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An Assessment of Water Accessibility in the Kuvukiland Informal Settlement of Tsumeb in Namibia

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Abstract

Challenges of water supply in informal settlements have been observed in different parts of the world. This study evaluates accessibility to water in the Kuvukiland informal settlement. The study employed two methods: a semi structured questionnaire and in-depth interviews. Semi-structured questionnaire was used to collect the data from 50 respondents in the Kuvukiland informal settlement, and the in-depth interviews were carried out with five key informants. The findings suggest that access to water in informal settlements is a challenge, because more than half of the population in Kuvukiland live more than a kilometre from the water points. Further findings also show that affordability is a critical issue, because the more than half of the population are unemployed, and as a result they cannot afford to pay for water. Finally the findings are that, water supply in Kuvukiland does not follow an integrated water resource management approach. In addition, there is poor community involvement, and stakeholder participation is weak.

Keywords: water access, availability, affordability, community involvement, informal settlement

1. Introduction

Within today's paradigm of integrated water resource management, the management of water resources is seen as a process that aims at coordinated development and management of water and other natural resources (Global Water Partnership [GWP], 2009). The meaning of these words is reflected in the harsh realities faced by water users in drought-prone regions throughout the world. The distribution of scarce water resources therefore needs to be revised because, conflicts among water users easily erupt. Water is a critical factor for human livelihood and supply remains a serious problem throughout Namibia, as the country is considered to be one of the most arid countries in Southern Africa (Ruppel, 2013).

Many societies face enormous deficit in water supply and sanitation challenges. Currently, 900 million people around the world suffer from drinking water shortages and 2.6 billion people around the world live without safe water (Framework Programme Research for Sustainable Development [FONA], 2011). Bouwer (2000) argues that the global renewable water supply available is about 7,000 cubic meters per person per year, which means that there is enough water for at least three times the present world population. Therefore, water shortages are due to imbalances between population and precipitation distribution. The World Health Organisation (WHO) report of 2000 estimated that one sixth of humanity (1.1 billion people) lacked access to any form of improved water supply within one kilometre of their home (WHO, 2003). According to the Southern African Development Community (SADC) report, of the SADC region's total land area, only three per cent is humid; the rest of the land is moist and sub-humid (40%), dry sub-humid (19%), and semi-arid (16%). Therefore, the distribution, occurrence and availability of water resources are uneven in the region as well as in the individual countries because availability depends on rainfall (SADC, 1996).

In Namibia, water is increasingly becoming scarce, a fact compounded by two hard realities (Mendelsohn, el Obeid, & Roberts, 2002). The first is the general scarcity of water due to low, sparse and variable rainfall, coupled with high evaporation rates. The second is that a large number of people are concentrated in areas far from the major sources of water. Similarly, Schachtschneider (2000) states that Namibia is the driest country in sub-Saharan Africa, yet the concept of water demand management is not well established. The 2001 population

and housing census revealed that more than half of the households have piped water within their compounds, while 35% get their water from public pipes and boreholes, and that urban households are relatively better off compared to rural households with regard to availability of piped water within their compounds (Republic of Namibia, 2003). Recent census, 2011 population and housing census reveal that, almost all urban households in Namibia have access to safe water (98%) in the form of piped water inside or outside their dwellings, or from public pipes or boreholes. 59% of rural households share the same privilege (Namibia Statistics Agency [NSA], 2011). In 2002, the Namibian Cabinet approved the National Water Policy White Paper that formed the basis for the Water Resource Management Act of 2004. The policy provides a framework for equitable, efficient and sustainable water resource management. This policy clearly states that water is an essential resource to life and that an adequate supply of safe drinking water is a basic human need (Ruppel, 2013).

This study evaluates accessibility to water in the Kuvukiland informal settlement. The study intended to inform, motivate and empower people in the Kuvukiland informal settlement at different levels of decision-making. Without providing information on water management activities and awareness of the need to conserve water to communities without water in the Kuvukiland informal settlement, this precious resource will not be sustainable. The Kuvukiland informal settlement in Tsumeb is continuously experiencing water challenges of access and availability.

The informal settlement is located on the outskirts of the town of Tsumeb, and the only access to water is through a pre-paid water meter which is shared by the community. It is on this basis that the study identified the need to assess the accessibility of water in the Kuvukiland informal settlement and evaluate the integrated water resource management in Tsumeb.

2. Integrated Water Resource Management

This study utilises the definition of integrated water resource management by the Global Water Partnership (GWP) Technical Advisory Committee (2000), which defines integrated water resource management as "a process that promotes the coordinated development and management of water, land, and related resources, in order to maximise the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems". Viessman (1997) argues that integrated water resource management means putting all of the pieces together. Social, environmental and technical aspects must be considered. Issues of concern include: providing forums; reshaping planning process; coordinating land and water resources management; recognising water sources and water quality linkages; establishing protocol for watershed management; addressing institutional challenges; protecting and restoring natural systems; capturing society's views, educating and communicating; forming partnerships; and emphasising preventive measures.

