Water Testing Week Report

By WaterCAN and Citizen Scientists around South Africa

October 2022

WATER CAN
COMMUNITY ACTION NETWORK

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#WhatAmIDrinking

Contents

List of Figures

List of Tables

WaterCAN: Democratise water through citizen action networks

1. BACKGROUND

South Africa is a water scarce country that is going to be deeply impacted by climate change. The little water the country does have is inequitably shared and being polluted by government and industry. This report by the Water Community Action Network (WaterCAN) underlines the importance of citizen science activists to regularly test water sources around the country to help ensure access to safe water for all as well as to hold all polluters accountable.

The Water Research Commission (WRC) estimates that 65% of river ecosystems are threatened because of the poor state of the country's water resources. Furthermore, the deteriorating quantity and quality of water in South Africa has a direct impact on people, too often resulting in a lack of access to safe, clean, and sustainable drinking water. (Water Research Commission, 2015)

2. INTRODUCTION

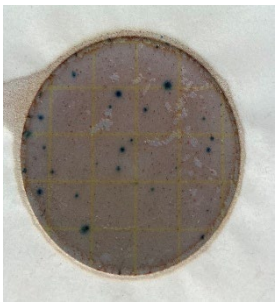
WaterCAN, an initiative of the Organisation Undoing Tax Abuse (OUTA), embarked on a week of testing the quality of drinking water across South Africa between 14-18 September 2022.

Using an activist citizen science approach, WaterCAN asked individuals, residents' associations, NGOs and community organisations to test tap water and raw water sources such as rivers, streams and dams at various points around the country. Tests were conducted in 8 of the 9 provinces, with most tests done in urban areas and small towns, with a few in rural areas. The "citizen scientists" who participated, were from diverse backgrounds with regards to race, class, age and gender.

The iLAB testing kits that were used assess parameters to test the quality of drinking water. The parameters selected are key to the South African National Standard (SANS) 241 that provides drinking water specification and stipulates the minimum requirements for potable water. The kit tests chemical and bacterial parameters including nitrates, nitrites, phosphates, pH, hardness, alkalinity, chlorine, a test that provides a combine assessment of metals such as copper, lead, cadmium and mercury, total coliform screen, and an E. Coli test.

Each of the tests can be viewed in the table below.

Table 1: Images of the various tests used

 Clear test for coliform bacteria.	 Positive for coliform, test turns black after 36 hours.	 Petrifilm test for E. Coli bacteria after 72 hours. If clear, then no bacteria present.	 Petrifilm positive for E. Coli - presence of blue spots.
 Test for pH, alkalinity, chlorine, hardness.	 Test for nitrates and nitrites.	 Test for phosphates.	 Test for copper, lead, mercury, cadmium.

This report highlights the main objective of WaterCAN, i.e., to address the lack of accurate and meaningful information and poor monitoring and mismanagement of South Africa's water. It provides a summary of the state of South Africa's water resources which influenced the formation of WaterCAN while presenting the key results from the tests conducted and motivating for citizen science activists to hold all polluters accountable.

The results, while not surprising (given the Green Drop and Blue Drop reports of 2022), are an indication of the need to monitor our water, build networks, share data, train citizen scientists, and have an activist approach to the protection of water resources in our country.

Tests were conducted in 8 of the 9 provinces: Gauteng, Limpopo, KwaZulu-Natal, Free State, Eastern Cape, Mpumalanga, North West and Western Cape. The chemical parameters on tap water were all in line with the acceptable limits and can be regarded as safe for drinking.

However, with regards to the bacterial parameters, there were four results that had presence of total coliform, of which the one in Winburg was high enough to raise concern with the municipality (See Table 1).

The tests on raw water sources reflect high levels of E. Coli and coliform in the water, which are a serious health risk. The high levels of hardness, alkalinity and phosphates were from various samples of raw water sources. However, there is no pattern and therefore the water must be monitored regularly. The E. Coli plate and the Aqua Screen that measures total coliforms are certainly of concern, as 76% of the tests had E. Coli and/or coliform.

The conclusion derived from the results is that our tap water, while healthy in most urban areas, needs more people to test smaller towns and rural areas. The electricity crisis has affected pumping of water at reservoirs, and this could result in water being contaminated – which means that regular testing is becoming even more imperative.

The risk of contaminated drinking water supply in some municipalities are exacerbated by a lack of maintenance at water treatment facilities, the lack of laboratory facilities to regularly test water in line with regulatory requirements and the lack of proper treatment of highly contaminated raw water,

The quality of raw water sources is a major concern, as this is where drinking water is abstracted from to serve communities. However, the health risks are even more severe in places where participants are dependent on the direct water source for drinking and cooking.

Failing infrastructure, lack of sufficient budget allocation, poor oversight and a lack of law enforcement are the main causes of sewage pollution. The Department of Water and Sanitation (DWS) needs to hold municipal managers accountable for polluting raw water sources, and not the municipality, as these fines are just passed on to the very rate payer who has paid for the sewage to be cleaned in the first place.

Municipalities need to do regular tests and make the results timeously available to the public. In addition, WaterCAN and all its citizen scientists are demanding that action plans be provided in areas with high levels of pollution to ensure that the water sources are protected.

3. CONTEXT

The world's water resources face dwindling supplies and poor water quality. South Africa is a water scarce country, and our water resources are highly compromised. The country has an average rainfall that is about 50% less than the global average. South Africa's water resources are threatened with almost 65% of ecosystems in a dire state of degradation that is projected to reduce available potable water by 17% by 2030. (Federation for a Sustainable Environment, 2018)

The little water that the country does have, faces a barrage of challenges such as climate change, prolonged droughts, pollution, waste and poor infrastructure and management. There is a significant inequality in water access between those who have water to the many millions who have little to no access at all (Hedden and Cilliers, 2014; WWF-SA, 2016).

Furthermore, some of the country's key river systems, such as the Vaal, Olifants and Crocodile are severely affected by salinity which have been mainly attributed to mining activity (Department of Environmental Affairs, 2012). In an article, Coetzer (2022) describes many dams and rivers as being "choked with water hyacinth, algal blooms and have dangerously high E. Coli levels, brought about by sewage flowing into the natural water systems". Coetzer (2022) further points to the state of dams across the country:

> *The Hartbeespoort Dam in the North West has had long running problems with algal blooms; the Roodeplaat Dam in Pretoria was overgrown with water hyacinth; while the Wemmer Pan lake in Joburg was found to be infested with sewage and litter. All three dams have dangerous levels of E. Coli, as does the Vaal Dam, where Gauteng sources most of its water from. Across the country, the Ntshingwayo Dam near Newcastle in KwaZulu-Natal had a very high cyanobacteria health risk, as did the Gariep in the Free State, Spitskop in the Northern Cape and Voëlvlei Dam in the Western Cape, among others.*(Coetzer, 2022)

The water challenges that the country faces will only be made worse by climate change. South Africa can expect to experience more climate shocks and disasters as we have witnessed in Kwa-Zulu Natal in April 2022.

