A

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant

And

MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER: EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

NOTICE OF MOTION

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BE PLEASED TO TAKE NOTICE THAT the Applicant intends to make an application to the above Honourable Court on ____ day of _____ 2024 at 10 am or soon thereafter as may be heard for an order in the following terms:

1. Declaring that the Amathole District Municipality's failure to provide sufficient water to the Applicants, as well as all residents of Toboyi-Komkhulu, Merilis and Kunene ("Toboyi villages") in Ward 17 in Mquma, is unlawful and inconsistent with the Constitution in that it violates:

   1.1 Section 27(1) read with section 27(2) of the Constitution; and

   1.2 Sections 3 (1), 11(3) and 23 (d) of the Water Services Act 108 of 1997 read with regulation 3 of the Regulations relating to Compulsory National Standards and Measures to Conserve Water, published in terms of Section 9 of the Water Services Act 108 of 1997; and

   1.3 Sections 10, 12, and 24 of the Constitution.

2. Directing the Amathole District Municipality to file a report in this court, confirmed on Affidavit, within 30 days from the date of this order setting out the steps that it has taken to devise a plan that will ensure:

   2.1 the uninterrupted supply of free basic water to the Applicants as well as the residents of the Toboyi villages; and

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2.2 the uninterrupted supply of sufficient water and sanitation to the Applicants as well as the residents of the Toboyi villages; and

2.3 the implementation of interim measures for the immediate provision of sufficient water and sanitation to the Applicants as well as the residents of the Toboyi villages; and

2.4 the implementation of a water services development plan in terms of Section 3 of the Water Services Act.

3. Directing the fourth respondent to pay the cost of the suit, including the costs of two counsels.

TAKE NOTICE FURTHER that the affidavit of GIBSON ZAMUXOLO MZOLWA, together with the annexures thereto, will be used in support of this application.

TAKE NOTICE FURTHER that the Applicants have appointed the **CENTRE FOR APPLIED LEGAL STUDIES** c/o **Ntshinga Attorneys** at the address set out below, as their attorneys of record.

AND TAKE FURTHER NOTICE that any party intending to oppose this application is required –

a) To notify the Applicant's attorneys in writing within five (5) days of receipt of the application; and

b) To file an answering affidavit within fifteen (15) days of filing the notice to oppose.

KINDLY MAY YOU PLACE THE MATTER ON THE ROLL ACCORDINGLY.

DATED at Johannesburg on this 15th day of March 2024.

CENTRE FOR APPLIED LEGAL STUDIES
Attorneys for the Applicants
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ntshingaattorneysinc@gmail.com

TO: **THE REGISTRAR OF THE ABOVE HONOURABLE COURT, MTHATHA**

AND TO: **MINISTER OF WATER AND SANITATION**

First Respondent

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0001

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Fax: 012 336 8664

AND TO: **MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS**

Second Respondent

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Tel: 012 336 5950

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AND TO: **PREMIER: EASTERN CAPE PROVINCE**

Third Respondent

F

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Fax: 040 639 1166

AND TO: **AMATHOLE DISTRICT MUNICIPALITY**
Fourth Respondent
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AND TO: **AMATOLA WATER BOARD**
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AND TO: **ANELE NTSANGANI *N.O***
Sixth Respondent
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AND TO: **BHEKISISA MTHEMBU *N.O***

Seventh Respondent

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East London

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Tel: 043 701 4000

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MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER: EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

FOUNDING AFFIDAVIT

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I, the undersigned,

GIBSON ZAMUXOLO MZOLWA

state under oath that:

1. I am an adult male residing in Toboyi-Komkhulu, Ward 17, in the Mnquma Local Municipality ("Mnquma"). Mnquma falls within the jurisdiction of the Amathole District Municipality ("Amathole"). I am currently the Chief of Toboyi and have occupied this position since 2001.

2. The facts contained in this affidavit are, to the best of my knowledge and belief, both true and correct. They are, save where otherwise stated or indicated by the context, within my personal knowledge. Where I make statements of a legal nature, I do so on the advice of my legal advisors.

3. This is an application to declare Amathole's failure to supply the residents of Toboyi-Komkhulu, Merilis, and Kunene ("Toboyi villages") in Ward 17 of Mnquma with sufficient water a dereliction of Amathole's constitutional obligations. Further, that such failure violates the residents' constitutional rights to sufficient water as enshrined in the Constitution. Lastly, this application is also aimed at compelling the respondents, particularly Amathole, to provide the villages with potable water while the municipality works on a long-term solution to the water crisis facing the villages.

4. None of the Toboyi villages has access to a basic water supply. I am advised that the failure of the respondents to provide the villages with a potable water

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supply within 200m of their places of residence is unlawful. It infringes on our rights of access to sufficient water, dignity, freedom, and security of the person, and the right to a healthy environment.

PARTIES

Applicants

5. I am the first applicant in this matter. The second applicant is Matinise Lulwana residing in Toboyi-Komkhulu village in Ward 17 in Mnquma. He is sixty-three years old and was born and bred in Toboyi. He is also a Headman of the villages concerned. The third applicant is Xolisa Pupuma, a fifty-five-year-old adult male. He resides with his wife and children in Nomaheya, a nearby village to Toboyi. Notably, he is the councilor for Ward 17. Ward 17 comprises three Toboyi villages, five Nomaheya villages, two Dudumashe villages, and three Lambatha villages.

6. The fourth applicant is Nosingatha Mathafeni, a fifty-year-old female residing in Kunene village in Ward 17. She has resided in Kunene since 1992. The fifth applicant is Vumenjani Simoyi, a sixty-seven-year-old male residing in Toboyi-Merilis, Ward 17 of Mnquma. He was born and bred in Toboyi-Merilis. The sixth applicant is Noludwe Sentwa, a fifty-eight-year-old female residing in Toboyi-Komkhulu village in Ward 17. She has been residing in this village since 2005.

7. The seventh applicant is Siphokazi Sifumba, a thirty-nine-year-old female residing in Toboyi-Komkhulu village in Ward 17. Sifumba serves as a ward committee representative for Toboyi-Komkhulu village, one of the three villages

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in question. The eighth applicant is Nonzame Tsutsu, a fifty-five-year-old female residing in Toboyi-Komkhulu village in Ward 17. She was born and bred in that village.

8. The applicants bring this application in their own interest in terms of section 38(a) of the Constitution. As the Chief of Toboyi, I also bring the application in terms of section 38(b) on behalf of the people of Toboyi. It is also brought in the interests of the residents of the Toboyi villages in terms of section 38(c) of the Constitution; and in the public interest in terms of section 38(d) of the Constitution. The confirmatory affidavits of the second to eighth applicants are attached hereto as annexures **GZM1-7** respectively.

Respondents

9. The first respondent is the Minister of Water and Sanitation, Senzo Mchunu, cited in his official capacity, with his head office at Sedibeng Building, 185 Francis Baard Street, Pretoria. The second respondent is the Minister of Co-operative Governance and Traditional Affairs, Ms Thembi Nkadimeng, in her official capacity, with her head office at 87 Hamilton Street, Arcadia, Pretoria.

10. The third respondent is the Premier of the Eastern Cape Provincial Government, Mr Lubabalo Oscar Mabuyane, in his official capacity, with his head office at Office of the Premier Building, 2nd floor, Independence Avenue, Bhisho.

11. The fourth respondent is the Amathole District Municipality, with its head office situated at 3 Waverley Office Park, 33 Philip Frame, Chislehurst, East London. As far as I am aware, the fourth respondent is currently under the administration of the Executive Council of the Eastern Cape Government in terms of section

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139(5)(a) of the Constitution with its head office at the Office of the Premier Building, 2nd floor, Independence Avenue, Bhisho. Amathole comprises six local municipalities, one of which is Mnquma. The villages in question are under Mnquma.

12. I am advised that as a district municipality, the fourth respondent is both the water services authority and the water services provider in respect of the villages in terms of the Water Services Act 108 of 1997. It is, therefore, responsible for the provision of basic water supply services to the Toboyi villages.

13. The fifth respondent is the Amatola Water Board, a statutory body with its head office at 6 Stewart Drive, Baysville, East London. The sixth and seventh respondents are the Amathole Executive Mayor and Municipal Manager, respectively, with their offices at 3-33 Phillip Frame Road, Chislehurst, Cambridge, East London.

14. In what follows in this affidavit, we address the following issues:

    a. First, a factual background highlighting water challenges faced by the applicants;

    b. Second, poor quality of the available water;

    c. Third, measures taken by the applicants to address water shortages;

    d. Fourth, the content of the right of access to sufficient water;

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e. Fifth, the constitutional and statutory obligations to provide access to sufficient water; and

f. Sixth, the appropriate relief. The relief sought by the applicants is in two parts, one in the immediate and the other in the long term.

FACTUAL BACKGROUND

15. As indicated above, this application concerns three villages under the Mnquma Local Municipality. They are Toboyi-Komkhulu, Merilis and Kunene. We must give an accurate factual background about each of the villages so that the water crisis faced by the villages is understood within the right context. The Toboyi area has approximately 1237 (One Thousand Two-Hundred and Thirty-Seven) people, with 492 (Four-Hundred and Ninety-Two) in Komkhulu, 519 (Five-Hundred and Nineteen) in Merilis, and 226 (Two-Hundred and Twenty-Six) in Kunene. These numbers increase during holidays when those who are employed elsewhere return home.

16. According to the 2020 Integrated Development Plan by Amathole, there are approximately 1237 people residing in Ward 17. As stated above, I reside in Toboyi-Komkhulu with my wife and have been the chief of the Toboyi villages since 2001. My children were also born and bred in Toboyi, despite currently residing elsewhere. Having been born and brought up in Toboyi, I have seen the deterioration of the water infrastructure over time.

17. As far as I can recall, the deterioration of the infrastructure started in 1995 and has continued unabated until now. In the Toboyi villages, roughly 40% of

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residents have water tanks to collect rainwater; they have bought these tanks using their own money. The rest of the residents cannot afford to buy these tanks for their homesteads and are therefore forced to collect water from communal taps, communal tanks, windmills, rivers, and streams. The problem with relying on these water sources is apparent (see paras 31-34 below).

18. Three communal taps were installed in Toboyi-Komkhulu pre-1994. No new communal taps have been installed in Toboyi-Komkhulu or either of the other two villages since then. The taps receive water from a windmill; however, the water sometimes does not reach the taps. During such times, the windmill would be the only source of usable water.

19. The three communal taps are situated on the northern side of Toboyi-Komkhulu. They are the only reliable source of water supply because household water tanks, rivers, and streams dry up in times of drought, and the windmill in Merilis is very old and tends to be broken most of the time.

20. Around 2017 or 2018 the government provided each of the three villages with two water tanks for each village. The government water tanks in Toboyi were usually filled with potable water every two months by the government. However, the tanks were last filled with water in September 2020. Even when they were filled regularly, they would run out of water within two days because of the scarcity of alternative sources. The government tanks in Kunene were last filled around June 2021. About twenty or twenty-one households depend on one government tank; hence the tanks are usually emptied by the villagers within days of re-filling. This was when the tanks were being filled.

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21. However, many residents of the Toboyi villages live more than 200m from the two communal taps or the windmill and must collect their water using 20L containers or buckets from surrounding rivers and streams. Some residents of Toboyi-Komkhulu live too far away from the communal taps to rely on them, and residents of Merilis or Kunene live more than 3km away. It takes many residents more than two hours to carry or transport the water back to their homes using wheelbarrows or balancing buckets on their heads. Elderly residents must transport the water using a wheelbarrow to safely handle the 20L buckets without losing water on the way back.

22. To meet their water needs, residents need to collect up to 8 to 10 buckets daily. Women and young girls in their menstrual period must collect more water during this time. The collection of water has an element of risk associated with it. For instance, many women and girls do not feel safe when they fetch water from rivers and streams and carry pocket knives to protect themselves. Moreover, the water must be collected at dawn, while it is sometimes dark. This is when it is at its cleanest because the cattle and sheep have not gotten to it by that time. With livestock drinking from the same streams, the water is easily muddied.

