A GIS-based approach to analyse potable water accessibility in Langeloop village in Ehlanzeni District Municipality, Mpumalanga, South Africa

Knowledge Mathaba[1], Peter Schmitz[2,3]

[1]Department of Geography, University of South Africa, South Africa.
45754217@mylife.unisa.ac.za
[2] Department of Geography, University of South Africa, South Africa,
schimpmu@unisa.ac.za
[3]Geomatics, University of Applied Sciences, Stuttgart, Germany

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Abstract

Access to clean potable water is a fundamental human right for sustaining life and well-being. However, in rural areas, people struggle to find enough clean water to cook and drink; they travel or walk long distances to access potable water. Langeloop settlement is a rural area that struggles to access potable water. Therefore, this study aimed to analyse potable water accessibility in the Langeloop community to identify underserved areas using a GIS-based approach. Langeloop settlement consists of the 11 sections/extensions used in this study. The mixed methods research approach was used, and data regarding potable water sources such as standpipes were captured using a GPS device, while a questionnaire was used to conduct a survey. Service area network analysis was performed on the standpipes data. The findings of the study are that water accessibility is below average, with many households still having no access to potable water. The study further proposes an expansion of the current standpipe system to improve access to safe drinking water. This study also found that water availability is a more prominent problem than proximity to a water source. Hence, one of the observations of this research is that most residents would prefer water availability to be highly prioritised in a quest to improve water accessibility in the Langeloop settlement. Further objectives of this research are to reflect on the importance of resource allocation and targeted interventions to improve water accessibility for communities in need.

Keywords: Water accessibility, Langeloop, Water access indicators, GIS

1. Introduction

Accessibility to potable water is one of the fundamental human rights that should not be discriminatory or reflect any spatial inequalities. As a basic human right, potable water should be accessible and safe to consume (de Oliveira, 2017). Geographical Information Systems (GIS) is well suited for analysing the spatial distribution of essential services, such as potable water, and their accessibility. GIS-based accessibility analysis is one method that can be applied to test or examine accessibility to various resources (Mokgalaka, 2015). This research focuses on determining access to potable water within the different communities of Langeloop settlement.

1.1 The *status quo* of water accessibility

The World Health Organization (2016) indicated that approximately 785 million people still lack essential drinking water services, which means that one person in 10 does not have access to safe water. Furthermore, there is also a high possibility that this same proportion would access drinking water from unimproved water sources (Lulesa *et al*., 2022). There has, however, been some progress in improving water accessibility in some countries. According to Slawson (2017), one of the successful projects is that of Paraguay which ensured that in 2015, 94% of its rural population had access to safe drinking water compared to 52% in the year 2000.

South Africa, on the other hand, continues to face persistent challenges in ensuring reliable and equitable access to potable water (Lumborg *et al*., 2021). According to various sources, such as Naz *et al*. (2022), Roux *et al*. (2018), Gumbo *et al*. (2016), and Alhassan *et al*. (2015), water management in South Africa is confronted with multiple challenges that include severe shortages of and interruptions to supply owing to a highly variable climate and a rapid population growth rate. This has resulted in a situation where the water supply no longer meets the demand in many catchment areas within South Africa (Macharia *et al*., 2021).

Wrisdale *et al*. (2017) noted that South Africa must contend with water shortages, and Langeloop is no exception. Furthermore, as reported by the Nkomazi IDP (2018), the quality of available water resources in Langeloop is poor. Despite myriad problems, such as limited infrastructure and inadequate funding for water projects, thereby impeding progress towards ensuring universal access to clean drinking water, the Department of Water and Sanitation entrusts the Water Services Authorities and Water Services Providers with the duty of ensuring that every person should have access to at least a basic level of service. The basic level is defined as 25 litres of potable water for each person per day at no cost to the consumer (Mothetha *et al*., 2013).

In a research study conducted by the Department of Forestry, Fisheries and the Environment (DFFE) (2013) in South Africa, the following concerns about water accessibility were identified by DFFE (2013):

- Most rural or semi-rural municipalities have little or no information on the actual population numbers in their areas and their water usage to inform effective essential service delivery.
- Water meters are missing in some areas, leading municipalities to lose revenue that

would help maintain and repair the water infrastructure.

- Groundwater is an essential water source but is not utilised in some areas because of the high costs of extracting groundwater or of drilling a borehole.
- Shortages of funds and skills apply, particularly in the remote or rural areas of South Africa.
- There is a lack of proper management and institutional capacity within municipalities to deal with illegal water connections that would of necessity lead to potable water inaccessibility.

The study aims to analyse potable water accessibility in terms of the Langeloop community. It uses a GIS-based approach in seeking to attain its objectives, which include mapping the spatial distribution of the currently available water sources, and quantifying and mapping the level of satisfaction of community members in respect of potable water accessibility in Langeloop and in its underserved areas.

The conundrum in dealing with this issue is clearly evident in the statement by Gine-Garriga *et al*. (2013) that even in establishing and operationalising water access indicators, the methodology remains a paradox among researchers and practitioners because some lack GIS skills and have been left behind by the advances made in GIS technology trends. This applies particularly to local municipalities. According to the Nkomazi IDP (2018), this is evident in Nkomazi Local Municipality, where there are limited GIS capabilities to measure residents' access to water in Langeloop and other areas under the jurisdiction of Nkomazi Municipality.