Poor investment in the development and maintenance of infrastructure, mismanagement at a local government level and South African's lack of a culture of water conservation and responsible use of water will exacerbate how we respond to climate shocks.

The DWS must complete a "No Drop" assessment for the whole country, which must be a pre-emptive analysis on water losses as well as water scarcity. South Africa faces a deficit of 3.8 billion kilolitres of water by 2030. One of the biggest risks is water security for Gauteng as the Lesotho Highlands Water Project Phase 2, which should have provided water to the region in 2018, is yet to be built. However, best solutions do not always have to be the most expensive or the biggest, but they require planning and construction well ahead of day zero. Proper budgeting and maintenance of existing infrastructure will save a lot of water as an estimated 40 - 50% of clean water gets lost due to infrastructure leakage.

The Constitutional responsibility of local government is entrenched in the Water Services Act 108 of 1997 to ensure that these institutions make access to safe water and sanitation a reality by specifying that: *"Every water services authority 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"*. Metropolitan municipalities, some

District Municipalities and authorised Local Municipalities are responsible for ensuring the provision of water and sanitation services in their area of jurisdiction.

A key factor that has led to poor water quantity and quality is a failing and corrupt government, especially at a local level. There are 278 municipalities in South Africa, comprising eight metropolitan, 44 district and 226 local municipalities**.** They are responsible for growing local economies and providing infrastructure and basic services. Unfortunately, the state of municipalities is dire.

In April 2022, the Blue Drop (quality of drinking water) and Green Drop (quality of wastewater treatment) reports were released for the first time in nine years. Both reports are red flags for the dire state of our drinking water and wastewater treatment.

The Blue Drop assessment shows that 52% of water supply systems range from medium to critical risk. In addition, 60% of supply systems do not comply with microbiological standards and 77% of supply systems do not comply with chemical standards, as outlined in SANS 241:2015. The report also shows that technical skills are poor throughout the country with 61% of supply systems having poor technical skills and 72% having insufficient maintenance teams. (Department of Water and Sanitation, 2021b, 2021a)

The Green Drop report highlights the fact that only 23 wastewater systems qualified for Green Drop Certification and 334 (39%) of municipal wastewater systems were identified to be in a critical state. The reports prove the significant sewage pollution by municipalities as well as the poor state of sewage infrastructure, management and accountability. (Department of Water and Sanitation, 2021b)

The deteriorating quantity and quality of water in South Africa has a direct impact on people having access to safe, clean, and sustainable drinking water. Unsafe potable water poses a significant risk to human health and comes in the form of infectious diseases, reproductive problems, and neurological disorders (Edokpayi, et al., 2018).

There is an increase in citizens raising their concerns and anger at the lack of efficient delivery of clean, safe, and reliable water services. A 2012 study by the WRC confirmed the link between water scarcity as an important component of service delivery, and civil unrest. Brouwer et. al. (2020) has argued that transparency and the availability of more information about water treatment procedures and water quality would contribute to increasing customer trust.

Mulgan (2012) argues that it is assumed that the existence of transparency would result in better governance and more accountability. Bellver and Kaufmann (2005) also explains that the demand for accountability is often responded to by increasing the level of transparency under the assumption that better and more information would allow citizens and governments to hold institutions accountable for their policies and performance.

One of the most crucial ways to address these problems is linked to empowering people to be activist citizen scientists. Citizen science is about ordinary people using science, whether as volunteers gathering data or as a partnership between community and scientists to act on issues of concern, especially on environmental issues. Citizen science has been described as a way to empower communities to gain greater control over their lives, health and environment, and to take action.

4. METHODOLOGY

The approach to the methodology was a quantitative one with 100 kits that were distributed (on a first come first served approach) to organisations and people across the country. The participants came from diverse backgrounds, from individuals to residents' associations, environmental groups, community-based organisations, sports and recreation organisations and social justice movements.

The full iLAB testing kits assesses more than 10 drinking water chemical and bacterial parameters that includes nitrates, nitrites, phosphates, pH, hardness, alkalinity, chlorine, a metals test, total coliform screen and an E. Coli test. The iLAB sample kits were once off kits that had 1 test on chemical parameters (pH, alkalinity, total chlorine, hardness) and one Petrifilm to conduct a bacterial analysis.

A training video was developed with a step-by-step approach to testing. Each person had to register and watch the video. An online training session was held with all volunteers to make sure that the process was understood.

Two Google forms, bacterial and chemical parameters, were developed for uploading results and photographs. The testing began on 13 September and while the testing week ended on 18 September (World Water Monitoring Day) it was left open to allow for participants to upload bacterial results due to the incubation period of 72 hours for the Petrifilm.

There were 77 responses and data uploaded with an almost equal number on tap water and raw water sources. Most of the participants who tested tap water used the sample kits, while most of the participants who tested rivers, streams and dams used the full iLAB kit.

The interpretation of health effects and parameters were conducted in line with DWS standards and guidelines.

5. THE RESULTS

5.1. Testing Areas by Province

Tests were conducted in 8 of the 9 provinces: Gauteng, Limpopo, KwaZulu-Natal, Free State, Eastern Cape, Mpumalanga, North West and Western Cape. Most of the tests were conducted in Gauteng, KwaZulu-Natal and the Western Cape, with the majority conducted in urban areas

and small towns. There were few tests conducted in rural areas. It is possible that the information of the testing week may have been limited to areas and networks that WaterCAN was already working in.