Integrated water resource management is crucial in meeting and managing the increasing water demand in Namibia. Recent studies have shown that as part of that process, both water demand management measures and non-conventional water supply augmentation schemes are considerably cheaper than developing more traditional pipeline schemes (Biggs & Williams 2001). Grafton and Hussey (2011) argue that the driving force for the development of integrated water resource management comes from an awareness of the distinctive nature of the resource and its ubiquitous influence on human well-being and environmental sustainability. Grafton and Hussey further stress that our lives depend not only on how much water of what quality is available at any point in time and space, but crucially on what we choose to do with the resource. Therefore, integrated water resource management might be seen as a necessary measure to foil the increasing complexity of managing political economies and malfunctions as they attempt to manage challenges such as water supply and demand.

Viessman (1997) argues that there is a need for governance structures, from national to local and state agencies as well as other institutions, to strengthen or establish partnerships among themselves and with relevant publics. Such cooperative arrangements aid in conflict resolution, enhance efficiency in commitment of resources, and facilitate the identification of paths that complement or supplement each other's goals. This approach fosters learning, rather than opposing one another, because partnership is one way to bring about needed institutional reforms.

On the other hand, Soussan, Pollard, de Mendiguren, and Butterworth, (2004) argue that any discussion of water issues in contemporary South Africa must be set within the context of the existing dynamic to water laws, policies and institutional responsibilities. They further state that key aspects of the reform process are defining mechanisms to improve existing services and to allocate water to different stakeholders based on assessment of their minimum needs. For the domestic sphere, this reflects a definition of basic needs that assumes domestic water to be only about health and hygiene; this implies only water for cooking, washing, sanitation and drinking.

3. Water Supply in Informal Settlements

Muli (2013:10) defines informal settlement as: First, "Areas where groups of housing have been constructed on land that occupants have no legal claim on, or occupy illegally". Second, "Unplanned settlement and areas where housing is not in compliance with current planning and building regulations". Both definitions are emphasising the illegal character of informal settlements. From a more inclusive point of view, this paper adopts the definition by Mason and Fraser (1998, p. 313) who take the environmental, socio-economic and living conditions into account as they define informal settlement as: "….dense settlement comprising communities housed in self-constructed shelters under conditions of informal or traditional land tenure. They are common features of developing countries and are typically the product of an urgent need for shelter by the urban poor. As a result, they are characterised by a dense proliferation of small makeshift shelter built from diverse materials, by degradation of the local ecosystem, such as erosion and poor water quality and sanitation".

Challenges of water supply in informal settlements have been observed in different parts of the world. For example, municipal water supply in Karachi informal settlements in Pakistan has become grossly inadequate with regard to users' needs and expectations. Residential communities suffer from poor levels of service, and peri-urban locations, especially low-income settlements, have very limited access to municipal water supplies (Ahmed & Sohail, 2003). Informal settlements such as the one in Karachi's Orangi Township in Pakistan's inner city areas have increased in density, giving rise to acute water shortages. Squatters have sprung up in peri-urban areas, thus increasing the cost of piped water supply because of their distance from the existing water mains. Therefore, settlements located at the end of the network receive a very low level of services, since a large amount of water allocation has already been removed, legally or illegally. It is mostly the urban poor who reside on the peripheries who suffer from the water supply situation (Ahmed & Sohail, 2003).

In Namibia, Becker and Bergdolt (2001) argue that, as for potable water supply, the city of Windhoek aims to fully recover costs. Therefore, non-payment of accounts by residents results in the cutting off of the water supply. The introduction of a prepayment water management system is designed to effect substantial savings for bulk-water suppliers. Two types of payment metres are available: the yard connection for use at individual sites and the community standpoint for use at communal water supply points, mainly in informal settlements. Namibia's informal settlements, like many other international examples, are faced with challenges of water access, availability, affordability and community participation. The objective of this study was to evaluate accessibility to water in the Kuvukiland informal settlement.

4. Research Methodology

4.1 Study Site

The mining town of Tsumeb is located at 19º 15' S and 17º 42' E and it lies 1,320 m above sea level. Tsumeb is the capital of Oshikoto Region, located in north central part of Namibia (Figure 1). The climate of Tsumeb is semi-arid to arid, with an average annual rainfall of 524 mm. The rainy season is normally in summer, from December to February. The time between May and July is regarded as winter, with no or little rain. The mean annual temperature for Tsumeb is 25ºC and the monthly temperature ranges between a mean maximum temperature of 26ºC and a mean minimum temperature of 16ºC throughout the year (Knesl, Konopasek, Kribek, Majer, Pasava, Kamona, Mapani, Mufenda, Ellmies, Hahn, Ettler, 2006).