1.2 Approaches to measure spatial accessibility

Spatial accessibility measurement allows for the identification of areas with inadequate access to essential public facilities such as healthcare, education, transportation, and water (Wang & Zhou, 2022). According to Gülhan *et al*. (2014), spatial accessibility measurement is a powerful tool that can help policymakers and planners make informed decisions through service area spatial analyses to improve access to public facilities, to reduce spatial inequalities, and to ensure social inclusion for all members of society.

A service area analysis is a GIS process that models or simulates reality to access essential services in an area or settlement. It is also known as a Service Area Network analysis (Ekanayaka and Perera, 2018). According to Ouyang *et al*. (2019), this involves modelling an organisation's network infrastructure, identifying critical services and their associated dependencies, assessing potential points of failure or vulnerability, and developing strategies to improve service accessibility, availability and performance. For instance, in a service area analysis, Khashoggi and Murad (2021) model the shortest distance between different locations and identify the respective service coverage areas of service facilities. The limitations are that it does not consider the quality of the service, user preferences and user experiences (Murad, 2018; Brún and McAuliffe, 2018). However, a service area analysis is one of the key tools in a GIS that assists in allocating resources effectively.

1.3 Water Access Indicators

To assess and monitor water access around the world, various indicators have been developed to measure different aspects of this important resource. Indicators provide valuable information about water supply availability, quality, and reliability in other regions (Ingram & Memon, 2020). Hence, according to Mwamaso (2015), the South African government emphasised water access while accentuating identified accessibility aspects such as proximity, water quantity, quality, reliability, and affordability. The six aspects of water access indicators that were considered in this study are presented in Table 1:

Table 1: Water access indicators and standard measures

Indicator	A measure of indicator standard
Proximity or physical access to a water point	Less than 250 metres
Water quantity	25 litres of water per day
Affordability	A citizen's income status determines his/her ability to pay for a water-supply service.
Service availability and reliability	Water is available 24 hours a day.
Quality and safety	Water is clean, with no odour or contamination, and safe to drink.
Acceptability	The facility is user-friendly/ Respect is shown for the prevailing cultural and social factors in the local area.

These indicators are key to collecting water accessibility information from the residents by means of a questionnaire. Green *et al*. (2008) state that the questionnaire process is a community consultative process to ensure better decision-making by local municipalities or authorities and to develop better service provision policies. Hence, the community consultative process might consider the outputs of the GIS service area analysis in question to support municipal decision-making in planning facilities where they are needed and where people live, irrespective of ward boundaries and political processes (Green *et al*. 2009).

2. The study area and methodology

2.1 Study area

The study area is the Langeloop settlement, under the jurisdiction of Nkomazi Local Municipality in Ehlanzeni District Municipality in Mpumalanga province. Langeloop village is about 40km southwest of Komatipoort and 14km from the Eswatini border. Figure 1 shows the location of the study area. As stated in Nkomazi Local Municipality's Integrated

Development Plan (Nkomazi IDP, 2018), the Langeloop community has many reported cases of protest action within the Nkomazi local municipal area. Furthermore, Statistics South Africa Census 2011 (STATSSA, 2011) indicated potable water inaccessibility as the case in many settlements in the Nkomazi Local Municipal area, including Langeloop, with a 77% level of piped water inaccessibility inside a dwelling.

2.2 Methodology

GIS-based analysis in assessing spatial accessibility has emerged as a logical and effective method for evaluating the extent to which equitable access to services and facilities is achieved. Hence, GIS-based spatial accessibility analysis in respect of essential community services uses a mixed methodology approach. The mixed-methods research approach uses both qualitative and quantitative data. Bryman (2012) indicated that success in implementing a mixed-methods approach in a study is determined by the nature of the research questions and objectives.