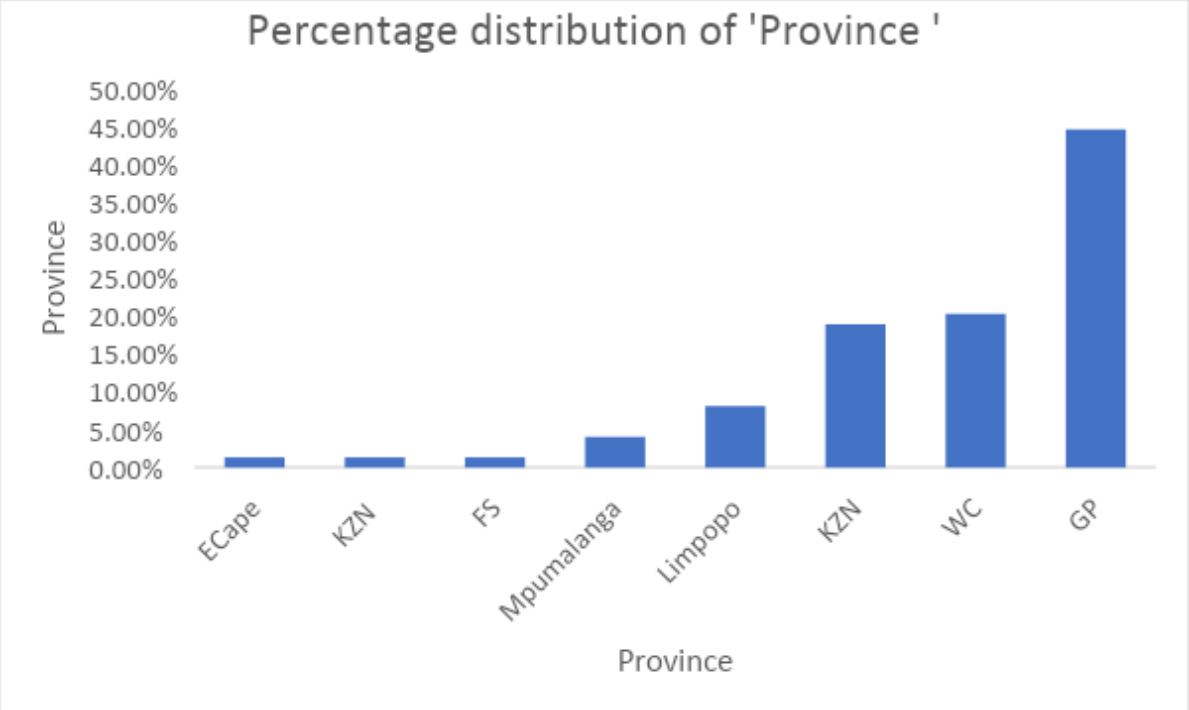


Figure 1: The percentage of tests in each province

5.2. Water Sources and testing kits

Table 2:Water Sources where tests were taken

Water Source	Numbers
Raw water source (river, dam etc)	40
Tap water	37
Grand Total	**77**

Table 2 provides a breakdown of the number of tests done on tap water and raw water sources. Almost 100 kits (full kits as well as sample kits) were handed out with results received from about 77 participants. It has taken some participants longer to add their data to the Google forms and there are participants who have not used their kits nor supplied results for a range of reasons including illness and work commitments by the time of publicising this report.

There were two different kits that were provided to citizen scientists to test water quality. The first kit is a testing kit that has 6 tests each of the chemical and bacterial parameters and are for long term monitoring. The main parameters are based on drinking water quality and tests for nitrates, nitrites, phosphates, pH, hardness, alkalinity, chlorine, a metals test, total coliform screen and an E. Coli test. The smaller sample kits were issued to participants to do a once off test and included a 6-in-1 test (alkalinity, hardness, pH, chlorine) and 1 Petrifilm to test for E. Coli and coliform.

Most of the sample kits were used to test tap water. The results analysed were for 37 drinking water or tap water sources and 40 raw water sources. The chemical parameters for the 37 samples of tap water were generally quite good and within the acceptable limits thus indicating that the water was safe to drink. This is across all provinces, in the main urban areas.

The 40 tests done on raw water sources in general reflected medium to good chemical parameters. The high levels of hardness, alkalinity and phosphates were from various samples of raw water sources. However, there is no pattern and therefore it must be monitored regularly. The sections below will discuss each parameter and the impacts of high levels. The E. Coli plate and the Aqua Screen that measures total coliform are certainly of concern as 76% of the plates had E. Coli and/or coliform and 72% of the Aqua Screen were positive for total coliform.

5.3. Chemical Parameters

5.3.1. Hardness

The measure of hardness is not a direct impact on health. In fact, some hardness is beneficial to health, but excessive hardness should be avoided. A value greater than 425ppm is regarded as unsafe. (iLAB, 2022)The results showed 8 samples that were in the range of 425ppm. These were raw water sources in KZN, Limpopo and Western Cape.

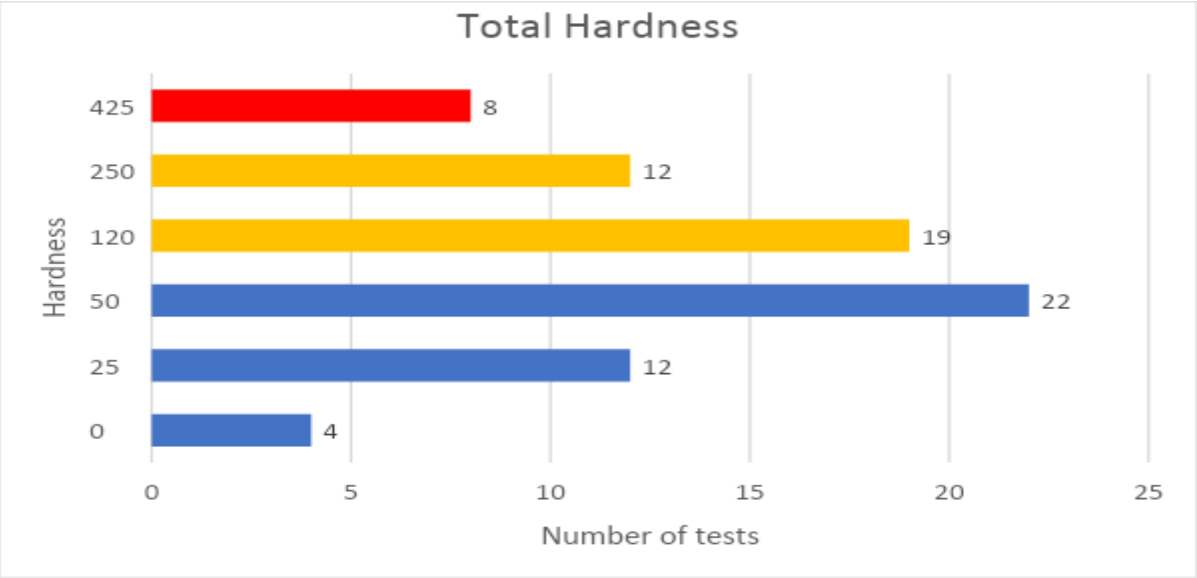


Figure 2: The range of hardness (ppm)

5.3.2. Total chlorine

Chlorine is the most commonly used disinfectant because it is effective and cheap. All drinking water for cities and communities must be disinfected, including water from potentially clean sources such as protected watersheds and reservoirs. (Randwater, 2017)

If an adequate concentration of chlorine is present in the water for a few minutes, disease causing bacteria will be destroyed. A number of conditions affect the disinfection action of chlorine. If chlorine is detectable in municipal drinking water, it can be assumed that the system has been flushed and bacteria have been killed. However, there are cases where municipalities may use too much or too little chlorine. In general values greater than 3ppm are regarded as not safe. It was interesting to note that Walter Sisulu Botanical Gardens, Modderfontein Nature Reserve, Umgeni River (at the canoe club), Isipingo and Ballito all had levels of 3ppm or greater. The high levels in KZN were after the floods and could be linked to flushing of the system as the E. Coli levels have been quite high, resulting in beaches being closed.