Figure 1. Map of Tsumeb (en.wikipedia.org)

According to Dierkes (2011), the Tsumeb water supply wells are drilled into Karstland with multi-aquifer systems. Tsumeb falls within the hydrological region that hosts eight major water supply schemes, of which Tsumeb's (108) waterworks are independent. Dierkes further states that until the early 1990s, the domestic water supply to the Tsumeb municipality was entirely dependent on the 2.5 cubic millimetres per year of groundwater supplied in Tsumeb and purified from the mine.

In Namibia, the need for forming institutions to manage water and other resources within the basin has been incorporated in the Water Resource Management Act of 2004 (Republic of Namibia, 2008). However, water supply remains a major challenge in Namibia, especially in the rural areas. Ruppel (2013) states that in order to organise the water supply, infrastructure has to be maintained, facilities have to be managed and fees are to be collected. The Ministry of Agriculture, Water and Forestry is the overall custodian in managing and regulating water resources in the country, with the prime objective of ensuring that water resources will be properly investigated and used on a sustainable basis to cater for the needs of the people and to sustain their environment (Republic of Namibia, 2008). Furthermore, local authorities and regional councils are responsible for the implementation of water supply and sanitation in the rural and urban settlements (proclaimed and un-proclaimed) where demand is continually increasing and a growing backlog exists. In addition, the Central Government should allocate capital resources wherever the Regional Council or local authority is unable to provide sanitation to the poor and marginalised, with strict standards that will be applied by the Directorate of Water Supply and Sanitation Coordination (Republic of Namibia, 2008).

The Kuvukiland informal settlement is located on the western part of Tsumeb, on the periphery of the town, with no services such as water, sanitation and electricity. The settlement is characterised by informal housing structures. The houses are made of makeshift corrugated iron sheets; some of the houses are built of cardboards. The informal settlement has a population of 3,300 people and over 350 households. Most houses are female-headed households, the majority of whom are unemployed and depend on pension hand-outs and wages from informal employment.

4.2 Research Methods

This study employed two methods: a semi structured questionnaire and in-depth interviews. The semi-structured

questionnaire was used to collect the data from household respondents in the Kuvukiland informal settlement. 50 semi structure interviews were conducted and 5 (five) key informant questionnaires were collected. The open-ended questions allowed for the respondents to express their own opinions. Closed questions were formulated and the questions were easy to select. It was challenging to gather information from respondents who could not speak Oshiwambo, Afrikaans or English. A community member was used as a translator where there was a language barrier.

In-depth interviews were carried out with five key informants who included the Tsumeb local authority members, Kuvukiland informal settlement community leaders, and a representative from the office of the constituency counsellor. The key informants were brief and understood the questions. However, the main challenge was to schedule meetings with all the community leaders. The process of indexing was followed and it was helpful in generating the necessary information that was needed to meet the research objectives. All sets of scripts were analysed and those scripts with similar themes where grouped together, and the field notes were constantly compared to observe the significance of the notes to the objectives of the study. A Microsoft Excel spreadsheet was used to analyse data from the completed questionnaires through this process, graphs and tables were generated, only graphs that answer the questions of the study and those tables and graphs that help the research meets objectives were interpreted.

5. Results

5.1 Water Management and Supply in Tsumeb

The Tsumeb municipality, unlike other towns in Namibia that receive water from the Namibia Water Corporation Ltd. (NamWater), uses water from its own underground water aquifers. Water is pumped into the reservoirs for treatment and use for the town. The main water supplies in Tsumeb are from the Tupperware Dam, with a water holding capacity of 15,500 cubic meters. This reservoir supplies water directly to the town.

> *"We are part of the sub-basin water management committee and this helps us to prolong the water aquifers"* (Interviewee 2, 2013, July 9).

> *"In an attempt to manage water, the town council encourages the community to use water sustainably"* (Interviewee 2, 2013, July 9).

The Kuvukiland informal settlement does not have reliable and regular water supply like the formal settlement in Tsumeb. Water in Kuvukiland is supplied through a pre-paid water system; five standpipes were erected by the municipality. However, this does not address the issue of supply and access, since only two of the standpipes are working. The community members dig trenches and the municipality supplies them with water pipes to channel the water to different parts of the settlement. However the community feels that the standpipes should be improved for them to have reliable water supply.

> *"We supply water to Kuvukiland informal settlement through a bulk water supply, which works like a pre-paid system"* (Interviewee 5, 2013, July 9).

> *"We as the community dig the trenches ourselves; what the municipality does is supply the water pipes and erect the standpipes for us. However, the standpipes are not reliable because they do not work in line with the card system; they overcharge us"* (Interviewee 3, 2013, July 7).

Community leaders' claim that water supply in the Kuvukiland informal settlement is very poor; the residents sometimes harvest water from the roof during rainy seasons; long queues at the water points demonstrate slow release of water by the only operational standpipe; it can take up to 10 minutes to fill a 20-litre container of water. Further, water is sometimes supplied by sprinkler trucks, and such water is always brownish in colour.