23. The lack of safety caused by water scarcity is not the only issue to contend with. The scarcity of water has a gendered aspect too. This is not only so because girls and women bear the social burden of collecting water for domestic use. It is more so because when there is not enough water for females during their menstrual period, they miss school and community events. The water in the rivers and streams is unsanitary because it is mixed with human and animal waste. There are no fences to stop chickens and cattle from defecating in the

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water, and some children also urinate and defecate near the water. The water has a murky appearance and does not taste good.

24. Overall, the villagers use the water from the rivers and streams for drinking, cooking, bathing, washing laundry, and cleaning the home. Because the water is unsanitary, residents must boil the water or add bleach to it before they can drink it.

25. Some residents have complained to me that their children develop stomach aches, skin rashes, and diarrhoea after drinking water from the rivers and streams before it is bleached or boiled. Residents must spend R300 to R600 on bleach and electricity to make the water safe to drink. Given the high unemployment rate among the villagers, not everyone can afford these amounts.

26. In Kunene, a borehole installed by the municipality in 2001 used to provide water for the residents there. During the drought season, it would be the only source of water for the residents of Kunene, as all water in the rivers and streams dries up. The borehole water pump broke down in 2006.

27. Kunene is the worst hit by the lack of basic water supply because they do not have any communal taps. In 2020, during the COVID pandemic, Amathole brought communal water tanks to Kunene that were re-filled on a bi-weekly basis. However, since June 2021 Amathole has failed to re-fill the tanks as per the bi-weekly re-filling agreement.

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28. When it is drought season and the communal taps are broken or not re-filled, the residents often complain of being unable to grow their own vegetables, livestock death, and children missing school.

29. In 2018 the Department of Water and Sanitation ("department") started a project to pipe water from Tsomo to the Toboyi villages, but we have not seen any construction progress towards Toboyi. I was recently informed, unofficially, that the project had been delayed due to political instruction for the project to be managed by Amathole instead of the department, and indeed, the department has withdrawn from the project as of March 2023.

POOR QUALITY OF THE AVAILABLE WATER

30. Our attorneys of record, the Centre for Applied Legal Studies, have conducted numerous inspections of our villages and the water sources we rely on. They have documented their findings, assisted by relevant water experts, in a report. A confirmatory affidavit to this effect is attached as annexure **GZM 8**.

31. The report makes crucial findings about the extremely poor quality of the water and the long distances we have to travel to get the water. As a background, it states that recurring droughts within the district coupled with poor water service delivery have left most of the residents with little to no access to water, with the main sources of water being water tanks and boreholes near rivers during the wet season.

32. Three water samples from different water sources were collected as part of the study. About the first sample, the report states that 107 Total Coliforms (MPN/100

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ml) were detected, suggesting a need for improved water treatment as clinical infections may occur if the water is consumed without treatment. This is supported by the high Heterotrophic Plate Count of 2930 cfu/1 ml, which suggests that water treatment needs to be improved as sensitive groups may not be able to cope with the high levels of bacteria in the water.

33. About the second sample, the report states that 35 Total Coliforms (MPN/100 ml) were detected. This is higher than the department's and World Health Organisation's standard limits, suggesting a need for improved water treatment as clinical infections may occur if the water is consumed without treatment.

34. About the third sample, the report states that the Nitrate and Nitrite Nitrogen concentration is higher than the standards and suggests that the water poses possible chronic risks to some babies and could result in blue baby syndrome in infants as nitrates concentrations are high and reduce oxygen circulation. Moreover, improved water treatment is required. The report also finds that none of the water sources are less than 600 metres away. At most, some are over 1000 metres away.

ATTEMPTS TO RESOLVE THE PROBLEM

35. The applicants have taken numerous steps to try and resolve this dire situation. None of them have yielded tangible results. The reporting of the broken borehole in Kunene was initially done in 2017 over the phone to the Ngqamakhwe municipality office, when no assistance came, this was followed up by a meeting with Mr Solomtha. He was the person responsible for the maintenance of water

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services within Amathole at the time. He informed us that the broken borehole pump was a very old model and its parts were no longer available in the market for it to be fixed. Therefore, the municipality would install a new modern pump for the borehole. That was in 2017, and as of today, there is still no new pump.

36. Regarding the communal tanks, as stated above, this was initiated by Amathole when Covid started, with two tanks for Komkulu, two tanks for Kunene, and one tank for Merelis, and the agreement was that a municipally-appointed contractor would re-fill the tanks with water for the community. As soon as Covid subsided, no water re-fill was done by the Municipality.

37. When we seek assistance from the ADM and other community leaders, we are told to wait because funds are unavailable. In 2005 the municipality conducted a borehole study in the area but never provided the community or me with a report of the study. Rather, we were simply informed that the municipality would install some boreholes in the area.

38. In a meeting held in 2020, Mr Balfour (Manager of Water Services at Amathole) informed the community that through the bulk water project, water services would be installed in the area by March 2021. No such installations have been done till now. Amathole did not provide the applicants with minutes of this and other meetings. The third applicant, Mr Pupuma was present at all the meetings referred to above and his confirmatory affidavit is attached hereto. As stated above, the third applicant is the Ward Councillor for Ward 17, under which the villages in question fall.

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THE RIGHT OF ACCESS TO SUFFICIENT WATER

The Constitution

39. I am advised that section 27(1)(b) of the Constitution states that everyone has the right of access to sufficient water. Section 27(2), on the other hand, obliges the State to take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of this right. This application is aimed, among other things, at compelling the respondents to disclose the reasonable measures they are taking, if any, to create access to sufficient water for the villagers. If they are not taking any, this application is aimed at compelling them to take such reasonable measures. I am further advised that because of the centrality of water to human existence, other human rights are affected and compromised by the lack of access to sufficient water. These affected rights include:

    a. Human dignity. I am advised that section 10 of the Constitution provides that "everyone has inherent dignity and the right to have their dignity respected and protected".

    b. Section 12(1)(c) of the Constitution states that everyone has the right to freedom and security of the person, which includes the right "to be free from all forms of violence from either public or private sources." This right is implicated because – as discussed above – the crime levels in the villages make the collection of water from rivers and streams unsafe, especially for women and girls.

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c. Section 24 of the Constitution provides for a right to an environment that is not harmful to health or well-being. As the report on water quality shows, many residents are forced to consume water from rivers and streams that may be harmful to their health.

40. All of these rights are breached by the respondents in the Toboyi villages through the failure to provide a basic water supply.

The Water Services Act 108 of 1997

41. I am advised that the Water Services Act ("Water Act") was passed to provide for the right of access to basic water supply. The first object of the Act, as listed in section 2(a), is to provide for "the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being." The Act defines basic water supply as "the prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity and quality of water to households, including informal households, to support life and personal hygiene."

42. Section 3 of the Water Act further provides that:

> *"(1) Everyone has a right of access to basic water supply and basic sanitation.*
>
> *(2) Every water services authority must take reasonable measures to realise these rights.*
>
> *(3) Every water services authority must, in its water services development plan, provide for measures to realise these rights.*
>
> *(4) The rights mentioned in this section are subject to the limitations contained in this Act."*

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The prescribed minimum standard of water supply services is set out in Regulation GNR 509 of 2001.

Regulations relating to compulsory national standards and measures to conserve water in GNR 509 of 8 June 2001 *("Regulations")*

43. The Regulations were made by the Minister in terms of section 9 of the Water Act. They set out the minimum standards for basic water supply and basic sanitation. Regulation 3 provides the basic minimum standards for basic water supply services, which are-

"*(a) the provision of appropriate education in respect of effective water use; and*

(b) a minimum quantity of potable water of 25 litres per person per day or 6 kilolitres per household per month-

(i) at a minimum flow rate of not less than 10 litres per minute;

(ii) within 200m of a household;

(iii) with an effectiveness such that no consumer is without a supply for more than seven full days in any year."

44. Residents of the Toboyi villages are not provided with 25 litres per person per day or 6 kilolitres per household per month. They have to walk more than 200m from their homes to access communal taps or the water from rivers and streams and they have been without water supply for more than seven days this year, and in previous years. The respondents are failing in their legal obligations to provide the applicants with basic water supply.

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CONSTITUTIONAL AND STATUTORY OBLIGATIONS OF AMATHOLE DISTRICT MUNICIPALITY

45. I am advised that Amathole is a water services authority and water services provider for basic water supply. In Amathole's Final Integrated Development Plan (IDP) for 2020/2021, the Municipal Manager's introduction states that the status of being a water services authority and water services provider have been functions assigned to Amathole 'to implement without fail'.

46. It follows that as the water services authority, Amathole is responsible for the provision of basic water supply to the villages. This is so because Ward 17 falls under the Mnquma Local Municipality, which is one of the six local municipalities within Amathole's jurisdiction.

47. I am advised further that Amathole's obligations as water services authority and water services provider are set out by a clear constitutional and statutory scheme:

The Constitution

48. Section 155 of the Constitution provides for the establishment of municipalities, which according to section 151(3), have the right to govern, on their own initiative, the local government affairs of their communities, subject to national and provincial legislation, as provided in the Constitution. Section 155(1) establishes three categories of municipality (A, B, and C), of which Category C municipalities have municipal executive and legislative authority in an area that includes more than one municipality, and Category B municipalities share municipal executive

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and legislative authority in its area with a Category C municipality within whose area it falls.

49. In terms of section 152(1) of the Constitution, the objects of local government are:

    a. to provide democratic and accountable government for local communities;

    b. to ensure the provision of services to communities in a sustainable manner;

    c. to promote social and economic development;

    d. to promote a safe and healthy environment; and

    e. to encourage the involvement of communities and community organisations in the matters of local government.

50. Moreover, I am advised that section 156(1) provides that a municipality has executive authority in respect of, and the right to administer, the local government matters listed in Part B of Schedule 4 and Part B of Schedule 5, and any other matter assigned to it by national or provincial legislation. Part B of Schedule 4 lists water and sanitation services limited to potable water supply systems, and domestic wastewater and sewage disposal systems.

Local Government: Municipal Structures Act 117 of 1998 ("Structures Act")

51. The Structures Act provides for the obligations of categories and types of municipalities. Section 1 of the Structures Act confirms that a district municipality is the same as a Category C municipality in terms of the Constitution, and a local

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municipality is the same as a Category B in terms of the Constitution. Amathole is a Category C municipality and a district municipality.

52. Section 84 of the Structures Act divides functions and powers between local and district municipalities. In terms of section 84(1)(b), the functions and powers of a district municipality – Amathole in this case – include "potable water supply systems". A local municipality has the functions and powers assigned to it in terms of sections 156 and 229 of the Constitution and may be authorised to perform a function or exercise a power relating to potable water supply systems under section 84(3) of the Structures Act. In the absence of a ministerial authorisation, the functions and powers of a local municipality exclude the functions and powers vested under section 84(1) in a district municipality in whose area it falls.

53. Potable water supply systems are therefore the duty of municipalities and, specifically, the duty of district rather than local municipalities. Accordingly, I am advised, that Amathole is the entity legally responsible for providing potable water supply to the Toboyi villages.

Local Government Municipal Systems Act 32 of 2000 ("Systems Act")

54. Section 4(2)(d) of the Systems Act provides that a municipality has a duty to "strive to ensure that municipal services are provided to the local community in a financially and environmentally sustainable manner." On the other hand, section 4(2)(f) provides that a municipality has a duty to "give members of the local community equitable access to the municipal services to which they are entitled."

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55. Additionally, section 4(2)(i) provides that a municipality must also "promote a safe and healthy environment in the municipality." Whereas, on the other hand, section 4(2)(j) states that the municipality has a duty to "contribute, together with other Organs of State, to the progressive realisation of the fundamental rights contained in, amongst others, sections 24 and 237 of the Constitution".

56. Moreover, section 73 of the Systems Act states that a municipality must give effect to the provisions of the Constitution and give priority to the basic needs of the local community, and ensure that all members of the local community have access to at least the minimum level of basic municipal services. Basic municipal services are defined in section 1 as a "municipal service that is necessary to ensure an acceptable and reasonable quality of life and, if not provided, would endanger public health or safety of the environment."