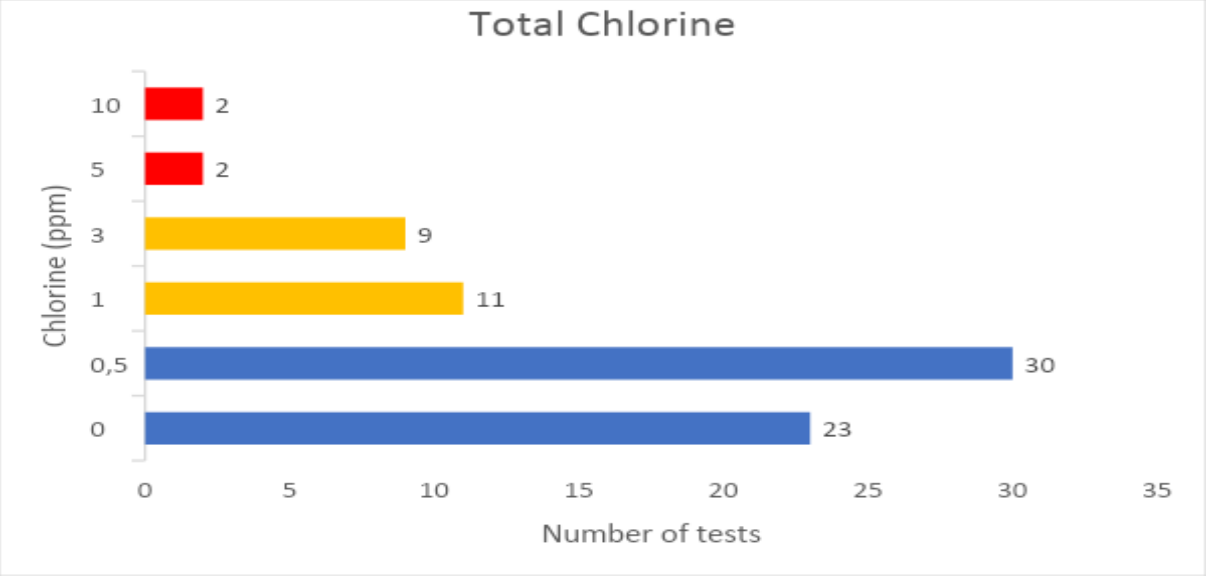


Figure 3: The range of chlorine levels (ppm)

5.3.3. Total alkalinity

Alkalinity does not have a direct impact on health. Alkalinity is the ability of the water to keep the elements less acidic by maintaining the right pH – it is therefore necessary to interpret alkalinity levels in conjunction with pH. In general, the values between 120 and 180 are regarded as safe. While there were a number of samples with high levels, it is a parameter that must be checked regularly to assess the impact. (iLAB, 2022)

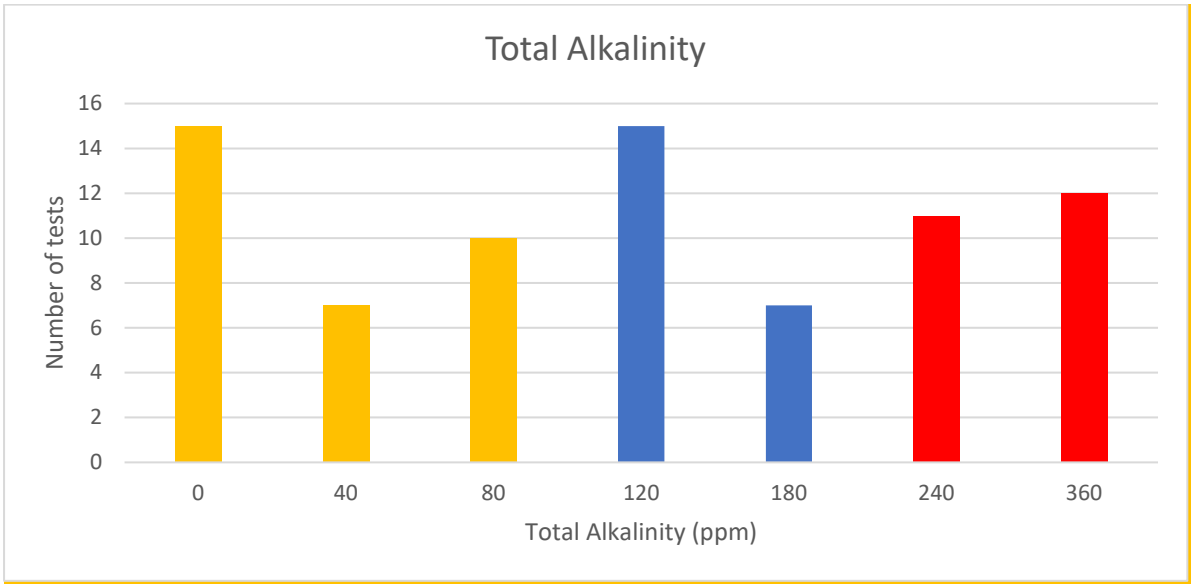


Figure 4: The range of alkalinity across all tests

5.3.4. *Measuring pH values*

A pH value measures the acidic or basic quality of water. The pH scale varies from 0 (very acidic) to 14 (very basic), with 7 regarded as neutral. A pH value that is very acidic or very basic is unsafe and can be dangerous if you swim in it, and it can also kill aquatic plants and animals. The pH of natural water is usually between 6,5 and 8,2. Most aquatic organisms have adapted to a specific pH level and may die if the pH of the water changes even slightly. In addition, pH is an important measure of pollution and can be affected by industrial waste, agricultural runoff, mining operations and sewage. (Randwater, 2017; iLAB, 2022)

The results show that most of the tests are within range. The results show a level between 6 and 9 with most between 6,8 and 8,2. There was one sample in Mpumalanga in a river that often has sewage spills close to the point of testing and thus reflected a value of 9. This is not regarded as harmful but should be monitored in future.

