies then rivers in Umlazi will continue to be one of the most polluted rivers in South Africa. The rivers are not well monitored and assessed affected by illegal dumping activities even after policies on surface water management against pollution have been existing for years and gazetted in South Africa especially as climate change in this area has started to have visible impact with frequent floods observed (EThekwini Municipality, 2019; Dludla, 2019; Donnenfeld et al., 2018).

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