Water Act

57. The Water Services Act not only provides for rights of access to basic water supply but also sets out the key obligations of water services authorities and water services providers. According to section 1, a "water services authority" means a municipality responsible for ensuring access to water services. A "water services provider", includes any person who provides water services to consumers. Amathole functions as both the water services authority and water services provider to the Toboyi villages.

58. I am advised that the duties of a water services authority are set out in section 11 of the Water Act. According to section 11(1), "[e]very water services authority

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has a duty to all consumers or potential consumers in its area of jurisdiction to progressively ensure efficient, affordable, economical and sustainable access to water services." Further, according to section 11(4), a water services authority may not unreasonably refuse, or fail to give access to water services to a consumer within its area of jurisdiction.

59. According to section 11(2), a municipality's duty to provide progressive, access to basic water supply is subject to:

    a. the availability of resources
    b. the need for an equitable allocation of resources to all consumers and potential consumers within the authority's area of jurisdiction;
    c. the need to regulate access to water services in an equitable way;
    d. the duty of consumers to pay reasonable charges, which must be in accordance with any prescribed norms and standards for tariffs for water services;
    e. the duty to conserve water resources;
    f. the nature, topography, zoning, and situation of the land in question; and
    g. the right of the relevant water services authority to limit or discontinue the provision of water services if there is a failure to comply with reasonable conditions set out for the provision of such services.

60. Section 11(3) states that in ensuring access to water services, a water services authority must also take into account, amongst others:

    a. alternative ways of providing access to water services;
    b. the need for regional efficiency;
    c. the need to achieve the benefit of scale;

NS
GZM

d. the need for low costs;

e. the requirements of equity; and

f. the availability of resources from neighbouring water services authorities.

61. Notwithstanding these contextual factors, which guide an assessment of the reasonableness of Amathole's legislative and executive action, Amathole has unreasonably failed to give access to water services to the residents of the Toboyi villages. Even where Amathole has adopted alternative ways of providing water – like delivering water into water tanks – it has failed to do so consistently. Its actions can hardly be said to be reasonable in the circumstances.

62. I am advised that according to section 12 of the Water Act, to progressively realise the right of access to basic water supply, a water services authority must prepare a water services development plan, as part of the process of preparing an integrated development plan. Section 13(g) continues to state, among others, that a water services development plan must contain details on the number and location of persons within the area who are not being provided with a basic water supply and basic sanitation.

63. Section 13(i) provides that the water services development plan must also set out "the number and location of persons to whom water services cannot be provided within the next five years, setting out (i) the reasons therefor; and (ii) the time frame within which it may reasonably be expected that a basic water supply and basic sanitation will be provided to those persons."

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GZM

64. In addition to serving as the water services authority for the Toboyi villages, Amathole is also the water services provider. According to section 23(d) of the Water Act, a water services provider must give such information concerning the provision of water services as may reasonably be called for, amongst others, to a consumer or potential consumer.

CONCLUSION AND RELIEF SOUGHT

65. The legal obligations resting on the respondents, particularly on Amathole, are not in dispute. The respondents cannot seriously dispute that they have a legal obligation to provide the applicants' villages with water in the short and long term. Similarly, it cannot be seriously disputed that the respondents have failed to provide access to *sufficient* water to the applicants as is constitutionally expected of them.

66. Numerous meetings have been held between the villagers and the respondents, promises were made but have not been kept. On 19 January 2022, our attorneys of record wrote a letter to Amathole requesting that it provide us with:

- Reasons for the lack of supply or poor supply of water in the area;
- Reasons for the lack of adequate sanitation in the area;
- A plan for installing water and sanitation in the area, if any;
- A plan for installing interim measures for water and sanitation if any; and

NS.
GZM

- A full copy of the current Mnquma Local Municipality and/or Amathole's Integrated Development Plan.

67. Moreover, the letter demanded that, in the interim, Amathole must provide the villages with thirty Jojo tanks which are strategically placed within the villages so that villagers do not have to walk long distances to get water. Further, that such tanks must be filled by Amathole once a week.

68. On 24 January 2022 Amathole's attorneys wrote back to us stating that they are taking instructions from Amathole and that they "shall revert ...soon". They still have not reverted and that was the last we heard from Amathole. Consequently, we are left with no option but to approach this Court to seek the short-term and long-term relief set out above.

69. In the result, we pray that the relief set out in the notice of motion is granted with costs, including the costs of two counsel.

GZ Mbuli

DEPONENT

I CERTIFY that this Affidavit was SIGNED and SWORN to before me at NGAMAKWE on the 18 day of MARCH 2024 by the Deponent having knowledge that he/she knew and understood the content of this Affidavit, had no objections to taking this oath, considered this oath to be binding on his/her conscience and who attached the following words:" I swear that the contents of this affidavit are true, so help me God"

NS.

GZM

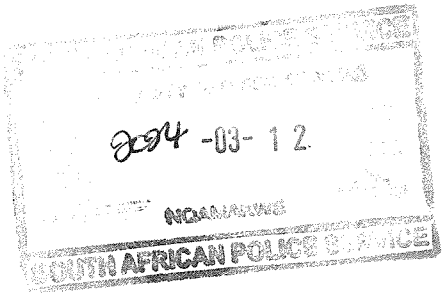
334 N

COMMISSIONER OF OATHS

Name: N. SANGELA

~~RANK~~ Title: Sgt

Address: P.O. BOX 13
SAPS NORMANDIEN
4990



N.F.
GZM

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

N.S.

I, the undersigned

MATINISE LULWANA

do hereby state under oath that:

1. I am a 63-year-old male born and bred in Toboyi-Komkhulu. I work as a Headman to the Chief for the Toboyi villages.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by members of the community.

4. For me and my family to have water during drought season, I collect water from the river and streams with two 25L buckets. I usually take an hour for the return trip when collecting the water and we use the water for cooking, drinking, bathing, laundry and cleaning the home. I must boil the water first for us to drink it as it is unsanitary. I do find that the water is mixed with human and animal waste as there are some children and livestock who defecate and urinate near the water.

N.L

5. My children often experience stomachache after drinking the water I collect from the river and streams. Sometimes I must give my children water to carry to school when the school tank has dried up. I would be very happy if the municipality can install more taps around the villages and drill boreholes. It would be difficult for me to pay for water and flushable toilet if the municipality were to provide those services at a cost as I am unemployed and depend on social grant money from the government for me and my family to live.

MATINISE LULWANA

The Deponent has acknowledged that he knows and understands the contents of this affidavit which was signed and sworn before me at Nqamakwe on this the 12 day of March **2023** the regulations contained in Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2024-03-12
NQAMAKWE
SOUTH AFRICAN POLICE SERVICE

COMMISSIONER OF OATHS

Full name: N. Sanqoka
Capacity: Sgt
Address: P.O. Box 13
SAPS
Nqamakwe
4990

NS

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

I, the undersigned

XOLISA PUPUMA

do hereby state under oath that:

1. I am a 55-year-old male residing in Nomaheya, a nearby village to Toboyi, with my wife and children. I am the councilor for Ward 17 which includes the 3 Toboyi villages, 5 Nomaheya villages, 2 Dudumashe villages and 3 Lambatha villages.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by members of the community.

4. The Toboyi area has approximately 1237 people, with 519 in Merilis, 492 in Komkhulu and 226 in Kunene. As far as I know Kunene has always had water scarcity issues, while Merelis and Komkhulu water struggles started in the late 90s to early 2000s.

5. I am in my second term as Ward Councilor with 6 years' experience. Ever since I started in this position, I have received several complaints about water unavailability, with some residents even threatening to protest, accusing me of not advancing their water needs. In the Toboyi villages only 40% of households have water tanks, the rest of the residents cannot afford to buy water tanks and therefore collect water from rivers, water steams, and windmill in Merelis and communal taps in Komkhulu. The only reliable continuous source of water are the communal taps because the rivers, streams and household water tanks dry up when there is drought, and the windmill infrastructure is very old and tends to be broken most of the times.

6. The residents often complain of livestock death, children missing school and not being able to grow their own vegetables during drought season and the municipality does not refill communal water tanks and some of the communal taps are broken. I have held several meetings with the Amathole District Municipality regarding solutions to the water crisis. In 2020 during Covid the municipality was able to bring in communal water tanks that were refilled bi-weekly. This arrangement did not last for even 2 years.

7. In 2005 there was a study that revealed that drilling boreholes would be best suited for the Toboyi area as there was enough water underground. Based on that study I have proposed that the municipality drills boreholes, but my request fell on deaf ears, and I was told there was no funding for the project.

8. The latest water project that commenced in 2018 in Tsomo was funded and executed by the Department of Water and Sanitation. The pipeline construction from Tsomo for this project was supposed to reach the Toboyi areas but we have not seen any construction progress towards Toboyi. I was recently informed that the project has been delayed due to political instruction for the project to be managed by the Amathole Municipality instead of the Department of Water and Sanitation and indeed the department has withdrawn from the project as of March 2023. My recommendations are that for long term purposes the municipality should drill at least 3 boreholes for each of the three Toboyi villages, and as a short-term solution 500-1000L water tanks should be provided for each household.

_____

XOLISA PUPUMA

The Deponent has acknowledged that he knows and understands the contents of this affidavit which was signed and sworn before me at _____ on this the _____ day of _____ **2023** the regulations contained in Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.

_____

COMMISSIONER OF OATHS

Full name:

Capacity:

Address:

GZM 3

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

N.S. N. Z Mabuya

N.M

I, the undersigned

NOSINGATHA MATHAFENI

do hereby state under oath that:

1. I am a 50-year-old unemployed female. I serve as a ward committee representative for Kunene village and assist in bringing community complaints to our Chief and Ward Councilor.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by my family and members of the community.

4. I came to live in Kunene when I got married in 1992. My husband has since passed and I reside with my 3 children, 10-year-old girl, 12-year-old boy and a 16-year-old girl. When I arrived in Kunene, I used to collect water using a 20L bucket from water streams which are 3km away from my home. Later we installed a water tank in my house, but that tank was often empty because of drought.

N.S N.M

5. In 2020 communal water tanks were installed in the village, but months after that the municipality stopped refilling the tanks up until today. Since then, my children and I must collect water from the water streams if our water tank is drying up or has dried up. When I need to do laundry I collect 8 to 10 buckets of water in order to cater to our other daily water needs. I prefer to collect water from one specific water stream which is not accessible to animals for drinking, with the other streams we often find human and animal waste. Perhaps the municipality can enclose the water streams to prevent livestock from drinking and defecating there.

6. I need to ensure that there is always water available to bath ourselves as my children must go to school and this water must be more when one of us is in the menstrual periods. My children and I have not encountered any danger when we collect water from the streams, but because we have heard of such stories, we usually have a pocketknife with us. I would be happy if the municipality could drill boreholes for the village, but I want taps in my village because borehole pumps can also be broken and not fixed. My nephew is a plumber, so he can help with installing the pipes and taps.

N. Mathafeni

NOSINGATHA MATHAFENI

The Deponent has acknowledged that she knows and understands the contents of this affidavit which was signed and sworn before me at Nemahlewe on this the 12 day of March 2024 ~~2023~~ the regulations contained in

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2024-03-12
SOUTH AFRICAN POLICE SERVICE

NS N.M

Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.

COMMISSIONER OF OATHS

Full name: N. SANDERS

Capacity: SGT

Address: P.O. BOX 13
SAPS NOORDWAKKIE
4990

NS NM

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

N.S J V.

I, the undersigned

VUMENJANI SIMOYI

do hereby state under oath that:

1. I am 67-year-old male residing in Toboyi-Merelis, where I was born and bred. I was married but lost my wife in 2020. I used to work in Orange Farm in Gauteng for several years and I came back in 2019 when I reached my retirement age. I have 3 adult children, who live in their own homes outside of the Eastern Cape, but I do stay with my one grandchild, an 8-year-old boy.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by my family and members of the community.

4. Although I was permanently residing in my village in the years I was working in Gauteng, when I came back during December holidays, I saw and experienced the struggle for water access. Since coming home, followed by my wife's passing, I am responsible for collecting water from the windmill or water streams. Although I have

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a water tank in my home, because of seasons of drought I do collect water from the windmill when it is operational, although it rarely is. My last and sometimes only option to access water is to collect it from the water streams and rivers around the Toboyi areas.