> *"During rainy seasons, residents harvest water from the roof of their iron zinc houses"* (Interviewee 3, 2013, July 7).

> *"Sometimes when the water situation reaches a critical point, they send sprinkler trucks filled with water, which is always brownish in colour. Water supply is very poor here and the municipality does not really look after the water in Kuvukiland"* (Interviewee 3, 2013, July 7).

5.2 Community Perceptions of Water Situation in Kuvukiland

There are only five water points in Kuvukiland, and only two of the five water points were working during the interviews. The main point of water collection is the community standpipe (Figure 2).

Figure 1. Community water collection point

(Picture by AN Enkono, 2013)

The lack of water availability at the two water points has led the community members to collect water from the nearby surroundings, particularly from the Soweto public toilet. Most of the time, there is no water in the community and residents stand in long queues at water collection points.

> *"Water is rarely available here; we sleep standing in queues at the water point just to collect water"* (Interviewee 5, 2013, July 3).
>
> *"Water is scarce in this community, most of the time we collect water from the public toilet in Soweto"* (Interviewee 6, 2013, July, 5).
>
> *"Water is scarce here; we sleep at the water point just so we can get tap water. Most of the time, we collect our water from public toilets in Soweto."* (Interviewee 3, 2013, July 7).

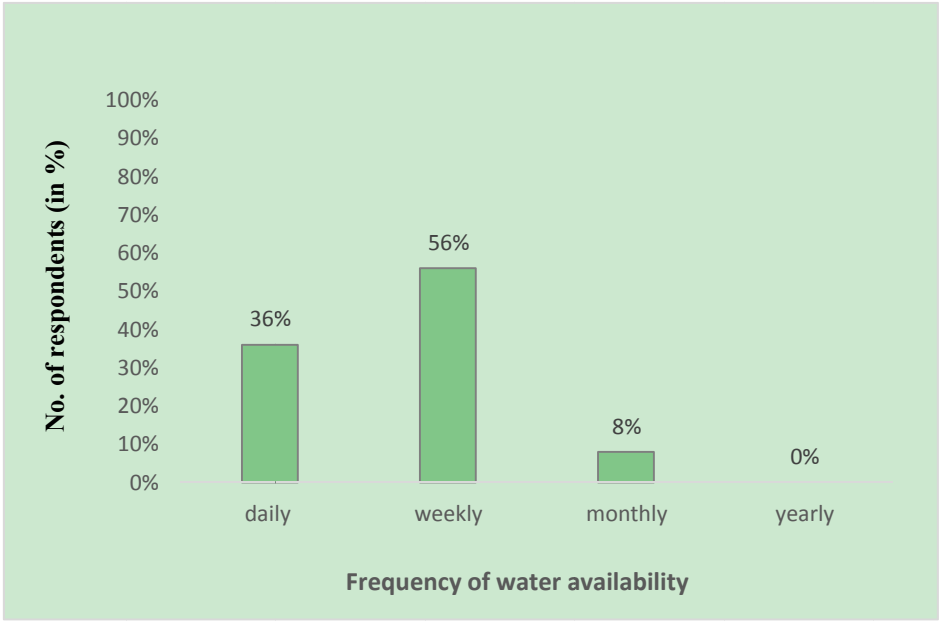

Figure 2. Access to water

As shown in Figure 3 above, most respondents claimed that water was only available once a week. However, a few respondents claimed that they had access to water on a daily basis. The divided opinions could be attributed to the fact that the community standpipes were broken most of the time, and only worked on some days. On the other hand, the majority of the respondents said that they lived further away from the water point and only collected water once a week.

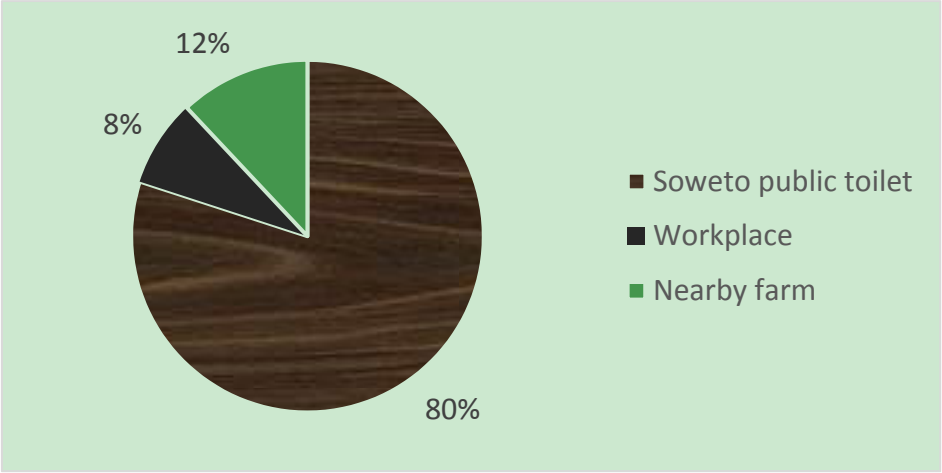

Figure 3. Alternative sources of water

Most respondents indicated that they collected water from public toilets in Soweto as an alternative source. Soweto is a semi-formalised location, which means that some parts of Soweto are formalised while a small part is informal. In Soweto, however, there are public toilets fitted with showers that are accessible to everyone. The residents do not have to pay for the water from the public toilets. However, the small part of Soweto that is not formalised also makes use of the toilets to collect water when they experience water supply problems. Some respondents said that they collected water from their workplaces, and those respondents that lived close to a private farm collected water from the nearby farm.