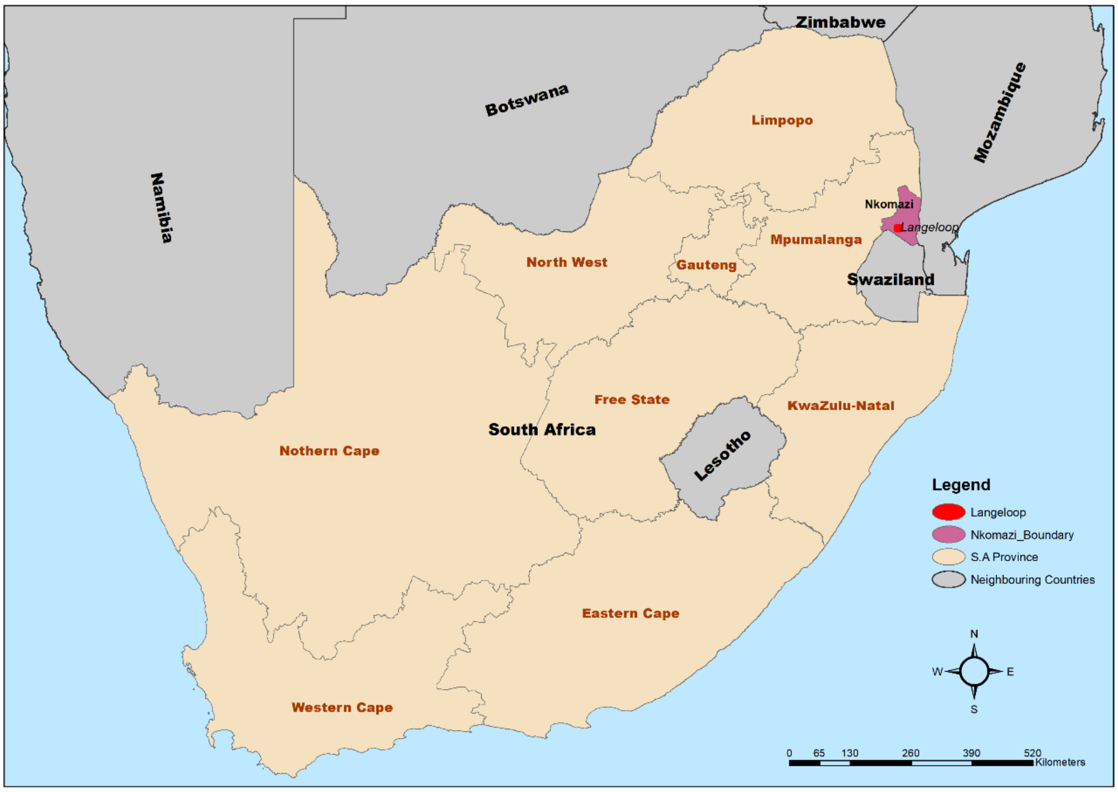

Figure 1: Location of the study area.

Bryman (2012) further claims that the mixed research method, used to double-check on the outcomes, is in fact a validation process. Regarding this research, the methodology used included GIS models, identified water accessibility indicators, and adopted standards to design a questionnaire to collect qualitative data from the residents within the study area. Furthermore, these researchers used a global positioning system (GPS) to capture data, and GIS software to perform spatial analysis and to spatially visualise the data or results.

Spatial analysis is one of the GIS-based methods used to analyse the accessibility of distributed essential services to consumers. Mokgalaka (2015) states that GIS-based accessibility analysis is a logical method that can be applied to test or examine accessibility to resources. In the light of this, the research focus was to determine the level of access to potable water within the community in the Langeloop settlement, to determine improved forms of accessibility in respect of water services and support, and to enhance the current provision of water sources and resource planning. Hence, the research relied on both qualitative and quantitative data. According to Bryman (2012), quantitative and qualitative research methods may be combined to double-check on the outcomes so that they might be substantiated. Hence, objective and subjective indicators are equally significant in measuring residents' access to potable water, even though they might give extra prominence to water quantity, reliability, quality, affordability, and proximity. A research study by Fukuda-Parr *et al*. (2014) further maintains that access to sufficient water as a human right calls for a methodology that consists of objectives and indicators that are qualitative and quantitative, and which can therefore reliably quantify critical aspects of water access. Therefore, this research used a mixed research methodology whereby both the research methods, namely qualitative and quantitative methods, were used for data collection or assembling data and for analyses to improve the rationality and reliability of the research results based on the research question and research objectives.

2.3 Data collection

Data pertaining to the community water service points such as standpipe taps, reservoirs and water-tanker service points were collected. Households with taps inside the house and in the yard were excluded from the study. Having water in a yard or house is the goal in respect of water provision. This paper aims to motivate the Nkomazi Local Municipality municipality to provide access to standpipes − which is lacking in the municipal area − as an interim measure, while the municipality rolls out the services to each household. A Global Positioning System (GPS) device was used to capture the locations of water sources which were used as water-accessible or supply points. Furthermore, ESKOM's SPOT- Building Count points dataset was collected and used as an indicator of household water service points or of water demand.

Additionally, data were collected using a questionnaire. However, an average household of 4.2 persons per Stats SA census (2011) data was used for sampling. The Langeloop study area consists of 11 sections/extensions. A questionnaire was administered to 22 randomly selected households per section. This sample size was determined using the sample calculator from Qualtrix on the Internet (Qualtrix, 2020). The number of households based on the Stats SA 2011 Census is 2657. Using a 90% confidence interval and a 5% error, the sample size amounted to 246 households. This figure was reduced to 242 households for ease of use, equating to 22 households per section. Only persons above 18 years of age were interviewed. The questionnaire was prepared in English to accommodate local and foreign people living in

Langeloop. Furthermore, the researcher explained the questionnaire to the respondents in a vernacular language to accommodate those who did not speak or understand English.

The questionnaire included a five-point Likert scale to rate water accessibility indicators based on the experience of the respondents in Langeloop in terms of their access to water. The five-point Likert scale contained a measure ranging from extremely poor to excellent. The questionnaire was like that used by Maritz (2013) which collected data on respondents' access to basic services. A question regarding the rating of their current access to safe drinking water in Langeloop was posed twice in the written questionnaire − at the beginning and at the end of the survey questionnaire − to determine the consistency of the answers and for correlation purposes. A priority scale was added to the questionnaire to determine the relative importance of all the indicators. According to this scale, the respondents were able to scale or rank those indicators − above the other indicators in their space/location − that they would like to be improved upon. Furthermore, while implementing the methodology, standard ethical procedures, particularly in terms of data collection, were followed.

2.4 Data analysis

The first step in data analysis was the counting and mapping of the captured water sources. The second was conducted using the questionnaire in MS Excel to quantify counts of the rated water accessibility indicators, indicating the levels of satisfaction and dissatisfaction, the average convenient walking distance, and other water-related statistical counts. Furthermore, for analysis, the software used for this research was Flowmap version 7.4.2 and ArcGIS 10.6. ArcGIS software was used to organise the data for analysis, the actual analysis of the data, and to visualise the results. On the other hand, tessellation surface boundaries were created in Flowmap, with the tessellation set representing both the demand and supply surface for the analysis. Demand was represented by the number of households in each hexagon and supply the hexagon with a standpipe. This information was imported into ArcGIS for use in the service area analysis tool.