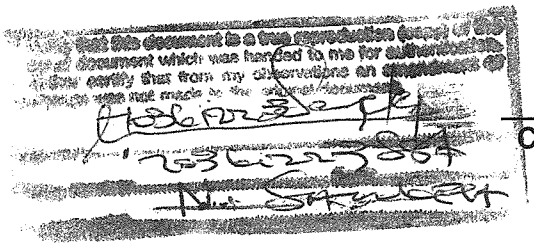
5. I travel 1 km to reach the windmill and I use a wheelbarrow to safely balance the 20L buckets without losing water on my way back. The water I collect from the windmill or stream/river I reserve for laundry and cleaning around the house because I fear using it for cooking and drinking, especially for my grandson because of its taste and murky appearance. My grandson and I then use the water from our water tank for cooking and drinking. I have also seen that the water from the windmill sometimes has bubbles in it, but I do not know what causes them, hence I do not use it for drinking. Since we do not have a flushing toilet, the water from the windmill and streams/river is used to wash our hands after using the toilet.

6. My grandson's school has water tanks, so he can drink from that water when he is at school. I would be very happy if our Municipality can install communal taps and drill boreholes around the village to be able to have water even in the drought season. I do know of people around the Toboyi villages who have skills to lay pipes and install taps. I would not be able to afford payment of municipal rates if that was to be enforced for us to have readily available water and flushing toilets.

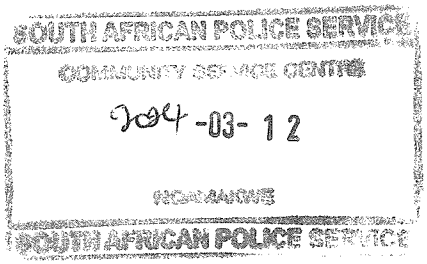
NS JV

VUMENJANI SIMOYI

The Deponent has acknowledged that he knows and understands the contents of this affidavit which was signed and sworn before me at NOAMAKWE on this the 12 day of March 2023 the regulations contained in Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.



COMMISSIONER OF OATHS



Full name: N. SAMUELA

Capacity: Cst

Address: P.O BOX 13

RAPS NOAMAKWE

NS

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

M.S N.M.S

I, the undersigned

NOLUDWE SENTWA

do hereby state under oath that:

1. I am a 38-year-old female and have lived in Toboyi-Komkhulu since 2005. I live with my husband and our 4 children aged 10, 15, 18 and 20.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by my family and members of the community.

4. My home is situated far from the 2 communal taps that we have in Komkhulu, so I collect water from the Toboyi river. While my boy children go to mind livestock my girl children and I use 20L buckets to collect 60L of water for our daily water needs, which include cooking, bathing, cleaning, and drinking. I find that the water from the river is sometimes dirty with animal waste, so I boil the water or add bleach to it to make the water safe for human consumption. We also use the water for washing laundry, cleaning the house and toilet as well as washing hands after using the toilet.

N.S. N.M.S

5. When the river and streams dry up, we buy water that costs R300, which usually lasts us for 2 months. I must resort to buying water because myself and my girls need to bath more than once a day when we are on our menstrual periods. One of my children once missed school because we had no water as it was drought season, she missed a test which affected her overall performance in that year.

6. When the girls go to collect water my husband and I have watch from a distance until they come back, this way we try to ensure that they are protected when going to collect water. My own kids have had skin rashes, diarrhea, and stomachaches after drinking river or stream water before it is treated with bleach or boiled. Although the school has a water tank, it dries up sometimes thereby necessitating that my children carry water to school. I would like for the municipality to drill boreholes and install taps and since my husband can fix things, he can help with laying pipes. If the municipality says we should pay for water and flushing of toilets, my family and I will not be able to pay as we depend on the government grant.

N.M. Sentwa

NOLUDWE SENTWA

The Deponent has acknowledged that she knows and understands the contents of this affidavit which was signed and sworn before me at Ngamakwe on this the 12 day of March 2024 the regulations contained in Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE
2024-03-12
NGAMAKWE
SOUTH AFRICAN POLICE SERVICE

N.S. N.M.S.

COMMISSIONER OF OATHS

Full name: N. SATWOOKA

Capacity: SGT

Address: P.O. BOX 13
SAPS NGHNAKLE
4980

N.S. N.M.S.

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
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SIPHOKAZI SIFUMBA	Seventh Applicant
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And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

S.M

I, the undersigned

SIPHOKAZI SIFUMBA

do hereby state under oath that:

1. I am a 39-year-old female living with my husband, three children, two parents and my 79-year-old grandmother in Toboyi-Komkhulu. My children are two girls aged 9 and 22 years and a boy who is 13 years old. I serve as a ward committee representative for the Toboyi-Komkhulu village.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by my family and members of the community.

4. My family and I rely on our household water tank during rainfall season, however in drought season we rely on the two communal taps situated in the Komkhulu village. Because the taps are situated in the northern side of the village, it takes me and sometimes my children 30 minutes to walk to and back from collecting the water. When the taps do not supply water, we go to nearby water streams to collect the

S.M S.S

water in the morning and in groups, but that water is not clean. I must carry a pocketknife when I collect water from the streams because I have heard of other women who were harassed on their way to collect water. To make this water drinkable and safe to use for domestic purposes, I must add bleach to it or boil it. We also use the water to clean around the house and the toilet and washing our hands after using the toilet.

5. I think the problem of animal waste found in the water from the streams can be sorted by fencing around the streams. As a woman with girl children, water availability is important for us as we use it to wash during our periods. My children have previously been sick with tummy aches and rash after drinking the water from the streams, so I make sure that I boil the water. I hope the municipality can install more taps for us and perhaps have other options such as windmills and boreholes. Although I do not have a lot of money, I would be willing to pay a small amount if the municipality provides water and flushing toilet services.

S.S. Fumba

SIPHOKAZI SIFUMBA

The Deponent has acknowledged that she knows and understands the contents of this affidavit which was signed and sworn before me at Ngamakwe on this the 12 day of March 2023 the regulations contained in Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.

S.M SS

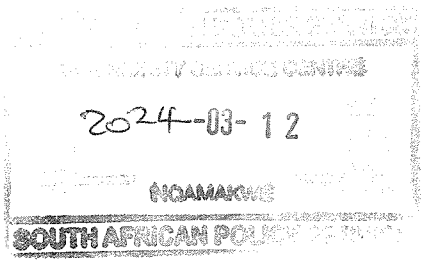
17196592-1
S. Mnhamho

COMMISSIONER OF OATHS

Full name: S. MNHAMHA

Capacity: CONSTABLE

Address: NOAMAKWE SAPS



S.M SS

IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER OF THE EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

CONFIRMATORY AFFIDAVIT

I, the undersigned

NONZAME TSUTSU

do hereby state under oath that:

1. I am a 55-year-old female born, bred, and currently residing in Toboyi-Komkhulu. I live with my 9 children, my mother and 5 adult siblings. I work as the Chief's Secretary for the Toboyi villages.

2. The facts contained in this affidavit are within my personal knowledge, unless otherwise indicated, and are true and correct, to the best of my knowledge and belief. Where I make legal submissions, I do so on the advice of my legal representatives who also represent all of the applicants.

3. The purpose of this affidavit is to confirm and corroborate the contents of the founding affidavit to this application in so far as they relate to me, and the scarcity of water experienced by my family and members of the community.

4. My family and I rely on water we collect from the communal taps in the village as well as water we collect from Toboyi river when the taps are not operational. It takes me 2 hours to return when I go to collect water from the river, and I use 20L buckets. As a big family we can use up to 80L of water for our daily needs, which include cooking, bathing, drinking and other domestic purposes. Because the water is not clean, I spend R150 – R300 for the bleach and electricity to treat the water.

5. In 2019 we experienced the worst drought in Toboyi and were collecting water from the two communal taps only. We need more taps around Toboyi in case we experience that kind of drought again. Because we share the river and streams with animals, we sometimes find the water dirty with animal waste. The women and girls in my family tend to need water more when we have our menstrual cycle because we need to bath to keep our selves clean. I have noted that because of this need for water, we women sometimes miss community events and girl children also miss school when water is very scarce.

6. I think the municipality should erect communal taps in the villages and install communal water tanks that the municipality can refill on a continual basis. This would prevent our children from being sick with diarrhea and tummy aches because of drinking water from streams and rivers. If the municipality were to offer and charge us for water and toilet services, I would not be able to pay because the money I earn goes to food and other necessities.

NONZAME TSUTSU

The Deponent has acknowledged that she knows and understands the contents of this affidavit which was signed and sworn before me at Nqamakwe on this the 12 day of March 2024 the regulations contained in Government Notice No. 1258 of 21 July 1972, as amended, and Government Notice No. R 1648 of 17 August 1977, as amended having been complied with.

SOUTH AFRICAN POLICE SERVICE
2024 -03- 12
SOUTH AFRICAN POLICE

COMMISSIONER OF OATHS

Full name: N. SAMUELS

Capacity: SGT

Address: P.O. BOX 13
NO DMAKUE
4990

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IN THE HIGH COURT OF SOUTH AFRICA

(EASTERN CAPE DIVISION, MTHATHA)

Case No.

In the matter between:

GIBSON ZAMUXOLO MZOLWA	First Applicant
MATINISE LULWANA	Second Applicant
XOLISA PUPUMA	Third Applicant
NOSINGATHA MATHAFENI	Fourth Applicant
VUMENJANI SIMOYI	Fifth Applicant
NOLUDWE SENTWA	Sixth Applicant
SIPHOKAZI SIFUMBA	Seventh Applicant
NONZAME TSUTSU	Eighth Applicant
And	
MINISTER OF WATER AND SANITATION	First Respondent
MINISTER OF CO-OPERATIVE GOVERNANCE AND TRADITIONAL AFFAIRS	Second Respondent
PREMIER: EASTERN CAPE PROVINCE	Third Respondent
AMATHOLE DISTRICT MUNICIPALITY	Fourth Respondent
AMATOLA WATER BOARD	Fifth Respondent
ANELE NTSANGANI *N.O*	Sixth Respondent
BHEKISISA MTHEMBU *N.O*	Seventh Respondent

SUPPORTING AFFIVADIT

I, the undersigned,

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ELHADI ADAM

state under oath that:

1. I am an adult male Associate Professor in the full-time employ of the School of Geography, Archaeology and Environmental Studies at the University of the Witwatersrand located at 1 Jan Smuts Avenue Braamfontein, Johannesburg 2050.

2. The contents of this affidavit are, unless context indicates otherwise, both true and correct. I have also read the founding affidavit of Gibson Zamuxolo Mzolwa and confirm its contents are true insofar as they pertain to me.

3. I have a PhD on Hypersectoral Remote Sensing of Wetland Vegetation quality and quantity. My PhD was awarded by the University of Kwa Zulu Natal in 2010. I am a member of the Geo- Information Society of South Africa and have also served as a member of the Dukuduku & Khula Village Community Actions for Forest Conservation.

4. I am also an Associate Editor for the Applied and Environmental Soil Science Journal and the Journal for Applied Remote Sensing.

5. I have wide ranging research and project expertise including but not limited to applications of remote sensing, geographic information systems in applied environmental science with special focus on mapping and monitoring

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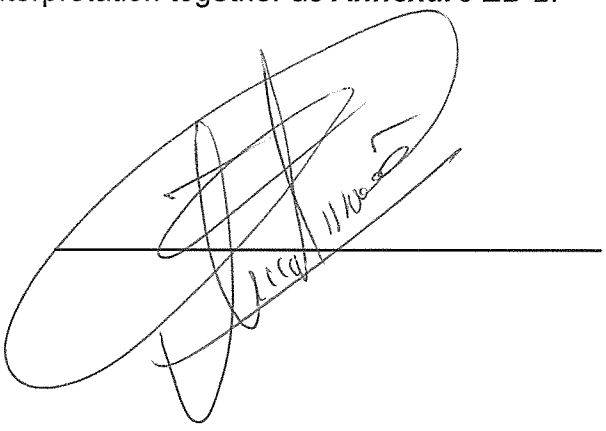
vegetation species, agricultural and plantation forests land use with over ten (10) years' worth of experience.