5.3 Distance from Water Collection Points

Despite the water collection points in the community, a larger portion of the community live far from the water source. Therefore, community members travel long distances to get water. The majority of the respondents said that they lived a long distance from Soweto, which is an alternative source of water collection, where water is collected from public toilets.

> *"The standpipes are far from our houses, they are not spread out into the community, we want them to extend the standpipes, because the distance is too much for us"* (Interviewee 6, 2013, July 5).
>
> *"Soweto location is very far for us and sometimes we just go without water, because we cannot afford to travel the long distance every day, especially for us women"* (Interviewee 5, 2013, July 3).

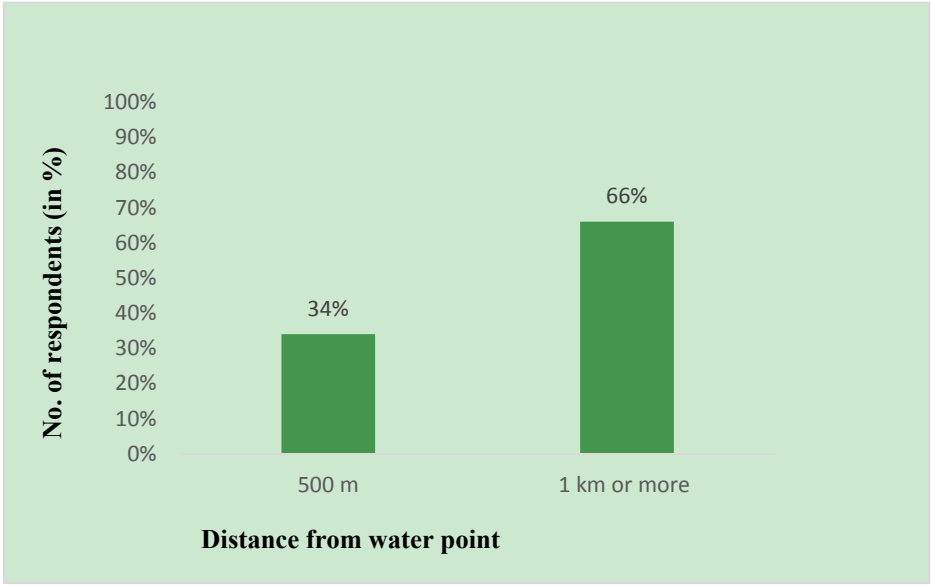

Figure 4. Distance travelled by respondents to access water

Most respondents said that they travelled more than a kilometre to collect water, only a few respondents had access to water within 500 metres. As indicated in Figure 5, access to water is a challenge for most of the residents in an area where most households are headed by females. It is a challenge for the women to carry water over such long distances. The majority of the respondents said that they travelled twice a day to collect water, while a few travelled more than twice a day to collect water, and only a small portion of the respondents collected water once a day. This clearly shows the high demand for water in the community.

Water consumption varies from household to household. Most of the respondents said that they used as much as 75 litres of water a day, while the number of those who used 50 litres and 100 litres of water was almost the same. The difference in water consumption among different households could be attributed to distance, where some households could not travel more than twice a day for more than one kilometre to collect water. Water use per household was predominantly the same. The respondents used the water for cooking, drinking, washing and bathing. Only a few respondents used the water for other household and non-household activities not listed.

Meanwhile, most respondents indicated that access to water had not changed over the past two years; some indicated that the situation was even worse than before. The respondents claimed that in the past, water was for free, but now the community had to pay for water. Therefore, they claimed that the improvement made was not significant. Even though efforts were made to increase the community standpipes, the standpipes are not evenly distributed in the community and of the five standpipes erected only two standpipes are working.

5.4 Water Quality and Affordability

The general view of the respondents was that when there was water shortage, the municipality sent a sprinkler truck filled with water to the community. However, the water was always brownish in colour and it looked dirty. Sometimes the children got sick from drinking the water.

> *"We cannot say the water is clean, because the municipality brings us dirty water, carried by trucks"* (Interviewee 5, 2013, July 3).
>
> *"Our kids get infected by the water they bring by trucks, and they usually suffer from diarrhoea"* (Interviewee 3, 2013, July 7).