As stated by Artmann *et al*. (2019), several steps are followed to conduct a GIS-based analysis of spatial accessibility. After the data in this study had been prepared, spatial analysis was performed using the service area analysis tool to determine the service areas of the existing standpipes. The service areas were determined using the average convenient 250m-walking distance to a standpipe. Although the maximum distance recommended in the Neighbourhood Planning and Design Guide from the Department of Human Settlements (2017) is 200m to a standpipe, it was decided that, owing to the street network, the existing standpipes, and the terrain, that the maximum distance should be 250m for the Langeloop study area. This was accomplished through various approaches: −generating descriptive statistics to characterise accessibility based on the distance to each type of service; creating geographical representations that visually depict the spatial entry of the studied phenomena; and employing hierarchical clustering to identify critical trends at the neighbourhood level (Thiam *et al*., 2015). ArcGIS determined the currently served areas: − households collecting water within 250m or less of the residential unit −, and underserved areas: − households collecting water within 250m or more of the residential unit. The service area analysis tool determined new standpipe locations for the underserved areas. The results are discussed as part of the section on results (findings) and discussion.

3. Results and discussion

The administered questionnaire was analysed, and the statistical analysis was conducted in line with the objectives of the study and in relation to the standards of the water access indicators as to how people as water service consumers rate/rank their accessibility to safe drinking water. The results detail the spatial coverage of water sources; they explicitly reveal the mapped water source patterns, the residents' perceptions, and the Service Area Network analysis output. Hence, pockets of underserved and well-served areas could be revealed. The findings cover spatial observations of the well-served or underserved communities and the level of service provided in terms of each water access indicator in the study area. Thus, a comprehensive and comparative evaluation of all indicators pertaining to water accessibility could be presented. The research findings include the locations of water sources and the availability of water in Langeloop, the level of satisfaction of the residents with regard to their access to safe drinking water within the Langeloop settlement, and the areas needing urgent attention with regard to the demand for them to supply potable water.

3.1 The spatial distribution of available water sources

In the Langeloop settlement, there are 100 currently available water points or sources. They were determined by capturing their locations and coordinates with a GPS, as Green *et al*. (2009) and Dusabe and Igarashi (2020) have done in their studies. The community currently sources clean, safe, drinkable water from standpipes and water tankers. Within the 100 water points are 93 standpipes, two reservoirs, and five privately owned water tankers. The spatial water-point distribution patterns indicate spatial inequality. The unequal spatial distribution of water points serves to substantiate the viewpoint of Lumborg *et al*. (2021) that South Africa continues to face persistent challenges in terms of equitable access to potable water, especially in rural areas. (Figure 2 shows the map displaying the captured water points (100).)

3.2 Access to safe drinking water within the Langeloop settlement

The responses to the questionnaire indicate the level of satisfaction of the residents in respect of their access to potable water. Hence, the measured water access indicators can be considered as the indicators that define access to potable water in a standardised manner (Mwamaso, 2015). In fact, the water accessibility results, as determined by the questionnaire, indicate that most of the settlement extensions indicated accessibility to water: −36% in respect of four of the extensions of Langeloop, and 64% in respect of the other seven extensions. This means that interruptions in receiving water daily are in fact experienced. The physical observation that emerges is that some standpipes are functioning only partially.

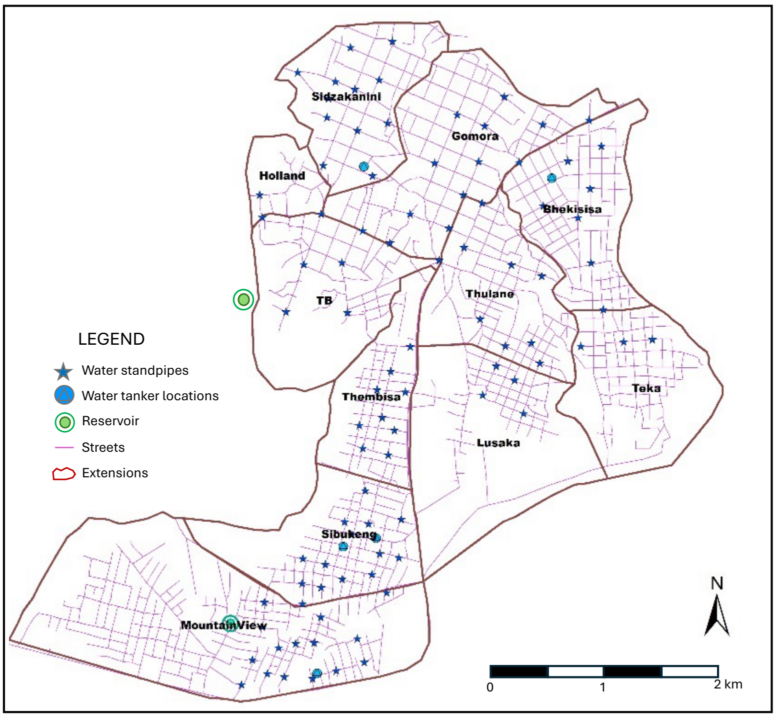

Figure 2: Spatial distribution of Langeloop water points.

This finding agrees with the observation by Wrisdale *et al*. (2017) that South African communities must contend with water shortages daily, and, according to Macharia *et al*. (2021), this has resulted in a situation where the water supply in many areas no longer meets the demand. Figure 3 shows the results of water accessibility per section. Respondents also indicated that if water is not available in a standpipe, they would walk a greater distance to collect water from another standpipe, whereas some would even prefer to hire a water tanker to collect and deliver water to them.