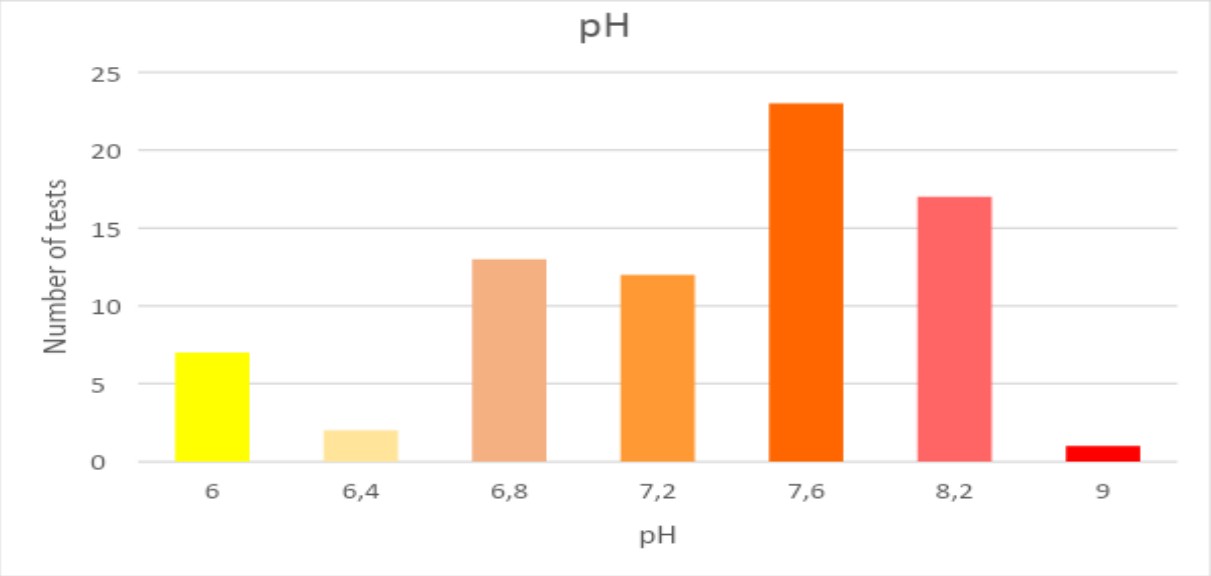


Figure 5: The range of pH values of the tests

5.3.5. *Phosphate*

Phosphate is a nutrient needed for plant and animal growth and is also a fundamental element in metabolic reactions. High levels of phosphate can lead to overgrowth of plants, increased bacterial activity, and decreased oxygen levels. The main effects are primarily based on aesthetics, although indirect health effects are associated with the possible presence of faecal matter and fertilizers. Levels less than 10ppm are regarded as safe for drinking and values above 10ppm are not safe to drink. (Randwater, 2017; iLAB, 2022)

There were 21 samples that had values of 25 and 50. Two of the high levels were found in Walter Sisulu Botanical Gardens and the Bronkhorstspruit River Nature Reserve. A range of results showing high levels of phosphate was found in KZN and the Western Cape.

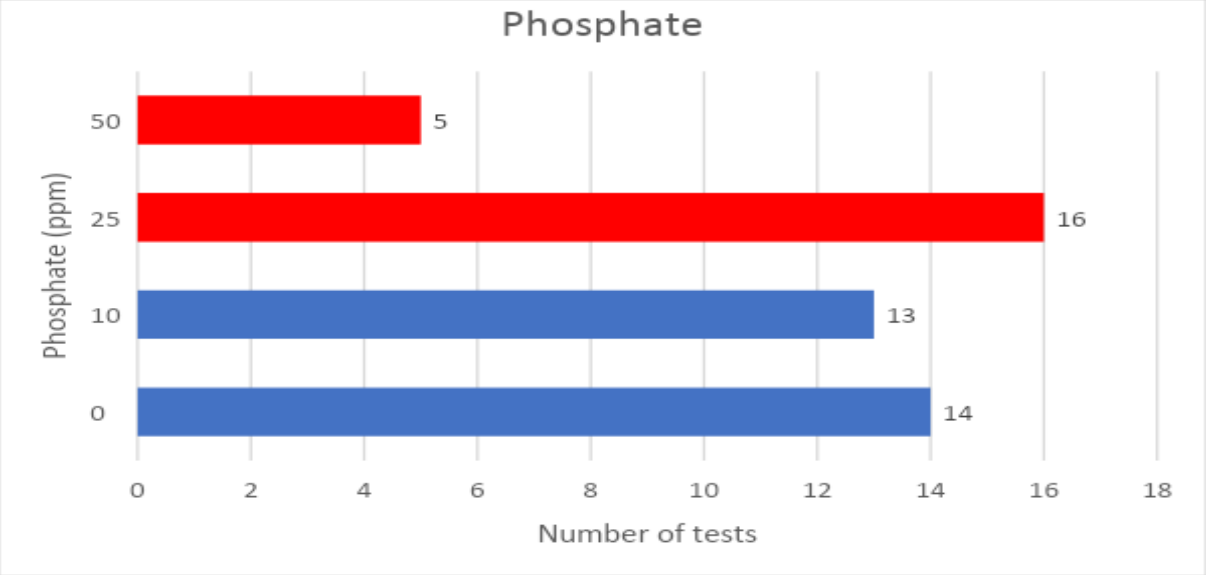


Figure 6: The range of Phosphate in (ppm) reported

5.3.6. Nitrate and nitrite

Nitrate is a nutrient needed by all aquatic plants and animals to build protein. The decomposition of dead plants and animals and human waste release nitrates into the system. Excess nitrates increase plant growth and decay, promote bacterial decomposition and as a result decreases the amount of oxygen available in the water. High levels could be due to fertilizers, agricultural runoff, and sewage. Less than 10ppm and more than 25ppm poses a significant risk. Drinking water high in nitrates can affect the ability of our blood to carry oxygen and can result in blue baby syndrome and tiredness in adults. (iLAB, 2022)

The levels of nitrite are important as high levels can be regarded as cancer causing substance. Water is safe if it is below 1ppm and unsafe if nitrite is more than 1ppm.(Randwater, 2017)

It was interesting given the levels of E. Coli and coliform that most of the results were in an acceptable range. The highest levels for both nitrate and nitrite were found in KZN at the Canoe Club in Blue Lagoon.

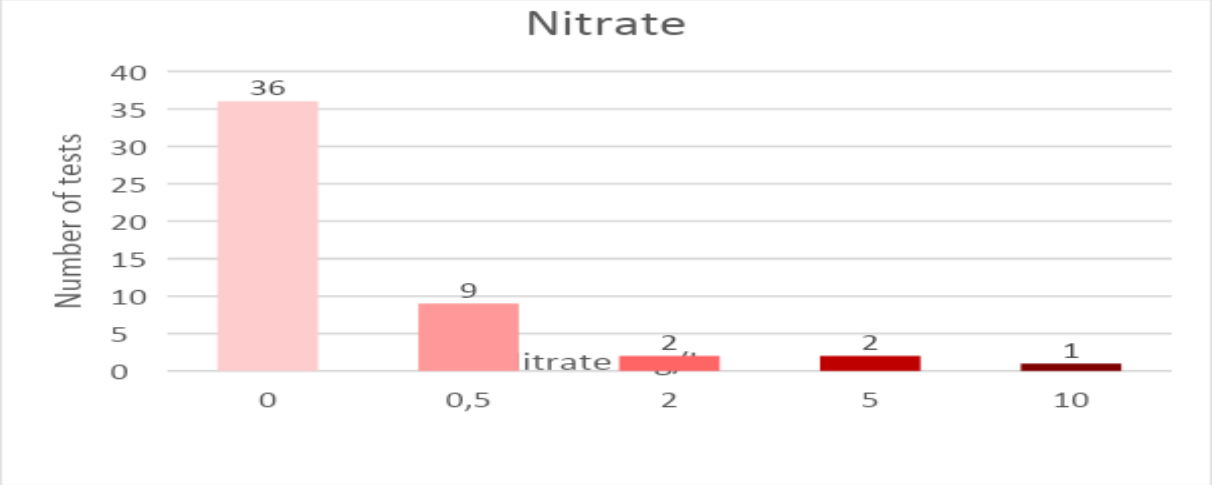


Figure 7: The range of Nitrate (ppm)