To access water, one must buy a pre-paid card which costs US $18.00. To collect water using the card system, the individual community members load money on the card. The amount of money loaded on the card depends on what an individual can afford. The majority of the residents are not employed. Therefore, water affordability is a major challenge.

> *"Buying the pre-paid [water] is a huge challenge; we cannot afford the N$180.00 paid for the card"* (Interviewee 7, 2013, July 5).
>
> *"The prepaid water system is not working for us, the standpipes are ever broken and they charge us a lot. The prepaid card does not work well for us. Most of us have no jobs. How can we afford the variation charges that these machines charge us?"* (Interviewee 5, 2013, July 7).

Figure 6 shows that most respondents indicated that they could not afford the water charges. However, a few of the respondents said that the amount was reasonable.

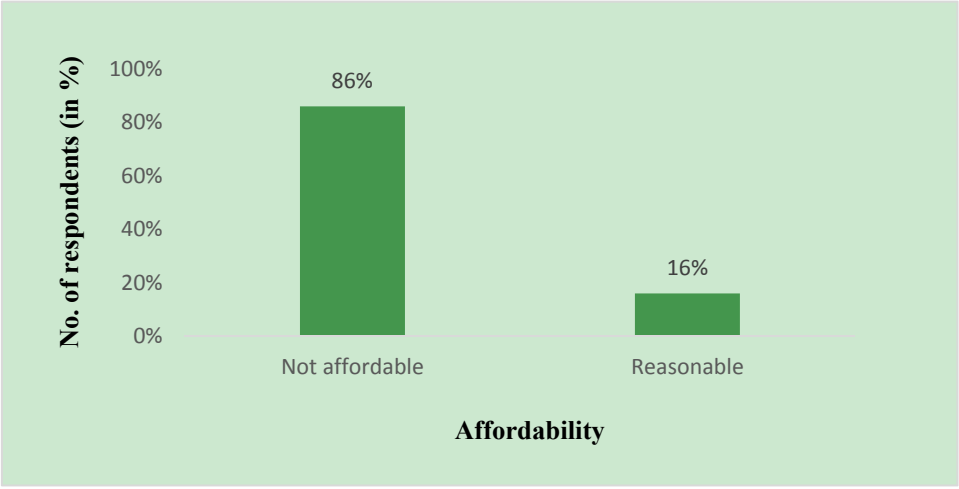

Figure 5. Perceptions of the respondents regarding water charges

5.5 Community Involvement and Stakeholders' Participation

There seems to be a lack of community involvement in making decisions that affect the community. The perception of the community is that, even though community meetings are held and they are requested to express their views, their views hardly make any difference and water supply and access challenges are hardly addressed.

> *"Even if we, the community leaders, attend meetings on behalf of the community to air our views, people only listen but they do nothing about it"*(Interviewee 5, 2013, July 7).

> *"We do not see anything positive happening here. We are never involved in the final decisions that are made, and we want to see our views in the implementation of policies"* (Interviewee 6, 2013, July 5).

Table 1. Community participation

Type of participation	No. of households respondents	Percent
Through public debate	18	36%
At organised committee meetings	32	64%
Total	**50**	**100%**

Table 1 shows that the respondents did participate in platforms that addressed water crisis issues. Most of the respondents participated at organised community meetings; however, some preferred to participate at public debates. Most respondents indicated that they were involved in decision making in most cases; however, a fair number of respondents claimed that they were less involved.

There is a reasonable degree of residents' participation in addressing water supply problems. The study found that the community members are willing to participate through community projects. The most tangible project involving the community is digging trenches to channel water to the community.

> *"The residents here are very active; they always attend community meetings and they are keen to address the water issue"* (Interviewee 3, 2013, July 7).

> *"We dig the trenches ourselves and the municipality provides us with the water pipes"* (Interviewee 6, 2013, July 5).

The views of the community leaders show that decision-making regarding addressing water problems is very poor. Therefore, the issue of water problems in the Kuvukiland informal settlement is a result of poor planning and decisions. There are quarterly meetings where residents are represented by their community leaders, and complaints are registered at stakeholders' meetings. However, community leaders feel that despite the quarterly meetings, the final decisions are not reflected in the planning process.

> *"Local leaders believe that incorporated decision-making will help to solve the problem of the Kuvukiland informal settlement"* (Interviewee 3, 2013, July 7).

> *"When it comes to the issue of water, decisions with regard to water are very poor and they are less integrated, because we hardly see our views visible in the planning process. We need a co-ordinated effort; one that fits all parties"* (Interviewee 3, 2013, July 7).

Regular stakeholder consultations have yielded some positive results. The poor people are allowed to build their low cost housing and engage in informal trading. Previously, the Council had decided against informal settlement, but with stakeholders' participation, informal development is now recognised and is made part of the economic setup of the town. The Kuvukiland informal settlement is of an economic value to the town, because they play a major part in the town's economy.

> *"We have community meetings organised through the office of the Mayor, and the residents have committee members who represent them at these meetings. We also have quarterly meetings with the residents so that we listen to their complaints"* (Interviewee 2, 2013, July 5).