The water accessibility responses of the respondents at the start of the questionnaire (Figure 4 – blue bar) were initially meant to state the intuitive rating of the respondents as to their access to a water source Ultimately, however, their ratings pertaining to their access to potable water at a later stage in the sequencing of the questions in the questionnaire (Figure 4 − orange bar) proved to be more coherent and well-thought out (for consistency of assessment) after they had already internalised the results of the considered indicators in the study.

Figure 4 is a bar graph that compares the residents' responses to the first questions in the questionnaire. The observations pertaining to this bar graph indicate that the residents' intuitive response to their accessibility to potable water was below average in all the settlement extensions. This finding agrees with the observations made in the Nkomazi IDP (2018) that the quality of available water resources in Langeloop is poor.

Figure 3: Water accessibility per section.

The coherent water accessibility results in Figure 4 (orange bar) also indicate that the respondents in most of the settlement extensions believed that water accessibility was below average. The observations in four extensions (36%) that water accessibility was average, and in seven extensions (64%), below average, correlates with the viewpoint/observation of Statistics South Africa (STATS SA) (2011), namely that drinking water sources for many of the settlements in the Nkomazi local municipal area, including Langeloop, are inaccessible.

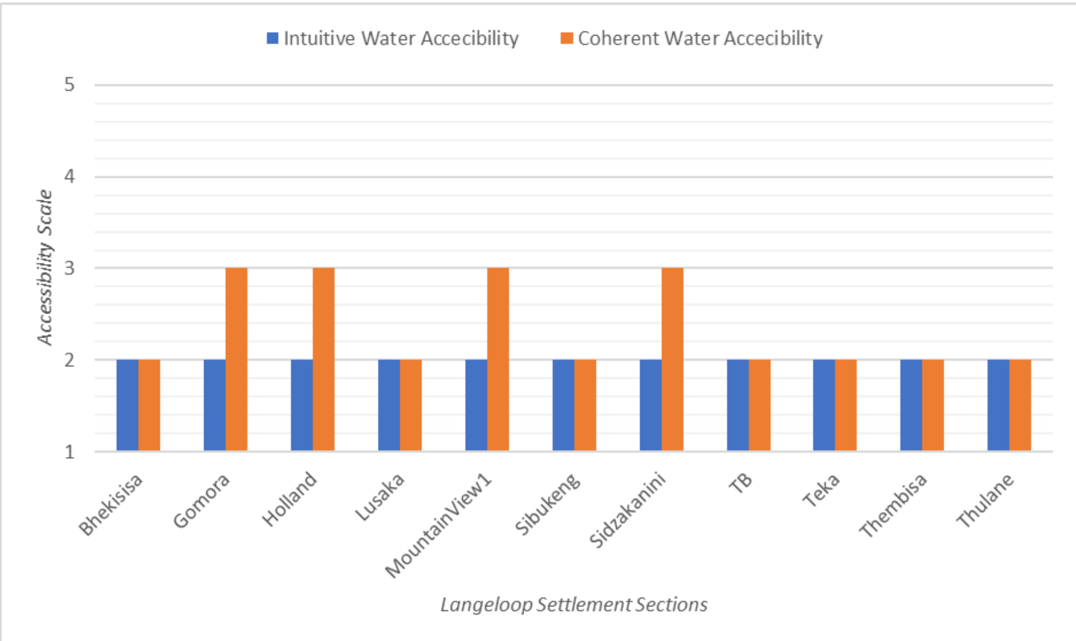

Figure 4: Intuitive and coherent current water accessibility per section.

The results in Figure 3 and Figure 4 indicate that there is a perception within the community that their access to potable water is unequal and compromised. Furthermore., the larger community is aware that there is a lack of access to clean and potable water in certain of its areas. Hence, a priority scale (in the form of a column) was added to the questionnaire to determine the relative importance of all the indicators. The respondents were able to scale the space/location of the indicators that they would choose to be improved upon above the others. Figure 5 shows the results: − the members of the entire Langeloop settlement prioritised water availability as the first indicator to be improved upon.(In the ranking scale, 1 is the highly preferred indicator, and 6 is the least preferred indicator.)

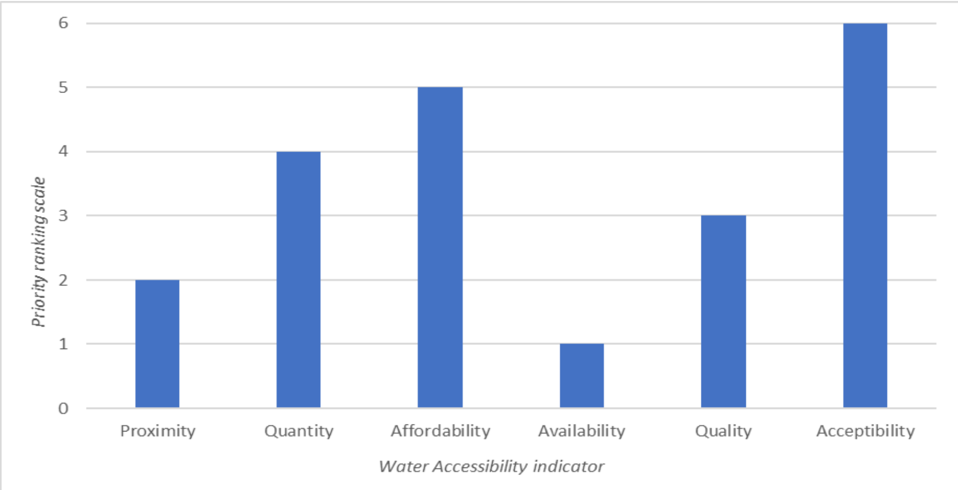

Figure 5: Prioritised indicators for improving water provisioning services.