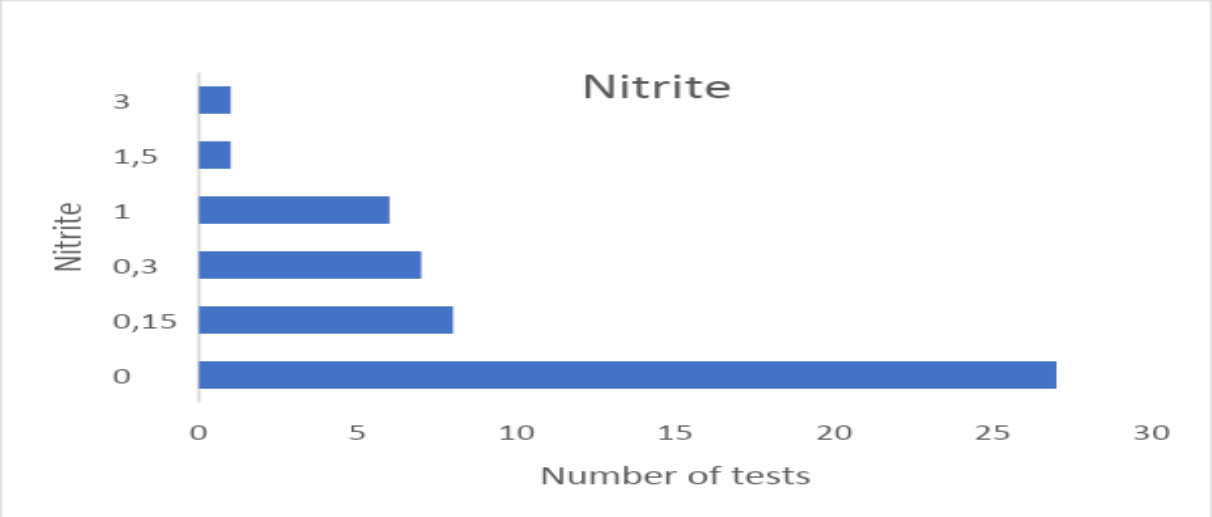


Figure 8: Range of nitrite across tests

5.4. Bacterial Parameters

5.4.1. Petrifilm: E. Coli/coliform plate count

Excessive bacteria in drinking water, treated sewage discharge and environmental water can cause diseases. The plate can be used as an indicator of the amount of bacteria in 1ml of water. In tap water, if any blue spots are present, the water is not safe to drink, and all blue spots (colonies) are counted as confirmed *E. Coli* in 1ml of water. The presence of any red spots indicates the amount of coliform bacteria per 1 ml of water. ANY red or blue spots (colony) indicates unsafe water. (iLAB, 2022)

Tap water should have no blue spots and less than 2 red spots to be regarded as safe. In raw water sources, more than 10 blue and red spots (combined) are regarded as unsafe.

The results on raw water sources are of concern as 76% of the plates had E. Coli and/or coliform. The testing points in KZN, Gauteng, Western Cape and Limpopo provinces had the highest positive levels for E. Coli and coliform. The main causes in each of the areas could be attributed to failing wastewater treatment plants, overflowing manholes and waste dumping into rivers and streams.

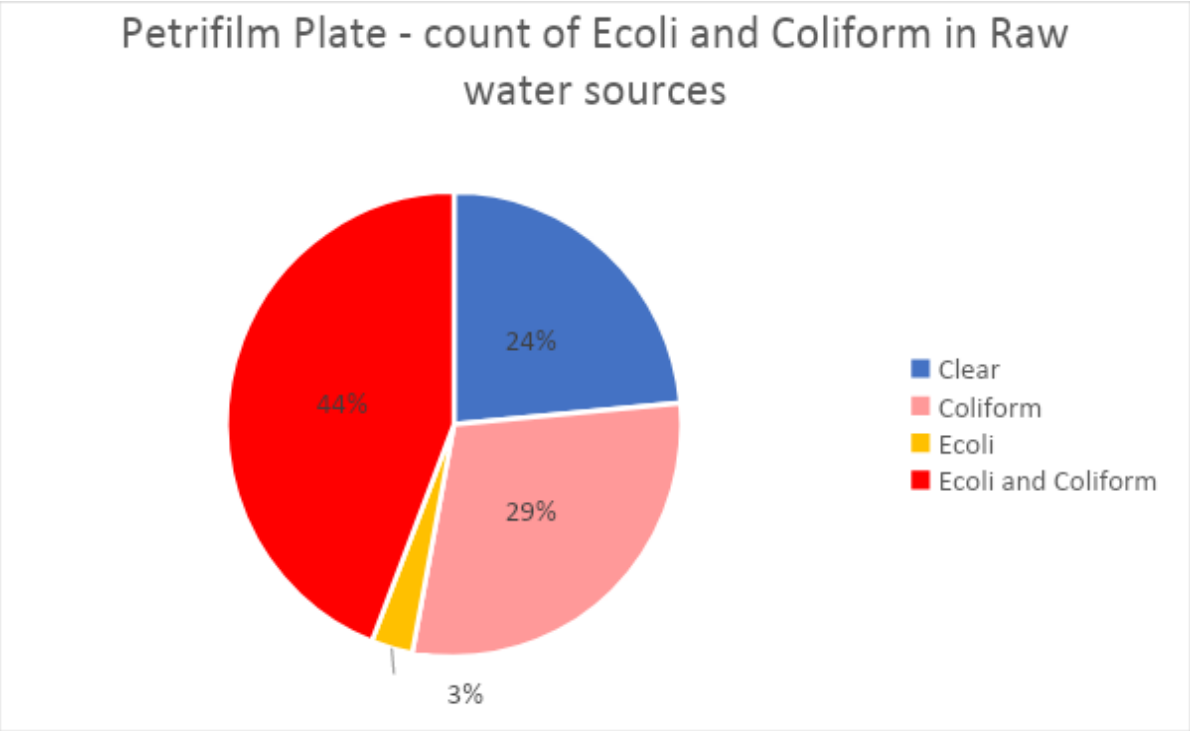


Figure 9: The percentage of E. coli and Coliform bacteria

Most of the tap water samples (32) had clear Petrifilm plates and a negative for faecal coliform. There were 4 samples with presence of coliform spots. One sample in Winburg, Free State showed high levels of total coliform on the Petrifilm (more than 10 red spots as can be viewed in Figure 1 below). The municipality was immediately informed about the presence of bacteria – they then issued a "boil your water" notice to the residents in the area in order to kill the bacteria (see Table 2). The water quality tests allow us to act and to go directly to the municipality. The example in Winburg is a success as the municipality was informed and acted immediately with a "boil your water" notice. The follow up actions will need to be monitored.