> *"We have approved a mixed development, to allow the poor to build their shacks. However, the challenges we have with the community is that the people are resistant to change"* (Interviewee 2, 2013, July 5).

The study found that there are policy related challenges. As a result, the management of resources is not clearly addressed. There are no policies that govern the maintenance of the facilities. Therefore, lack of awareness has

resulted in resistance from the community to change. One of the challenges that the town is faced with is to formalise Kuvukiland, because if the informal settlement is not formalised, the municipality is not supposed to supply water to the settlement. However, the municipality works in accordance with the Local Authority Amendment Act of 2002, which means that they are supposed to supply water to every residence. The most notable attempt to address policy related challenges is through committee meetings, but the challenge is that most members of the community are resistant to change, as they find it hard to adopt to new ways, unlike in the past where community used to get water for free, however now that water has become a commodity, most members of the community cannot afford to pay for the water.

> *"The policy related challenges that the town faces are from the town's residents. People are resistant to change. This is because there is lack of awareness* (Interviewee 2, 2013, July 9).
>
> *"We need to alert the community on the management of resources. There is still a lot of awareness to be done in order to enforce policies"* (Interviewee 5, 2013, July 9).
>
> *"We have challenges of water supply to Kuvukiland because the town is not formalised, so we are not supposed to supply water to the informal settlement. We also work in accordance with the Local Authority Act and, according to the Act, we are supposed to supply water to every residence"* (Interviewee 2, 2013, July 5).
>
> *"There are no rules on water supply; the only rule is pay for water and get water"* (Interviewee 5, 2013, July 9).

There seems to be lack of infrastructural development and social support from the local authority. The community expressed interest in working together with the local authorities to address the issues related to water. To a certain degree, the perception of the community is that the municipality has not shown interest in the community. Water is clearly a major concern for the community, and they find the municipality to be too relaxed on the issue of water supply in the area.

> *"The local community feels that there is a lack of interest from the local authorities with regard to addressing water issues and incorporating decisions"* (Interviewee 3, 2013, July 7).
>
> *"The municipality does not look after the water in Kuvukiland, and most of the time we have no water to sustain ourselves"* (Interviewee 3, 2013, July 7).

6. Discussion

6.1 Water Supply in Tsumeb

Integrated water resource management works best when all aspects of governance are accorded recognition, which addresses issues of socio-economic characteristics of the people, technical as well as environmental aspects, thereby leading to sound decisions that include all members of the society. Viessman (1997) similarly argues that integrated water resource management should include social, environmental and technical aspects for it to work. This view is further supported by Grafton and Hussey (2011), who content that the driving force for the development of integrated water resource management comes from an awareness of the distinctive nature of the resource and its ubiquitous influence on human well-being and environmental sustainability. However, guided by the definitions of integrated water resources management provided above, this research found the concept of integrated water resource management in Tsumeb to be weak. The implementation of the integrated water resource management approach in Tsumeb lacks the recognition of the community's views, hence the challenges of addressing water supply in Kuvukiland. Communication flow in Kuvukiland is poor due to poor education, which results in lack of awareness by the community. Therefore, water supply in Kuvukiland does not follow the integrated water resource management approach.

6.2 Water Supply in Kuvukiland

Water supply in Kuvukiland is through bulk water supply, where the pre-paid water system is used. Similar pre-paid water systems are used in other urban areas in Namibia, such as Windhoek, Swakopmund and Walvis Bay. Standpipes are erected in the community which serve as water collection points, but the standpipes cannot supply enough water for the community because they are broken most of the time. In addition, the water collection points are not evenly distributed across the informal settlement where houses are sparsely located. However, the Government of Namibia's position statement is that water supply in urban areas (all non-farming areas) where people reside on a permanent basis, such as in Kuvukiland, should be approached in the same way as water supply in the formal municipal areas (Republic of Namibia, 2008).

Water supply to informal settlement is a global challenge. Ahmed and Sohail (2003) found that municipal water

supply in informal settlements has become grossly inadequate with regard to users' needs and expectations. The findings in this research suggest that there is a serious water supply problem in the Kuvukiland informal settlement. Ahmed and Sohail's findings (2003) give guidance to this research to conclude that issues of water supply to informal settlements are very common elsewhere in the world and the water supply problem in Kuvukiland is one of those issues that need a holistic approach to address. Generally, informal settlements experience poor services because they are not formalised and most of the residence do not legally occupy the land. In addition, these are areas where the poor people live and they cannot afford to pay for the services. Indongo, Angombe and Nickanor (2013) point out that in most developing countries, over 30% of the urban population are living in slums or informal settlements, where vacant state-owned land or private land is occupied illegally and is used for illegal informal housing.