However, since the entire Langeloop settlement prioritised water availability as their first indicator to be improved upon, this also points to the need to improve the water infrastructure to ensure that water is always available at a convenient distance from their respective residential units. Hence, the proximity indicator was rated as the second to be improved upon. The water quality indicator came third and quantity was in the fourth place to be prioritised for improvement. Therefore, the community clearly wanted access to potable water from the nearest source − at a convenient distance from their homes. The observation of these results, as presented in Figure 5, concurs with the viewpoint of DWS (2017) that water should be made available 365 days of the year and that its supply should not be interrupted for any length of time.

3.3 Areas needing urgent access to potable water

Figure 6 indicates areas served by standpipes, while the areas outside the identified served area are unserved. This observation is consistent with the view of Maposa *et al*. (2012) that those sections of the settlement that are under-resourced in terms of a water infrastructure are regarded as water-unserved areas. Furthermore, Khashoggi and Murad (2021) indicated that a service area network analysis should be carried out to identify the areas of service facility coverage.

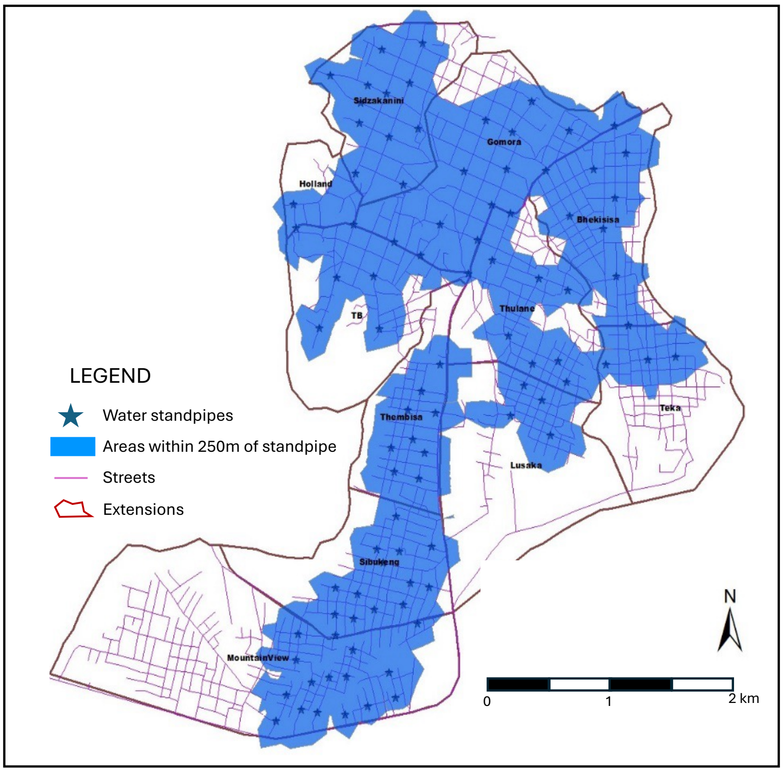

Figure 6: Water-served areas.

In Figure 6, the areas not served include most of the four sections, Teka, Lusaka, TB, and Mountain View. These results appear to be consistent with the results, as presented in Figure 3, where the residents rated the proximity indicator below average. However, the findings issuing from the service area analysis are consistent with the observation by Murad (2018) that this type of analysis overlooks the qualitative aspects of network performance, such as user satisfaction or user experience, and requires qualitative observations to substantiate the results.

Figure 7 indicates the tessellations between the embedded households and the water-served and unserved areas in the study area. The number of households was determined from ESKOM's SPOT Building Count data. The tessellation results indicate an embedded minimum of one (1) household and a maximum of eight (8) households to each hexagon, with their respective colours reflecting the number of households to each water-served /unserved area. An assumption was made that a hexagon without a household is an area with no residents/households/water consumers and therefore no demand for water. However, the GIS tessellation surface makes for a spatial visualisation of the areas and households served and underserved within an equal surface distance from a water source in the Langeloop settlement. Figure 7 shows that many households in the Teka, Lusaka, and Mountain View sections are unserved.

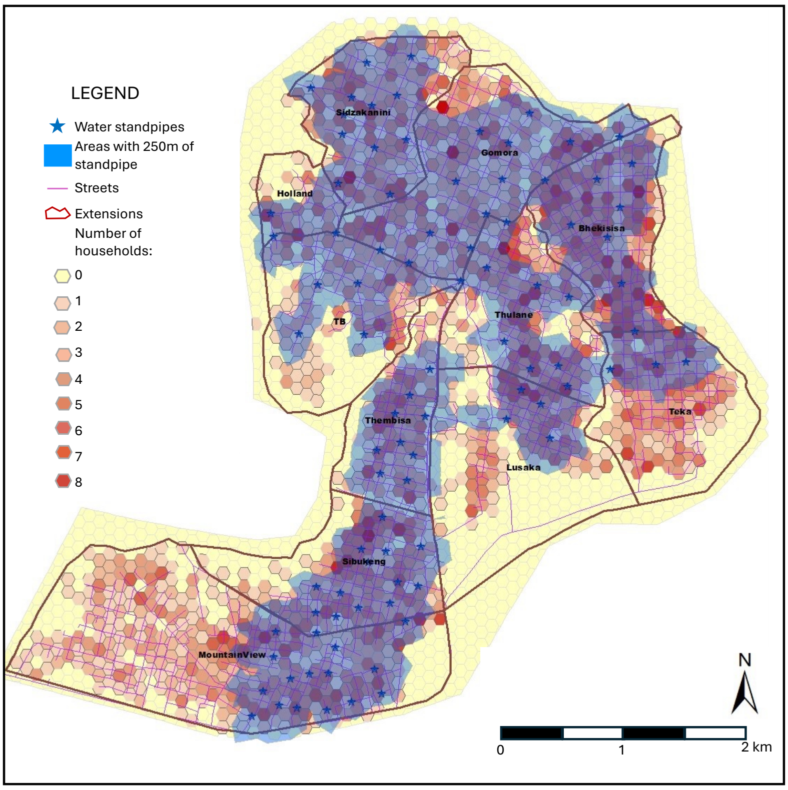

Figure 7: Households tessellated water-served and unserved areas.