6. Recently, I have begun to strengthen my field of research through developing new remote sensing techniques based on machine learning algorithms to mapping vegetation species, detecting and mapping disease infection on plantation forests and agricultural crops.

7. In addition to this, I have written several journal publications on remote sensing and geographic information systems, many of which have been on interpreting remote sensing data and, mapping and detecting agricultural land use changes in various areas. My curriculum vitae attached herein as ***Annexure ED 1*** will confirm some of these publications.

8. I confirm that on/about 14 June 2022, I attended to Toboyi-Komkhulu, Merillis, and Kunene in Ward 17 of Mquma in the Eastern Cape with the Centre for Applied Legal Studies. The purpose of the visit was to collect water samples in the areas for the production of a report on the water quality in the area.

9. I confirm that subsequent to collecting the water samples, they were sent to the laboratory services for testing, and I interpreted the results thereof. I attach both the water samples tests and the interpretation together as ***Annexure ED 2***.



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DEPONENT

The Deponent has acknowledged that the deponent knows and understands the contents of this affidavit, which was signed and sworn to before me at PARKVIEW on this the 14 day of ~~FEBRUARY~~ MARCH 2024, the regulations contained in Government Notice No.R1258 of 21 July 1972, as amended, and Government Notice No R1648 of 19 August 1977, as amended, having been complied with.

7258867
CST
SJ Mothapo

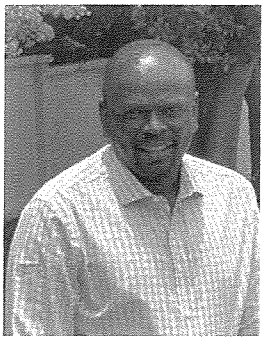
COMMISSIONER OF OATHS

Name: SEGOPA MOTHAPO

Title: CST

Address: NO. 71 OLIVDALE AVENUE PARKVIEW

SOUTH AFRICAN POLICE SERVICE
STATION COMMANDER
2024 -03- 14
VISPOL SUPPORT
PARKVIEW
SOUTH AFRICAN POLICE SERVICE



CURRICULUM VITAE
Prof Elhadi Adam

Personal details

Surname: ADAM
First names: ELHADI MOHAMMED IBRAHIM
Sex: MALE
Date of Birth: NOVEMABER 01, 1973
Nationality: SUDANESE (South Africa Permanent Residence)
ID NO : 7001016006190
Marital status: MARRIED
Languages: ARABIC, ENGLISH
Physical address: 6 Pafuri Road, Emmarentia, Johannesburg, 2190, South Africa
Postal address: University of Witwatersrand, Geography & Environmental Studies Division School of Geography, Archaeology and Environmental Studies, Room 102-Bernard Price Building, East Campus, Braamfontein, Johannesburg 2050, South Africa
Contact details: Tel: +27 (0) 11717 6532. Cell: +27 (0)726633222.
Emails: Elhadi.Adam@wits.ac.za or emiadam2006@yahoo.com.

Expertise profile

I have over ten years of experience in remote sensing and GIS technology applications. My main research area is Remote Sensing (RS) and Geographic information system (GIS) applications in applied environmental science and precision agriculture. I specialize in vegetation mapping and monitoring. To this end, I am exploring field-based, airborne and spaceborne remote sensors to detect subtle vegetation patterns such as biochemical concentration, invasive species mapping, wetland health and herbaceous biomass distribution, and characterizing landscape heterogeneity. I am currently strengthening this field of research by developing new remote sensing techniques based on machine learning and deep learning algorithms (such NN, random forest, support vector machine, boosting trees algorithm), to mapping vegetation species, detecting and mapping disease infection on plantation forests and crops as well as quantifying forest fragmentation and its impact on biodiversity and ecosystem services. I am also interested in algorithm development to classify remotely sensed imagery.

Keywords

Hyperspectral and Multispectral Remote Sensing (Earth observation), Image Processing, GIS Modelling for Environmental applications

Education background

2007 -2010, PhD, School of Environmental Science, University of KwaZulu-Natal, Pietermaritzburg, South Africa

Project: The remote sensing of Papyrus vegetation (*Cyperus papyrus L.*) in swamp wetlands of South Africa

2001 – 2002, MSc. Geography and Environmental Science, Geography, University of Khartoum, Khartoum, Sudan.

Project: An investigation into using An effective technique for water resource management in a vulnerable area: Case study of Sag Aln'aam- Northern Darfur.

1992-1996 B.A & Education (Distinction) Department of Geography, Elfashir University, Sudan.

Employment and work experience

2018-current: Associate Professor (Remote sensing and GIS): University of Witwatersrand-School of Geography, Archaeology and Environmental Studies. Current Activities and duties include:

2013-2018: Senior Lecturer (Remote sensing and GIS): University of Witwatersrand-School of Geography, Archaeology and Environmental Studies. Current Activities and duties include:

2013-2013: Senior Lecturer (Remote sensing and GIS): University of Limpopo - Department of Geography & Environmental Studies. Activities and duties were:

2010 to 2013 Postdoctoral research follow: University of KwaZulu-Natal, activities and duties were:

1- **Research and Postgraduate supervision**

My research was focusing on wetland vegetation mapping using high spatial and spectral data (e.g. Hyperion and AISA eagle) as well as advance multispectral data (WorldVeiw-2 and RapidEye); relating in-situ leaf reflectance to chlorophyll and nitrogen, water contain in wetland vegetation species; identification of key wetland and aquatic ecosystems for priority restoration; Development of remote sensing and GIS based machine learning algorithms to detect and map disease and pest infection on plantation forests; application of remote sensing in detect and map the effect of fragmentation in indigenous forest characteristics.

2. 2002-2007: **Lecturer** Geography Department, Faculty of Art and Education, Elfashir University. Activities and duties in the Elfashir University can be categorized in two main areas:

(i) Academic:

- **Teaching the following modules:** teaching at undergraduate and postgraduate levels

(third year) mainly the principle and applications of Remote Sensing and GIS to natural resource modelling, land-use change detections, environmental & ecosystem modelling. postgraduate levels (Honours) include: Cartography, Current Environmental Issues, environmental management and Biogeography.

(ii) Academic leadership

- Head of Geography Department from 2004 to 2006. -Honour Co-ordinator (2002,2005 and 2006). -Master Co-ordinator (2003,2004 and 2007).
- Member in many committees at the department, Faculty, and university levels.

3. 2000- 2002: Research Assistant Institute of Environmental Studies, University of Khartoum (March 2001-Feb 2002)

Duties in summary: Setting greenhouse and field experiments, data collecting and analysis

4. 1996-1999 Teaching at the higher schools, Northern Darfur State-Sudan.

Duties in summary: Teaching Geography and Environmental Studies

Academic Citizenship and Professional services

Since I joined Wits in 2014, I have been serving on various committees very actively both at the school and faculty level.

Faculty and school services

2018 to current	Postgraduate coordinator (MSc in GIS and remote sensing).
2017 to 2018	Member of Faculty of Science KRC committee; GASE Representative.
2016 to 2017	Member of Faculty of Science board; GASE Representative.
2015 to current	Capturing of research Outputs- Geography Division and RINC.
2015 to current	Student Registration.
2015 to 2018	Deputy Chair of the GIS and Remote Sensing working group.
2017 to 2020	Member of School transformation committee.
2020 to current	Member of Faculty of Science Research committee
2019 to current	Postgraduate coordinator (MSc in GIS and RS)
2022 to current	Honours coordinator (Hon in GIS and Remote sensing)
2023-current	Member of School executive committee

Professional Service

Activities related to journals (reviewer/editor/editorial board)

Journal	Role
Applied and Environmental Soil Science	Associate Editor
Remote sensing	Editorial board Guest Editor
Journal of Applied Remote Sensing	Associate Editor

SJ EMC

Cogent Social Sciences	Associate Editor

External Examiner undergraduate and Honours

Course	level of study	Institution	period
Land use and Natural Resources Management	Third year	University of Zululand	2015 to date
GIS and Remote Sensing	Third year and Honours	University of Johannesburg	2015 to date
GIS and Remote sensing	Third year and Honours	University of the Free State	2016 to date

External Examiner Postgraduate (PhD and MSc)

I have been an external examiner for postgraduate students for many national and international universities such as the University of New England, Australia, University of Zimbabwe, University of Khartoum, UKZN, UP, UCT and UL. I have also been involved in many NRF review processes and reference groups for WRC research projects.

Community service

2016 Invited to assess the flood risk for, Kliptown Residents, Johannesburg.

2017 Invited to speak about the importance of Wetland conservation for small scale formers community in iSimangaliso Wetland, KZN.

2018 to 2019 Member of Dukuduku& Khula Village Community Actions for forest conservation.

Professional Recognition

1. Distinguished teacher award (environmental science and geography) 1997-1998 Elfashir-Ministry of education-Northern Darfur State-Sudan.
2. The International Society for Optical Engineering (SPIE)
3. Member of the Geo-Information Society of South Africa (GISSA).
4. Member of IEEE Society
5. African Association of Remote Sensing of the Environment (AARSE)

Research outputs

Research articles in accredited Journals

2023

ALTOOM, M. B., **ADAM, E.** & ALI, K. A. 2023. Mapping and Monitoring Spatio-Temporal Patterns of Rainfed Agriculture Lands of North Darfur State, Sudan, Using Earth Observation Data. Land, 12, 307.

CHABALALA, Y., **ADAM, E.** & ALI, K. A. 2023. Exploring the Effect of Balanced and Imbalanced Multi-Class Distribution Data and Sampling Techniques on Fruit-Tree Crop Classification

Using Different Machine Learning Classifiers. Geomatics, 3, 70-92.
MOHAMED, M. K., **ADAM, E.** & JACKSON, C. M. 2023. Policy Review and Regulatory Challenges and Strategies for the Sustainable Mangrove Management in Zanzibar. Sustainability, 15, 1557.
MURRAY, J., **ADAM, E.,** WOODBORNE, S., MILLER, D., XULU, S. & EVANS, M. 2023. Monitoring Shoreline Changes along the Southwestern Coast of South Africa from 1937 to 2020 Using Varied Remote Sensing Data and Approaches. Remote Sensing, 15, 317.

2022

ADAM, E. & SULEIMAN, M. 2022. Reservoir Sediment Management Practices in Sudan: A Case Study of Khashm El-Girba Dam. Wadi Flash Floods. Springer, Singapore.
ALI, K., ABIYE, T. & **ADAM, E.** 2022. Integrating In Situ and Current Generation Satellite Data for Temporal and Spatial Analysis of Harmful Algal Blooms in the Hartbeespoort Dam, Crocodile River Basin, South Africa. Remote Sensing, 14, 4277.
CHABALALA, Y., **ADAM, E.** & ALI, K. A. 2022. Machine Learning Classification of Fused Sentinel-1 and Sentinel-2 Image Data towards Mapping Fruit Plantations in Highly Heterogenous Landscapes. Remote Sensing, 14, 2621.
JACKSON, C. M. & **ADAM, E.** 2022. A machine learning approach to mapping canopy gaps in an indigenous tropical submontane forest using WorldView-3 multispectral satellite imagery. Environmental Conservation, 49, 255-262.
JOMBO, S., **ADAM, E.**, BYRNE, M. J. & NEWETE, S. W. 2022a. Assessing the intraurban differences in vegetation coverage and surface climate in a heterogeneous area. Transactions of the Royal Society of South Africa, 77, 1-10.
JOMBO, S., **ADAM, E.** & TESFAMICHAEL, S. 2022b. Classification of urban tree species using LiDAR data and WorldView-2 satellite imagery in a heterogeneous environment. Geocarto International, 1-24.
KNIGHT, J., ABD ELBASIT, M. A. & **ADAM, E.** 2022. Land Degradation in Eritrea and Djibouti. Landscapes and Landforms of the Horn of Africa. Springer.
MPANZA, M., **ADAM, E.** & MOOLLA, R. 2022. The Potential Health Costs of PM10 Impacts on a Gold Mine Village, during Company Liquidation: An Analysis of 2013–2017. Minerals, 12, 169.
NKHWANANA, N., **ADAM, E.** & RAMOELO, A. 2022. Assessing the utility of Sentinel-2 MSI in mapping an encroaching Serephium plumosum in South African rangeland. Applied Geomatics, 1-15.
NKOSI, S. E., **ADAM, E.,** BARRETT, A. S. & BROWN, L. R. 2022. Spatio-temporal distribution of Vachellia stuhlmannii (Taub.) in Venetia-Limpopo nature reserve–SPOT-imagery. Transactions of the Royal Society of South Africa, 77, 63-72.
TESFAMICHAEL, S. G., NEWETE, S. W., **ADAM, E.** & BYRNE, M. J. 2021. Discriminating pure Tamarix species and their putative hybrids using field spectrometer. Geocarto International, 1-20.
TSOKA, J., KNIGHT, J. & **ADAM, E.** 2022. Predicting the Distribution of Farm Dams in Rural South Africa Using GIS and Remote Sensing. Applied Geomorphology and Contemporary Issues. Springer.