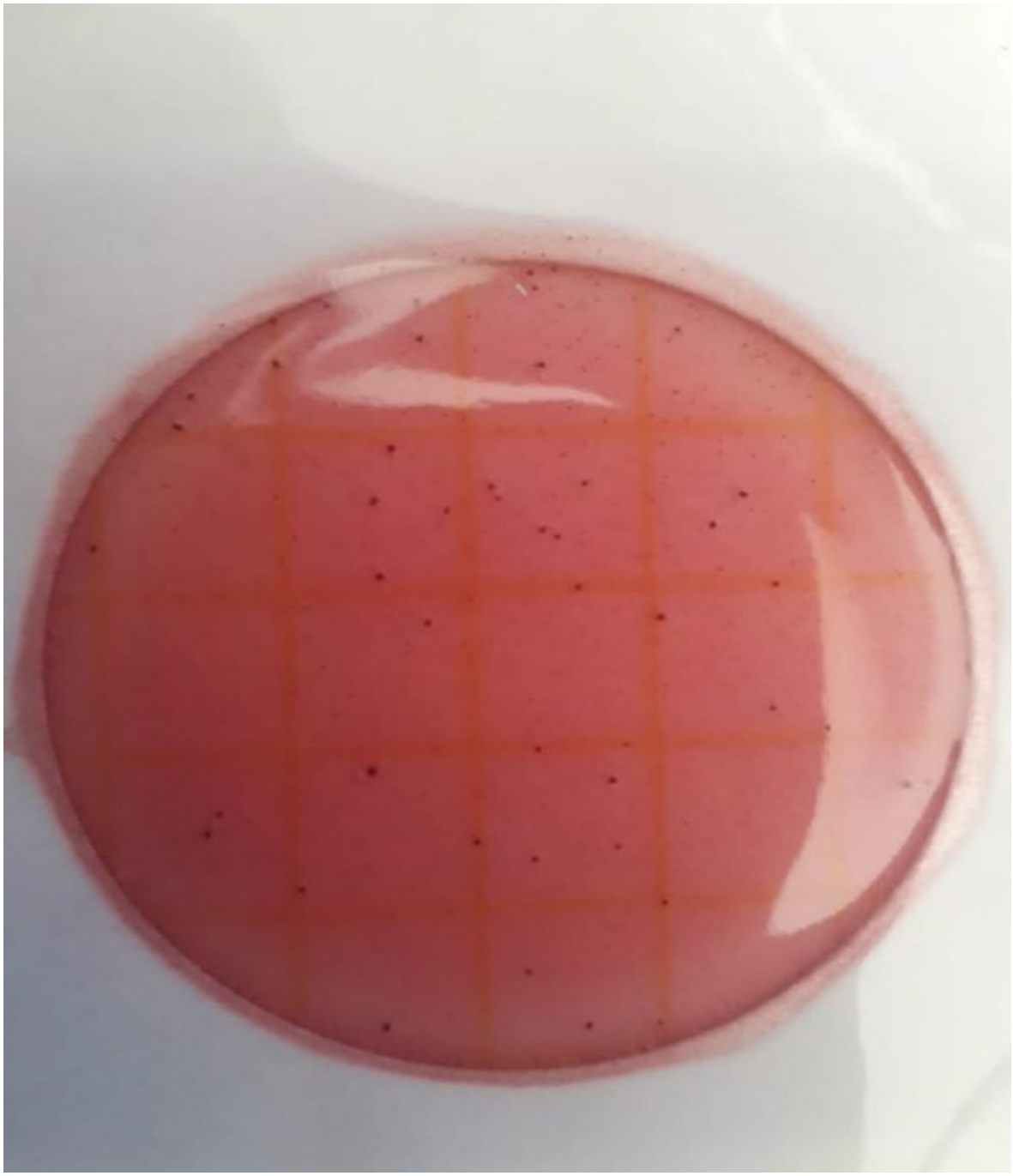


Figure 10:Test in Winburg showing high levels of Coliform bacteria (red dots)

Table 3: Boil alert issued by municipality

WATER BOIL ALERT IN WINBURG!!!

Residents of Winburg and Makeleketla are notified that there's a very high concentration of Algae blooms in the raw water supply get into the Water Treatment Works.
These Algae blooms are difficult to treat and are affecting the colour and odour of the purified water.

To mitigate against the challenge the Municipality working tirelessly on possible treatment methods and constantly observing the quality of the end product.
However, as a result of changes in disinfection methods the community is therefore advised to boil water for purposes of drinking or household use.

Masilonyana Municipality apologizes for any inconvenience that might be caused.

Issued by:

Masilonyana Communications

5.4.2. Aqua Screen: total coliform

Faecal coliform bacteria are naturally present in the human digestive tract but are rare or absent in unpolluted waters. Coliform bacteria should not be found in sources of drinking water. The presence of coliform is a reliable indication of sewage or faecal contamination. The Aqua screen which tests for the presence or absence of total coliform bacteria, is a measure of all coliform bacteria strains and may indicate faecal contamination. (Randwater, 2017; iLAB, 2022)

The Aqua Screen test indicates faecal contamination in the water. Sewage discharge water may have limited faecal bacteria. If the water turns black, bacteria like faecal coliforms are present and therefore the water is **not** safe to drink. Even rivers or dams have faecal matter from birds or animals.

If the test remains unchanged or clear, the water is safe. The results were quite concerning as 72% of all raw water sources were positive for total coliform. The combination of the findings in the Petrifilm test and the Aqua Screen indicates that the raw water sources that were tested have high levels of E. Coli or coliform bacteria and are unsafe.

At least 65% of river ecosystems are threatened in South Africa. The high E. Coli and coliform results should be raising red flags as this is not only a health risk for people and animals, but also has the potential to further threaten ecosystems. This is projected to reduce available

potable water by 17% by 2030. (Federation for a Sustainable Environment, 2018). This is a reduction we cannot afford as South Africa is a water stressed country.