4. Recommendations

As per Figure 7, the households that are not served with water, are households that need to be equally prioritised with those that are. Therefore, to address the spatial inequality in accessing potable water within the Langeloop settlement, it is recommended that an additional 140 standpipes be installed within the areas that are not served. The proposed standpipes can be highly beneficial to the community; hence, they can be regarded as one of the solutions to improve access to potable drinking water within the settlement. The proposed standpipes in Figure 8 are based on the areas within the settlement that are not served with water: − their locations are strategically placed within each section to serve safe water to the households in question.

Through the proposed standpipes, a 250-metre proximity distance indicator was used in the analysis of the service area network to determine whether the proposed standpipes would indeed improve accessibility to potable drinking water, provided that water be made available or supplied to the standpipes.

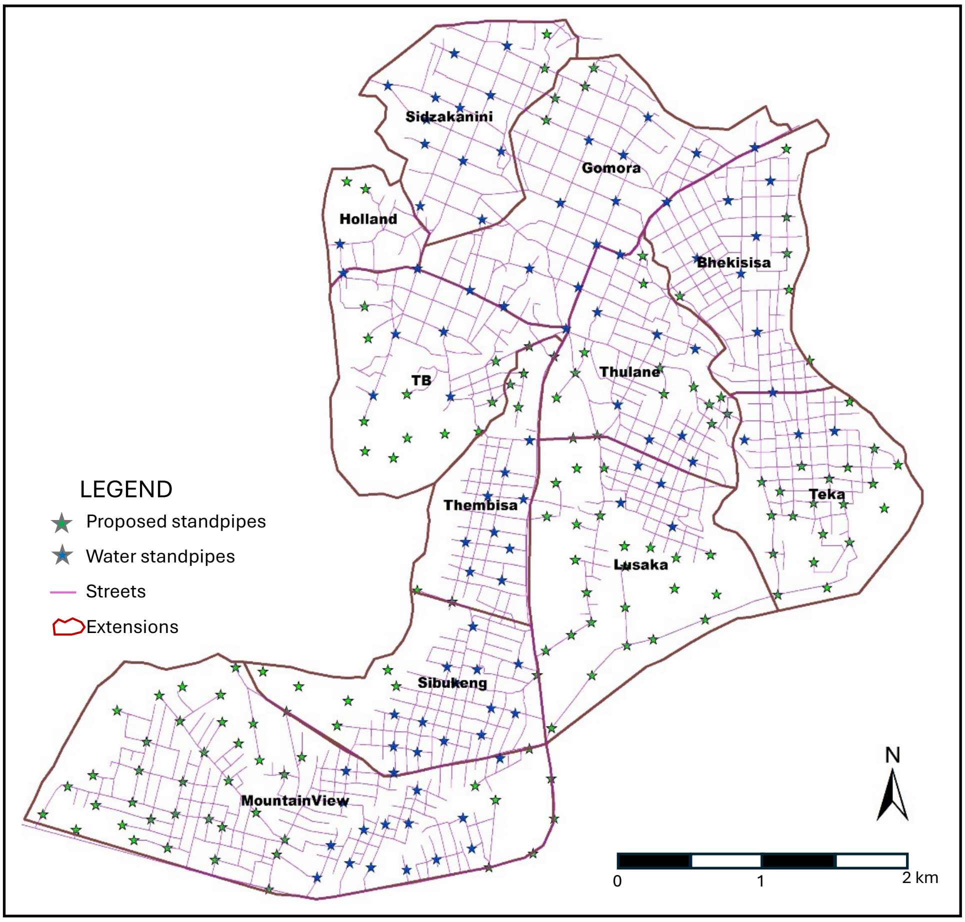

Figure 8: Langeloop proposed water standpipes.

Therefore, as indicated in the map in Figure 9, the areas previously not served with water are planned to be served − to the effect that the households in all the sections will be served with potable water. The results are consistent with the viewpoint of Gülhan *et al*. (2014) that through an interpolated service point, service area analysis makes it possible to identify areas showing improvements in public facility access, which would in turn reduce spatial inequalities and ensure social inclusion for all members of society.

There are several recommendations that can be made to further improve access to potable water in the Langeloop settlement. These include the maintenance and construction of the current and proposed standpipes, respectively. Hence, according to Slawson (2017), to ensure sustainability, it is critical to ensure that standpipes are appropriately placed, operational, and maintained. It is important to invest in infrastructure while implementing low-cost water treatment solutions such as chlorine tablets and ceramic or bio-sand filters; to promote community engagement; and to regularly implement some of the sustainable water solutions, including rainwater harvesting, water recycling, water reuse, leak detection, and repairs to damaged infrastructures. Overall, a multifaceted approach that includes a combination of the recommended options is most likely to be effective in improving access to potable water in the Langeloop settlement. It is also essential to consider the specific needs and challenges of the community and to work collaboratively with community members to develop further sustainable solutions.