2021

ABUTALEB, K., NEWETE, S. W., MANGWANYA, S., **ADAM, E.** & BYRNE, M. J. 2021. Mapping eucalypts trees using high resolution multispectral images: A study comparing WorldView 2 vs. SPOT 7. The Egyptian Journal of Remote Sensing and Space Science, 24, 333-342.

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DLAMINI, M., ADAM, E., CHIRIMA, G. & HAMANDAWANA, H. 2021a. A remote sensing-based approach to investigate changes in land use and land cover in the lower uMfolozi floodplain system, South Africa. Transactions of the Royal Society of South Africa, 76, 13-25.

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DLAMINI, M., CHIRIMA, G., SIBANDA, M., **ADAM, E.** & DUBE, T. 2021c. Characterizing Leaf Nutrients of Wetland Plants and Agricultural Crops with Nonparametric Approach Using Sentinel-2 Imagery Data. Remote Sensing, 13, 4249.

JACKSON, C. M. & **ADAM, E.** 2021. Machine Learning Classification of Endangered Tree Species in a Tropical Submontane Forest Using WorldView-2 Multispectral Satellite Imagery and Imbalanced Dataset. Remote Sensing, 13, 4970.

JOMBO, S., **ADAM, E.** & ODINDI, J. 2021. Classification of tree species in a heterogeneous urban environment using object-based ensemble analysis and World View-2 satellite imagery. Applied Geomatics, 13, 373-387.

MLAMBO, L., SHEKEDE, M. D., **ADAM, E.**, ODINDI, J. & MURWIRA, A. 2021. Home range and space use by African elephants (Loxodonta africana) in Hwange National Park, Zimbabwe. African Journal of Ecology, 59, 842-853.

TESFAMICHAEL, S. G., NEWETE, S. W., **ADAM, E.** & BYRNE, M. J. 2021. Discriminating pure Tamarix species and their putative hybrids using field spectrometer. Geocarto International, 1-20

2020

Bangelesa, F., **Adam, E.**, Knight, J., Dhau, I., Ramudzuli, M., & Mokotjomela, T.M. (2020). Predicting Soil Organic Carbon Content Using Hyperspectral Remote Sensing in a Degraded Mountain Landscape in Lesotho. *Applied and Environmental Soil Science, 2020*

Chabalala, Y., **Adam, E.**, Oumar, Z., & Ramoelo, A. (2020). Exploiting the capabilities of Sentinel-2 and RapidEye for predicting grass nitrogen across different grass communities in a protected area. *Applied Geomatics*, 1-17

Jackson, C.M., & **Adam, E.** (2020). Remote sensing of selective logging in tropical forests: current state and future directions. *iForest-Biogeosciences and Forestry, 13*, 286

Jombo, S., **Adam, E.,** Byrne, M.J., & Newete, S.W. (2020). Evaluating the capability of Worldview-2 imagery for mapping alien tree species in a heterogeneous urban environment. *Cogent Social Sciences, 6*, 1754146

Mpanza, M., **Adam, E.**, & Moolla, R. (2020a). Dust Deposition Impacts at a Liquidated Gold Mine Village: Gauteng Province in South Africa. *International Journal of Environmental Research and Public Health, 17*, 4929

Mpanza, M., **Adam, E.**, & Moolla, R. (2020b). Perceptions of external costs of dust fallout from gold mine tailings: West Wits Basin. *Clean Air Journal, 30*

Mukarugwiro, J., Newete, S., **Adam, E.**, Nsanganwimana, F., Abutaleb, K., & Byrne, M. (2020). Mapping spatio-temporal variations in water hyacinth (Eichhornia crassipes) coverage on Rwandan water bodies using multispectral imageries. *International Journal of Environmental Science and Technology*, 1-12

Ridhwannah, G., Heidi van, D., Laven, N., & **Elhadi, A.** (2020). Estimating soil moisture using Sentinel-1 and Sentinel-2 sensors for dryland and palustrine wetland areas. *South African Journal of Science, 116.* ***Co-supervising the student (first author), contributing in developing the research questions and reading the manuscript.***

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Thabeng, O.L., Merlo, S., & **Adam, E.** (2020). From the Bottom Up: Assessing the Spectral Ability of Common Multispectral Sensors to Detect Surface Archaeological Deposits Using Field Spectrometry and Advanced Classifiers in the Shashi-Limpopo Confluence Area. *African Archaeological Review*, 1-25

2019

Aina, Y.A., **Adam, E.**, Ahmed, F., Wafer, A., & Alshuwaikhat, H.M. (2019). Using multisource data and the VIS model in assessing the urban expansion of Riyadh city, Saudi Arabia. *European Journal of Remote Sensing, 52*, 557-571

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Dhau, I., **Adam, E.**, Ayisi, K.K., & Mutanga, O. (2019). Detection and mapping of maize streak virus using RapidEye satellite imagery. *Geocarto International, 34*, 856-866

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Lembani, R., Knight, J., **Adam, E.**, & Kalaba, F.K. (2019a). Quantifying spatial-temporal changesof aboveground carbon stocks using Landsat time series data: A case study of Miombo woodlands. *International Journal of Environmental Studies*, 1-21. **Co-supervising the student (first author), contributing in developing the research questions andreading the manuscript.**

Lembani, R.L., Knight, J., & **Adam, E.** (2019b). Use of Landsat multi-temporal imagery to assess secondary growth Miombo woodlands in Luanshya, Zambia. *Southern Forests: a Journal of Forest Science, 81*, 129-140. **Co-supervising the student (first author), contributing in developing the research questions and reading the manuscript.**

Mabhungu, L., **Adam, E.**, & Newete, S. (2019). MONITORING OF PHYTOREMEDIATING WETLAND MACROPHYTES USING REMOTE SENSING: THE CASE OF COMMON REED (PHRAGMITES AUSTRALIS (CAV.) TRIN. EX STEUD.) AND THE GIANT REED (ARUNDO DONAX L.). A. *Applied Ecology and EnvironmentalResearch, 17*, 7957-7972

Mukarugwiro, J.d.A., Newete, S., **Adam, E.**, Nsanganwimana, F., Abutaleb, K., & Byrne, M. (2019). Mapping distribution of water hyacinth (Eichhornia crassipes) in Rwanda using multispectral remote sensing imagery. *African Journal of Aquatic Science, 44*, 339-348. **Co-supervising the student (first author), contributing in developing the research questions and reading the manuscript.**

Thabeng, O.L., **Adam, E.**, & Merlo, S. (2019a). Spectral Discrimination of Archaeological Sites Previously Occupied by Farming Communities Using In Situ Hyperspectral Data. *Journal of Spectroscopy, 2019*

Thabeng, O.L., Merlo, S., & **Adam, E.** (2019b). High-resolution remote sensing and advanced classification techniques for the prospection of archaeological sites' markers: The case of dung deposits in the Shashi-Limpopo Confluence area (southern Africa). *Journal of Archaeological Science, 102*, 48-60

2018

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2018

Dhau, I., **Adam, E.,** Mutanga, O., Ayisi, K., Abdel-Rahman, E.M., Odindi, J., & Masocha, M. (2018a). Testing the capability of spectral resolution of the new multispectral sensors on detecting the severity of grey leaf spot disease in maize crop. *Geocarto International, 33*, 1223-1236

Dhau, I., **Adam, E.,** Mutanga, O., & Ayisi, K.K. (2018b). Detecting the severity of maize streak virus infestations in maize crop using in situ hyperspectral data. *Transactions of the Royal Society of South Africa, 73*, 8-15

Odindi, J., **Adam, E.**, Abdel-Rahman, E.M., & Mutanga, O. (2018). Testing the spectral resolutions of the new multispectral sensors for detecting Phaeosphaeria leaf spot (PLS)infestations in maize crop. *South African Journal of Geomatics, 7*, 1-10. **Co-author contributing in developing the research questions, data analysis, and reading the manuscript.**

Sakuno, Y., Yajima, H., Yoshioka, Y., Sugahara, S., Abd Elbasit, M.A., **Adam, E.,** & Chirima, J.G. (2018). Evaluation of unified algorithms for remote sensing of chlorophyll-a and turbidity in Lake Shinji and Lake Nakaumi of Japan and the Vaal Dam Reservoir of South Africa under eutrophic and ultra-turbid conditions. *Water, 10*, 618. **Co-author contributing in developing the research questions, data collection and analysis, and reading the manuscript.**

Tesfamichael, S.G., Newete, S.W., **Adam, E.,** & Dubula, B. (2018). Field spectroradiometer and simulated multispectral bands for discriminating invasive species from morphologically similar cohabitant plants. *GIScience & Remote Sensing, 55*, 417-436, **Co-author**

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EWC

contributing in developing the research questions, data analysis, and reading the manuscript.

2017

Abdel-Rahman, E.M., Mutanga, O., Odindi, J., **Adam, E.**, Odindo, A., & Ismail, R. (2017). Estimating Swiss chard foliar macro-and micronutrient concentrations under different irrigation water sources using ground-based hyperspectral data and four partial least squares (PLS)-based (PLS1, PLS2, SPLS1 and SPLS2) regression algorithms. *Computers and Electronics in Agriculture, 132*, 21-33,. **Co-author contributing in developing the research questions, data analysis, and reading the manuscript.**

Adam, E., Deng, H., Odindi, J., Abdel-Rahman, E.M., & Mutanga, O. (2017a). Detecting the early stage of phaeosphaeria leaf spot infestations in maize crop using in situ hyperspectral data and guided regularized random forest algorithm. *Journal of Spectroscopy, 2017*

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Higher degrees supervision over the last 7 years

Successfully graduated PhD candidates

NO	Name and Surname	Type of attendance	First registration	Date of graduation
1	Reuben Lembani	FT	2016	2018
2	Inos Dhau	PT	2014	2018
3	Olaotse Lokwalo Thabeng	FT	2015	2019
4	Simbarashe Jombo	FT	2017	2019
5	Jeanne d'Arc Mukarugwiro	FT	2016	2020
6	Loveness Mabhungu	PT	2016	2020
7	Sellina Nkosi	PT	2016	2020
8	Mandla Dlamini	PT	2016	2020
9	Mbalenhle Mpanza	PT	2018	2021
10	Yusuf Adedoyin Aina	PT	2017	2021
11	Colbert Mutiso Jackson	FT	2018	2022

Successfully graduated MSc by research candidates

NO	Name and Surname	Type of attendance	First registration	Date of graduation
1	Nyasha Mureriwa	FT	2014	2016
2	Andani Gangashe	FT	2016	2018
3	Ridhwannah Gangat	FT	2017	2019

Successfully graduated MSc by CWRR in GIS and RS candidates

NO	Name and Surname	Type of attendance	First registration	Date of graduation
1	Mpho Gegana	FT	2015	2016
2	Simbarashe Jombo	FT	2015	2016
3	Freddy Bangelesa	FT	2016	2017
4	Vuledzani Munyai	FT	2016	2017
5	Lungile Selani	PT	2015	2017
6	Sibongile Madela	PT	2015	2017
7	Tendani Mashamba	PT	2015	2017
8	Yingisani Chabalala	PT	2015	2017
9	Tseliso Mahao	FT	2015	2017
10	Nondumiso Gwala	PT	2016	2018
11	Mary Itohan Isoa	PT	2016	2018
12	Jonathan Tsoka	PT	2016	2018
13	Galaletsang Latoya Keebine	FT	2018	2019
14	Thabiso Richard Kekana	FT	2018	2019
15	Perceverence Khumalo	FT	2018	2019
16	Tsedzuluso Mundalamo	PT	2017	2019
17	Leolin Ntsika Qegu	PT	2017	2019
18	Wongama Tengela	PT	2015	2018
19	Ernest Tanjeck Akum	FT	2016	2019
20	Liberty Mlambo	FT	2018	2020
21	Sibongiseni Selahle	FT	2018	2020
22	Franck Zahinda	FT	2018	2020