6.3 Water Availability and Access

Mendelsohn (2002) found that lack of access to water is attributed to the fact that a large number of people in Namibia are concentrated in areas far from the major sources of water. In Kuvukiland, most community members do not have access to water, and when water is available, it is a long distance away from their homes. There is an observed difference in water consumption per household. This difference is determined by the distance that the residents walk to reach the access water access points. Residents closer to the water source are able to collect more water for consumption, compared to those that live a distance from the water source.

In South Africa, the Government has pledged to try and fulfil the millennium development goals by ensuring that all households have access to clean and safe running water by 2014. This will address the issues related to water shortages (Farrar, 1994). Similar attempts have been made in Namibia, where the Cabinet has endorsed a national water policy that includes decentralisation, with the main emphasis being to decentralise the resource to the lowest level, while at the same time managing the resource at basin level (Ruppel, 2013). The national water policy therefore needs to be more effective in addressing access to water supply in informal settlements across Namibia and, in particular, the policy must be applied in practice to improve the issues of water availability for the community, including the Kuvukiland informal settlement.

6.4 Water Affordability

Water affordability in Kuvukiland is hampered by the Tsumeb municipality's focus on trying to recover the cost of water supply while the majority of the informal settlement residents cannot afford to pay for the services. Becker and Bergdolt (2000) made similar findings in the city of Windhoek where non-payment of accounts by residents resulted in the cutting off of the water supply. These trends can be observed in informal settlements across the towns in Namibia. This is a policy related challenge that hinders the provision of safe affordable and continuous water supply to the Kuvukiland informal settlement, where more than half the population are unemployed, and a situation similar across informal settlements in Namibia. According to Soussan, Pollard and de Mendiguren (2002), these policy related challenges happen when institutions such as the Tsumeb municipality, which are responsible for implementation, are ineffective.

Two reasons why water in Kuvukiland is not affordable are: Firstly, more than half of community are unemployed and they have no source of income, making it impossible to afford the pre-paid card of N$180.00 from the municipality. Secondly, there is no standard fixed price for water per collection. The charges for water by the standpipes are not consistent and charges differ per individual collecting water at the water point. Therefore, the community cannot afford the different amounts that the standpipes charge them. The findings have shown that the standpipes are not well maintained and, as a result, they malfunction and draw inappropriate fees from the card. Therefore, issues of water supply should be addressed both from a social as well as from an economic point of view to ensure that those who cannot afford have equal access to water supply to meet their basic needs.

Soussan, Pollard and de Mendiguren (2002) contend that the discussion of water issues must be set within the context of the existing dynamic changes to water laws, policies and institutional responsibilities. This study found that there are policy related challenges, where water laws and policies in Tsumeb need to be more inclusive of informal settlement residents so that water supply is accessible to the community. The fact that Kuvukiland is not formalised is a policy related challenge, which hinders water supply to the informal settlements across Namibia.

6.5 Community Involvement

Results indicate that partnership between the local authorities and the local community of Kuvukiland is weak. This is contrary to the findings of Desert Research Foundation of Namibia [DRFN], (2005) that generally,

communities are interested in being involved in the management of their natural resources.

The findings are that community involvement is very strong. The community, through their leaders, hold regular meetings and amongst the issues they discuss are water shortages. In addition, it is also observed that the community participates actively in discussions. The community leaders represent the community at local authority meetings but, despite the regular meetings, implementation and planning by the Tsumeb municipality seldom includes the views of the community in decision making. However, the results show that the community is allowed to participate in activities such as digging trenches and the municipality provides them with pipes and with the erecting of the standpipes.

There was an assumption by the national government, that basin management committees will provide an opportunity for the Government and communities to work together to ensure that integrated water basin management is achieved (Republic of Namibia, 2000). On the contrary, this research found that decisions with regard to addressing water supply and shortages are very poor. The main principle of integrated water resource management is good governance, and the characteristics of good governance include good communication flow, consultation, stakeholder participation in decision-making and most importantly the political will (Viessman, 1997). The Tsumeb local authority governance structure does not incorporate these characteristics on purpose in its attempt to address the water supply problems in Kuvukiland. Thus, issues relating to water supply and shortage in the Kuvukiland informal settlement reflect a result of poor planning. The study therefore found that the views of the stakeholders are not reflected in the planning process and this underlines the fact that there is poor community involvement.

7. Conclusion

The study concludes that water supply in informal settlements is characterised by challenges of access to water, distance to water points, and availability and affordability of water to the resident communities. To improve good water governance, the Tsumeb municipality needs to improve the distribution of water points in the community and develop a water pricing policy for the poor and pensioners in the Kuvukiland informal settlement. Water supply to informal settlements in Namibia needs a holistic approach supported by policies that address issues of access, availability, affordability, and community involvement. Improvement of water supply in informal settlements should be a development priority in developing countries. Future research should focus on understanding social, and economic challenges in informal settlements that affect residents' quality of life. This study provides a foundation for similar studies in Namibia in order to contribute to the body of knowledge as well as provide evidence-based information for national development.

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