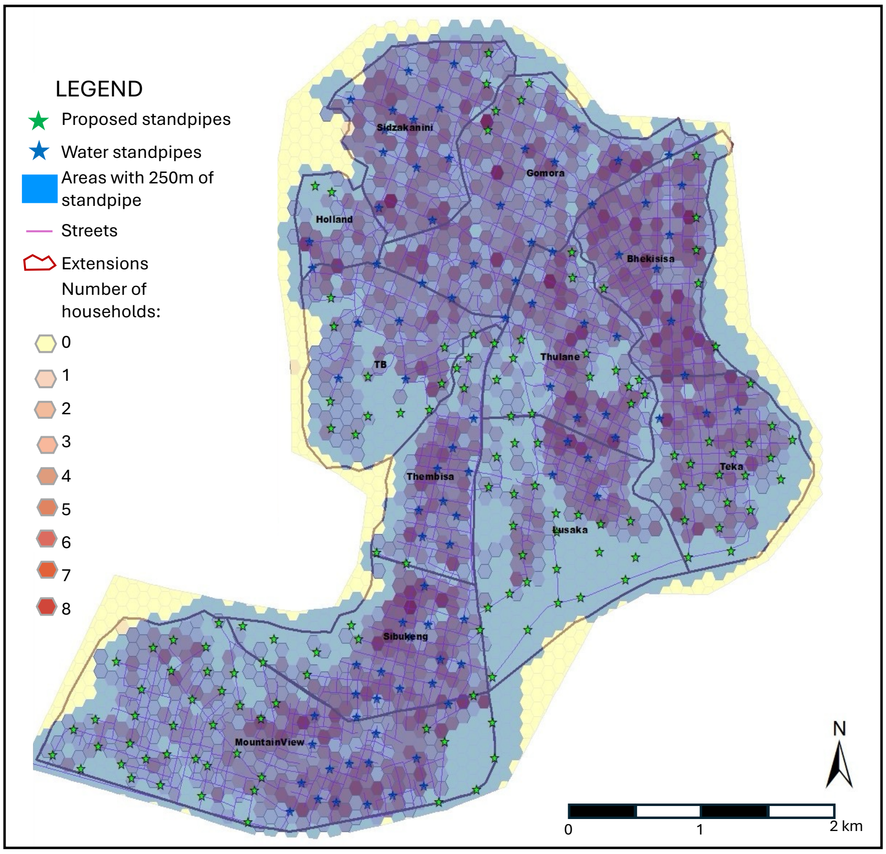

Figure 9: Coverage by the proposed water standpipes to serve Langeloop households.

5. Conclusion and Limitations

5.1 Study limitations

The study could not conduct a scientific water quality assessment to ascertain, amongst others, the contamination levels and the presence of pathogens in the water that the community members of Langeloop are currently accessing. Another limitation of this study lies in the assessment of road conditions, such as potholes and gullies in the streets, often caused by inclement weather conditions, that could limit or delay the community members' access to water. Also, some standpipes might not even be accessible to them. With heavy rains, streets and roads may be flooded and the ground saturated, to the extent that water tankers cannot supply water to the residents who rely on them.[1]

Further research could be conducted on the on-road usability of water tankers under such damaging conditions or during the rainy season. The Water Quality Index and pH levels of the

[1] It is worth noting that water accessibility across-the-board is also limited by such conditions.

water delivered by water tankers are further research topics to consider.

In summary: − The issue of water accessibility is a critical concern for the sustainable development of the community. It requires collaborative efforts on multiple levels to ensure that everyone can access safe drinking water sources. Moreover, such efforts must be informed by comprehensive research and an understanding of the complex dimensions and factors associated with water accessibility, including environmental sustainability, economic viability, and social equity.

5.2 Conclusion

Access to clean, potable water is a fundamental human right for sustaining life and well-being. Henceforth, the findings of this study do not deny or oppose the ingenuities of the contemporary accords and the optimistic substance of the Millennium Development Goals, as well as the national and local goals for improvements aimed at water accessibility. The GIS-based accessibility approach is a logical method applied to test or examine the degree to which access to a resource or service is obtained (Mokgalaka, 2015). This research used a mixed methodology approach to improve the rationality and reliability of its results. Hence, integrating GIS technology in water resource allocation has led to a more precise evaluation of the available water sources, thereby effectively facilitating and improving the decision-making capabilities of the municipality in respect of the Langeloop settlement.

This research found that there are 100 water points in the Langeloop settlement that are available to the community, and that the distribution of the water points is an indication of spatial inequality in terms of water accessibility. Thus, a finding based on the results from the survey questionnaire used in the research is that most sections of the settlement present with below-average water access levels. According to these outcomes, there is a collective perception in the community that not everyone has equal access to potable drinking water; people are aware that some parts of their community − if not the entire settlement − lack access to potable water. In fact, it was found that the community is dissatisfied with the current level of water accessibility. The respondents indicated that, because all sections of the Langeloop settlement do in fact present with patches of unserved areas, the entire settlement requires urgent attention in terms of the provision of potable water. Currently, the access to potable drinking water is below average. Hence, the respondents from the entire Langeloop community ranked water availability as their first-priority indicator to be improved upon. This assessment also points to the need to improve the water infrastructure to ensure that water is always available and from a source at a convenient distance from the residents' place of abode. Thus, it is recommended that 140 more standpipes be installed in the unserved parts of Langeloop to alleviate the geographical imbalance of access to potable water and to ensure that the residents have reliable sources of potable water to access.

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