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23	Seabilwe Tilodi	FT	2018	2020
24	Dineo Revinwa Mokgehle	FT	2018	2020
25	Tinobokashe Ncube	FT	2017	2020
26	Nthabeleng Masupha	FT	2017	2020
27	Prosper Bande	FT	2017	2020
28	Mathapelo Petunia Chauke	PT	2019	
29	Anele Tshabangu	FT	2019	
30	Mbali Khanyile	PT	2019	
31	Gladness Mikateko Khoza	PT	2019	
32	Catherine Ndzungu	FT	2020	
33	Bongani Mkheswa	PT	2019	
34	Jennifer Murray	FT	2020	
35	Talifhani Ralidzhivha	PT	2020	
36	Roxanne-pyal Parthab	PT	2020	
37	Chido Jakata	PT	2020	
38	Alwande Nxumalo	FT	2020	

Current PhD candidates

NO	Name and Surname	Type of attendance	First registration	Remarks
1	Nyaladzani Nkhwanana	FT	2018	
2	Altayeb Obaid	FT	2019	
3	Mohammed Altoom	FT	2019	
4	Yingisani Chabalala	PT	2017	
5	Mohamed Mohamed	PT	2018	
6	Ismail Idris	FT	2019	
7	Zothando Hesewu	FT	2019	
8	Sylvie Machaba	PT	2020	
9	Mohlehli Mohlehli	FT	2018	
10	Mary Chawira	PT	2019	

Current MSc CWRS in GIS and RS candidates

NO	Name and Surname	Type of attendance	First registration	Remarks
1	Zothando Hesewu	FT	2022	
2	Phemelo Hope Mahamuza	FT	2022	
3	Tshokologo Mapule Mangwale	PT	2022	
4	Thembanimudzimu Norah Mathoho	PT	2022	
5	Carol Mphahlele	FT	2022	
6	Rudo Hilda Ndemera	FT	2022	
7	Samukelisiwe Ngubane	PT	2022	
8	Nobahle Nobahle	FT	2022	
9	Napoleon Maropeng Rampyapedi	FT	2022	
10	Mittah Raditlhalo Mmankedi	PT	2022	
11	Rilwele Rabambi	PT	2022	

No	Name	Project	source of funding	Remarks
1	Dr. Solomon Newete	Mapping native and invasive tree species in	Life in the city 2014 to 2016	This is two years research project funded by Life in the City

1	Dr. Tinotenda Mangadze	A framework to assess global change in freshwater ecosystems	Wits Centennial Postdocs	

External grant funding raised over the last 3years

Source	Amount	Role	Comments (include duration of funding)
UNESCO	20 000 US$	PI	The project is focused on Review of the South African Derelict and Ownerless mines rehabilitation programme and development of remotely sensed indicators for monitoring rehabilitation success. It was a two years in collaboration with Ingrid Watson (CSMI) and Mintek.
NRF (SOUTH AFRICA / JAPAN JOINT SCIENCE AND TECHNOLOGY RESEARCH COLLABORATION 2016)	R248000	Co-investigator	This is a two year research project focusing on Future scenarios of Japan and South Africa surface water quality: Under changing climate and land-use. The project is running in collaboration with ARC Pretori and Wits I have already received 50% of the funding
CSIR	R90000	Co-investigator	Mapping soil moisture content (two years project)
ESA	25000 EURO	PI	Modelling NPP in Sahel Region
WITS-UCL	R120000	PI	Crops Monitoring
GIZ	40 000 EURO	Co-investigator	Machine learning and EO for precison agriculture.

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Certificate of Analysis

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Cert No: UNIV-2022-09-1
Project No: UNIVERSITY_OF_WITS-20220902

Date Sample Received: 2022/09/02
Certificate Date: 2022/09/14

CHEMICAL ANALYSIS

Date Analysed:		2022/09/07 - 2022/09/08		
Sample Number:		1	2	3
Sample Name:		S1	S2	S3
Sample Date and Time:		Unknown	Unknown	Unknown
Lab Number:		2288900	2288902	2288904
Sample Description:		Water	Water	Water
Sample Container:		250ml plastic bottle	250ml plastic bottle	250ml plastic bottle
Determinant (units)	Method Number			
Ammonia Nitrogen (mg/L N)	EL26B	0.1	<0.1	<0.1
Conductivity (mS/m @ 25°C)	EL 1	39	30	133
Nitrate & Nitrite Nitrogen (mg/L N)	EL26C	0.5	0.2	20.6
pH	EL4	7.6	7.7	8.3
Orthophosphate (mg/L P)	EL26G	<0.1	0.7	<0.1
Turbidity (FTU)	EL3A	38	53	<1

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Project No: UNIVERSITY_OF_WITS-20220902

Date Sample Received: 2022/09/02
Certificate Date: 2022/09/14

MICROBIOLOGICAL ANALYSIS

Date Analysed:		2022/09/02 - 2022/09/04		
Sample Number:		1	2	3
Sample Name:		S1	S2	S3
Sample Date and Time:		Unknown	Unknown	Unknown
Lab Number:		2288900	2288902	2288904
Sample Description:		Water	Water	Water
Sample Container:		250ml plastic bottle	250ml plastic bottle	250ml plastic bottle
Determinant (units)	Method Number			
E.coli (MPN/100mL)	EM 9	0	0	0
Heterotrophic Plate Count (cfu/1mL)	EM 3	2930	470	2190
Total Coliforms (MPN/100mL)	EM 9	107	35	7

Test results marked with * in this report are not included in the SANAS Schedule of Accreditation for ERWAT Laboratory. All results and related information will be treated in a confidential manner. The results relate only to samples tested in accordance with the "customer's" request and are subject to an estimated measurement of uncertainty at 95% confidence level, values of which are available on request. This Certificate of Analysis shall not be reproduced except in full with the approval from ERWAT Laboratory Management.

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Cert No: UNIV-2022-09-1
Project No: UNIVERSITY_OF_WITS-20220902

Date Sample Received: 2022/09/02
Certificate Date: 2022/09/14

A Mabunda, Control Scientist

Date:

S Nhlapo, Control Scientist

Date:

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CALS Butterworth water project report

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Document purpose

This document provides a brief summary of the water testing results and spatial analysis for the study undertaken to investigate quality water access within the study region described below.

Study area

The study area is situated in south-eastern part of Eastern Cape within the Amathole District Municipality in the Mnquma Local Municipality as shown below in Figure 1. It comprises of three rural settlement places (SPs), namely, Merelisa SP, Thoboyi SP and Kunene SP. These rural settlements are surrounded by the Mnquna non-urban (NU) settlement, where some of the water points are located. The study area is predominantly mountainous with deep valleys and elevations as high as 1775 metres (Mnquma LM IDP, 2019). Notably, this area receives between 600 – 800 mm of rainfall per annum, with the most rainfall occurring between October to March (Mnquma LM IDP, 2019). Recurring droughts within the district coupled with poor water service delivery has left most of the residents with little to no access to water, with the main sources of water being water tanks and boreholes near rivers during the wet season. It is within this context that water samples from some of the water points within the area were analysed, and spatial analysis was undertaken for the eight water points to quantify quality water access with the area and inform policy and decision-making.

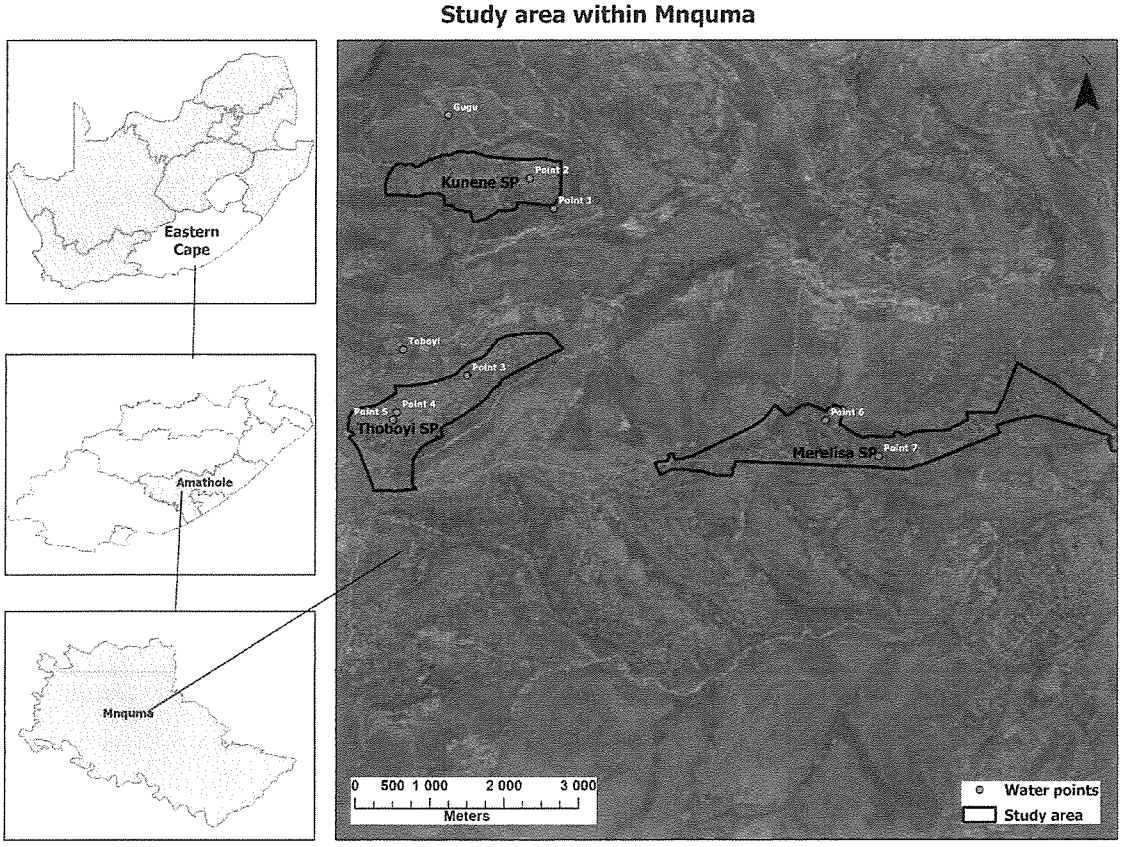

Figure 1. Study area within Mnquma Local municipality, comprising of Merelisa, Kunene and Thoboyi settlements. The water points for which spatial analysis was undertaken are also indicated.

Interpretation of water testing results

The results of the water samples collected within some of the water points within the study area are interpreted below to provide insights into the water quality within the study area.

Sample Name: S1

Sample S1 had an Ammonia Nitrogen concentration of 0.1 mg/L as N and a Nitrate & Nitrite Nitrogen concentration of 0.5 mg/L as N which is within the acceptable standards of as set out by the Department of Water and Sanitation (DWS) and World Health Organisation (WHO) as shown in Table 1 and 2 below. These concentrations suggest that water poses no adverse health effects for domestic use including drinking, food preparation, bathing and washing. Sample S1 had a conductivity of 39 mS/m measured at 25°C, which is within the recommended standards and shows that the water is not salty, corrosive or has a metallic taste, and thus, is ideal for domestic use. The pH level for sample S1 was 7.6 which reflects the alkalinity of the water and is within the pH range for drinking water. The pH level suggests that the water poses no health effects for domestic use. Additionally, the orthophosphate concentration of sample S1 was <0.1 mg/L as P. This concentration is less than the DWS limit of 1 mg/L as P and is ideal for human consumption. Sample S1 also had a turbidity of 38 FTU which indicates that the water poses an increased risk on health and has a muddy appearance. The water turbidity requires corrective action as it is above the DWS and WHO limits. Additionally, Sample S1 was tested for bacteria and no E. coli was detected, indicating no faecal contamination and no risk of infectious diseases in the water. 107 Total Coliforms (MPN/100 ml) were detected, suggesting a need for improved water treatment as clinical infections may occur if the water is consumed without treatment. This is supported by the high Heterotrophic Plate Count of 2930 cfu/1 ml, which suggests that water treatment needs to be improved as sensitive groups may not be able to cope with the high levels of bacteria in the water.

Sample Name: S2

Sample S2 had an Ammonia Nitrogen concentration <0.1 mg/L as N and a Nitrate & Nitrite Nitrogen concentration of 0.2 mg/L as N which is within the acceptable standard limits shown in Table 1 and 2. These concentrations indicate that the water poses no adverse effects for domestic use. Thus, the water quality of sample S2 is ideal for consumption. Sample S2 had a conductivity of 30 mS/m measured at 25°C, which shows that the water is not salty or corrosive and thus, is ideal for domestic use. The pH level for sample S2 was 7.7 which shows the water is alkaline but within the healthy standards of water. It poses no health effects for domestic use. The orthophosphate concentration of sample S2 was 0.7 mg/L as P, which is below the DWS limit and poses no health effects. Sample S2 also had a turbidity of 53 FTU which indicates the increased presence of infectious micro-organisms. The water turbidity requires corrective action. Sample S2 was tested for bacteria and no E. coli was detected, indicating no risk of infectious diseases in the water. 35 Total Coliforms (MPN/100 ml) were detected. This is higher than the DWS and WHO standard limits, suggesting a need for improved water treatment as clinical infections may occur if the water is consumed without

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treatment. The Heterotrophic Plate Count of 470 cfu/1 ml indicates that water treatment is effective as it is within the guideline values.

Sample Name: S3

Sample S3 had an Ammonia Nitrogen concentration <0.1 mg/L as N and a Nitrate & Nitrite Nitrogen concentration of 20.6 mg/L as N. The Nitrate and Nitrite Nitrogen concentration is higher than the standards and suggests that water poses possible chronic risks to some babies and could result in blue baby syndrome in infants as nitrates concentrations are high and reduce oxygen circulation. Sample S3 had a conductivity of 133 mS/m measured at 25°C, which shows that the water is acceptable for domestic use. The pH level for sample S3 was 8.3 which alkaline but still within the pH range of healthy water. The pH level suggests that the water poses no health effects for domestic use. Additionally, the orthophosphate concentration of sample S3 was <0.1 mg/L as P. This concentration has no effects on human health and is ideal for domestic. The turbidity for sample S3 was <1 FTU which indicates that the water is acceptably clear and only poses a slight risk of infection if micro-organisms are present. Additionally, Sample S3 was tested for bacteria and no E. coli was detected, indicating no faecal contamination and no risk of infectious diseases in the water. 7 Total Coliforms (MPN/100 ml) were detected. This value is higher than the DWS and WGO limits; improved water treatment is required. The Heterotrophic Plate Count of 2190 cfu/1 ml indicates that there is a high regrowth of bacteria which sensitive groups may not be able to cope with.

Table 1: DWS drinking water guideline values or standard limits

Parameter	*Standard limit*
Ammonia Nitrogen	1.5 mg/L as N
Nitrate and Nitrite Nitrogen	12 mg/L as N
Conductivity	170 mS/m
pH	6.5 – 8.4
Turbidity	<1 FTU
Orthophosphate	1 mg/L as P
E. coli	0 cfu/100 ml
Total coliforms	<5 MPN/100 ml
Heterotrophic Plate Count	<1000 cfu/1 ml

Table 2: WHO drinking water guideline values or standard limits

Parameter	*Standard limit*
Ammonia Nitrogen	<0.1 mg/L as N
Nitrate and Nitrite Nitrogen	10 mg/L as N
Conductivity	250 mS/m
pH	6.5 – 8.5
Turbidity	<1 FTU
Orthophosphate	No guideline for drinking water
E. coli	0 cfu/100 ml
Total coliforms	0 MPN/100 ml
Heterotrophic Plate Count	2000 cfu/ 1 ml

Spatial analysis

Spatial analysis in the form of buffer analysis was undertaken to investigate the accessibility of the water sources within the study area. This analysis involved mapping the water points and creating five distance buffers around these points to see how far the water sources are from the residential areas. In addition to the above, Google Earth Imagery was observed to see the terrain through which residents must travel to access water sources.

Figure 2 below depicts buffer analysis for the water sources. Five buffers, at distances of 200 meters, 400 meters, 600 meters, 800 meters and 1000 meters were created around the water points to give a general overview of the proximity of the water sources to the households.

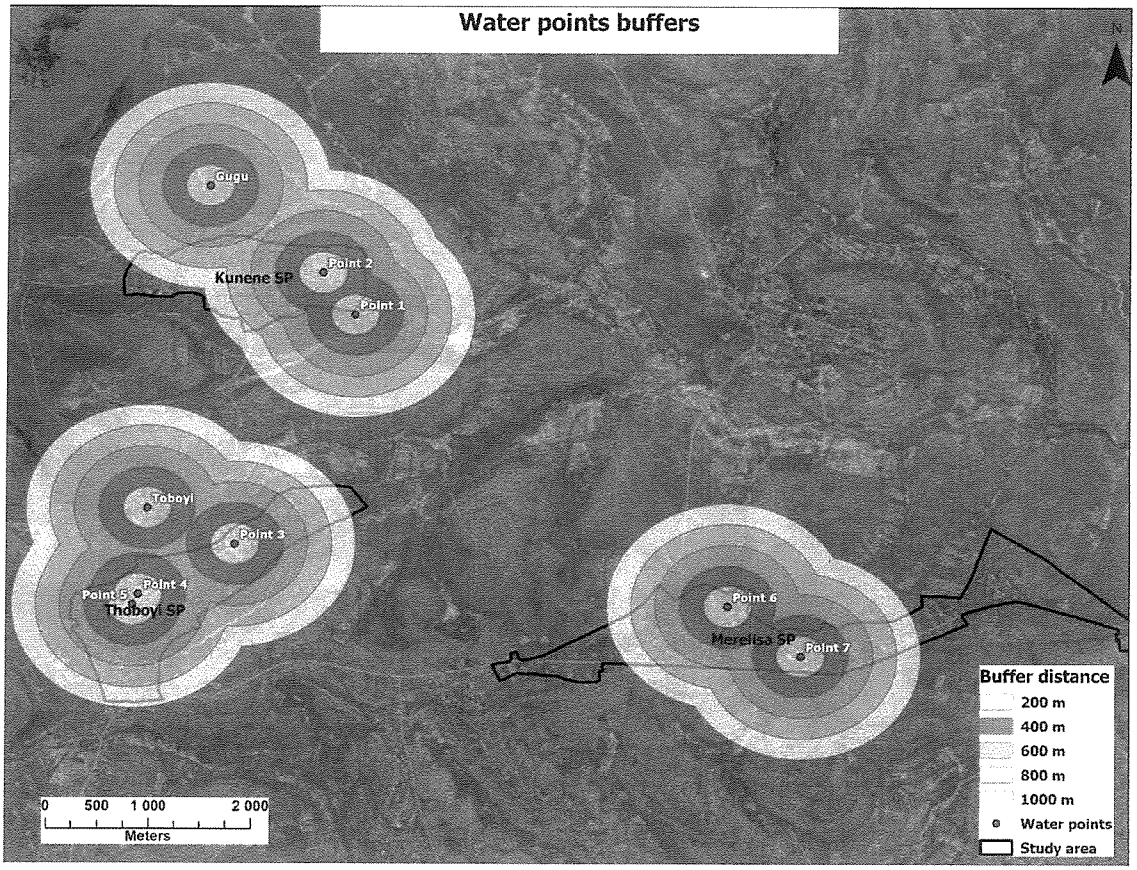

Figure 2. Buffer analysis for the eight water points within the study area

From Figure 2 above, it is noticeable that there is only one public water source within Kunene SP and two in the surrounding area of Mnquna NU whilst two water points are within Merelisa SP. Thoboyi SP has three water sources and one within the surrounding area of Mnquna SP. Thus, the water sources are not evenly distributed across the study area, which suggests unequal access to water. Notably, Gugu and Toboyi water points are the only boreholes near rivers and are used as the main source of water during the wet season. The Gugu water point is approximately 800 meters away from the nearest settlement, Kunene SP, as shown by the light blue buffer whilst the Toboyi water point is between 600 to 1000 meters away from Thoboyi SP. Notably, the southern parts of Thoboyi SP are over 1000 meters away from the Toboyi water points.

EMC SJ

In addition to the above, Figure 3 below shows the terrain between Gugu water point and Kunene SP is upslope and hilly with deep gullies near the water source. Similarly, the Toboyi water point is in a valley with steep slopes. This makes accessing these water points even more difficult. Additionally, the above-mentioned water points are also utilized by livestock, and are thus, not suitable for human consumption as indicated by the high turbidity values for sample S1 and S2. Moreover, looking at water Point 1 and Point 2, which are both over 1000 meters away from the western parts of Kunene SP along with water Point 6 and Point 7, which are also over 1000 meters away from the eastern and western parts of Merelisa SP, it is evident that there is no equality with regards to water access within the study area. In addition to the above, although water Point 3, 4 and 5 are within 1000 meters of most parts of Thoboyi SP, there is limited access to these water sources as some of them are in people's yards, who restrict entry into their households. This is further evidence of poor water access within the study area. Furthermore, unequal access to quality water is proved by the water testing results which showed that water from Merelisa SP (Sample S3) were of better qualify compared to the water from Kunene and Thoboyi SP (sample S1 and S2).

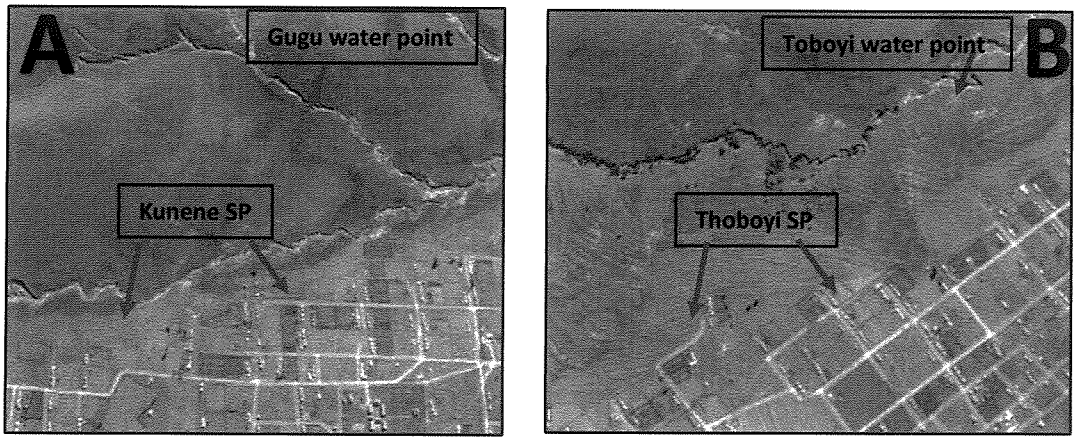

Figure 3. Terrain between Gugu water point and Kunene SP (A), and Toboyi water point and Thoboyi SP (B)

Conclusion

The water testing results illustrated that the water quality of the water points with the study area is very poor, as the collected samples were not fully within the drinking water guidelines set out by the Department of Water and Sanitation as well as the World Health Organization (WHO). The water in Merelisa SP had comparatively better water quality compared to the other settlements as it had the lowest turbidity and total coliforms and had parameter values that were close to the standard limits. The spatial analysis results proved the unequal access to water that exists within the study area as some places, such as Thoboyi SP had more water points than other settlements, and some areas, such as the southern parts of Thoboyi and the eastern parts of Merelisa, were over 1000 meters away from the water points. Conclusively,

there is grounds to believe that the current water situation within the study area infringes on resident's right to quality water access.

References

Mnquma LM (2019). Mnquma LM IDP 2018/2019. Butterworth.