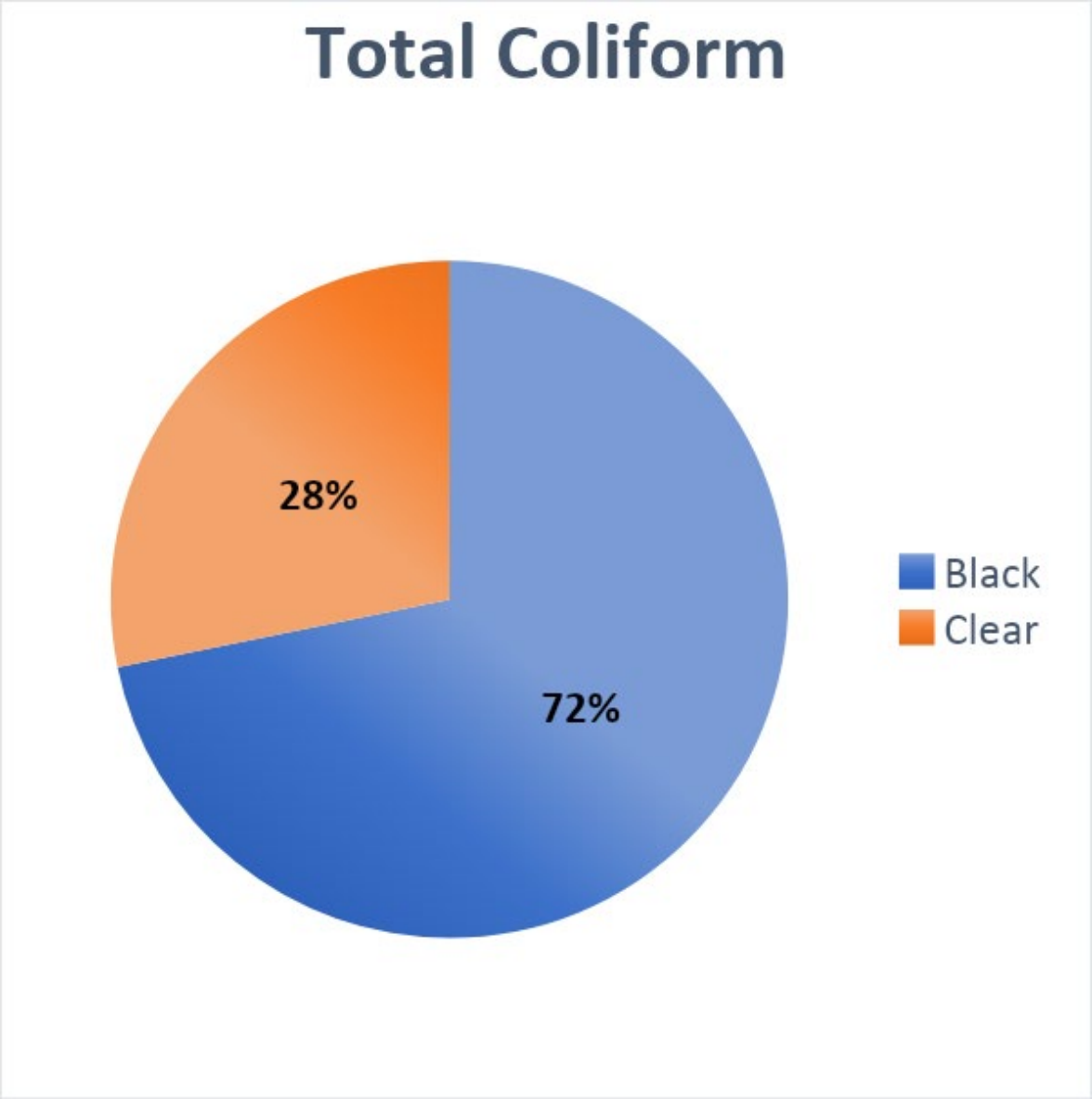


Figure 11: The percentage breakdown of positive Coliform bacteria versus clear tests

6. ACTIONS AFTER TESTING

6.1. George, Wilderness and Sedgefield - Western Cape

A citizen science volunteer, Gavin Borrageiro, tested tap water and raw water sources in George, Wilderness and Sedgefield. He picked up E. Coli and coliform bacteria in the Kaaimans River (Swart Rivier and N2) and Touws River (Pirates Creek and Anchorage Lane). The area is in close proximity to tourist accommodation and beaches and the citizen scientist therefore alerted the local councillor and municipality to the tests.

This case is an example of activists being sent from government pillar to post. The councillor sent Mr Borrageiro to the district municipality and claimed that George municipality is only responsible for infrastructure along the river courses. In addition, Mr Borrageiro mentioned that "*the councillor also tried to lay blame on farmers and farm animal faecal matter that is washed into the river. She wrote in an email "we cannot be held responsible for farming along river courses*."[1]

The councillor sent the citizen science activist to two other people who are responsible for drinking water quality at the municipality. Mr Borrageiro has not heard from anyone since then and no action has been taken and stated that "*the individuals I personally spoke to confirm the blame shift within the Municipality and almost no response ahead of peak holiday season and the insufficient E. Coli notification on the Blue Flag status board*." [2]

At the same time, another group in George issued a statement on the tests that they did (see section below).

This is not a new issue, and the ongoing challenges can be viewed in these articles:

https://www.georgeherald.com/News/Article/General/touw-river-mouth-202201201120

https://www.iol.co.za/capetimes/news/sanparks-monitors-sewage-spill-16309987

https://www.news24.com/news24/contingency-plans-in-place-if-reports-of-touw-river-sewage-spill-are-confirmed-sanparks-20180727

6.2. The Garden Route Dam Action Group (GARDAG), Western Cape

GARDAG tested in two areas using the testing kits supplied by WaterCAN as well as laboratory tests. The tests showed a reading of 3 900 E. Coli, while the maximum allowed is 1 000 E. Coli per 100 ml for safe contact sport. GARDAG has been monitoring the state of the rivers in the George District for several years. The municipality is aware of the need to upgrade the main sewer line from Denneoord to the Eden sewage pump station.

GARDAG suggests that there are pipe-bursts or overflows into the Kat River is an ongoing issue. The group issued a statement to warn canoeists and other groups using the river for recreation as this was not done by the municipality. The statement can be found here: Cat-footing it at the Kat River | George Herald

A member of GARDAG, Desiree Du Preez mentioned that the "George Municipality is not very easy to communicate with, but responds quickly to media releases like these." The response from the municipality was detailed and provided the incidents of sewage overflow as well as the actions to be taken as listed below:

[1] From email communication sent by Mr Gavin Borrageiro to Dr F Adam
[2] From email communication sent by Mr Gavin Borrageiro to Dr F Adam

Table 4: Extract od email response from Municipality to GARDAG

George Municipal River Sampling:
George Municipality takes note of the high E-Coli count as a result of the three incidents as listed above. Monthly river samples are taken up- and downstream of pumping stations near or next to the Kat River. This monitoring program is not a legislative requirement but was implemented by the George Municipality as a precautionary management measure to monitor the infrastructure, where a risk of possible pollution may occur. Samples are taken and tested as part of standard operating procedures. Should any trace of contamination be detected, or is brought to the attention of the Municipality, it is referred to the section Wastewater Collection to investigate and resolved. This is then further communicated to the GRDM, which is the monitoring authority, BGCMA and DEADP per the protocols in the Wastewater Risk Abatement Plan of the George Municipality.

All spillage incidents are dealt with, within 24 hours, or a maximum of 48 hours, depending on the available manpower and intensity of the complaint. The George Municipality acts within the spillage incident protocols.

Remedial and preventative measures:
Remedial measures along the Kat river stream affected by sewer blockages and sewer pump station spillages is implemented by George Municipal Sewer operations: Preventative measures implemented to prevent spillages in the Katriver (Eden pump station drainage area):
i. Backup generators is in place in the event of power outages;
ii. Desludging periods at the WTW are schedule to be during off-peak periods (during night flows);
iii. Process controllers make frequent visits to the pump station to check the pump performances;
iv. As part of the pump station upgrading a new Motor Control Centre will be installed at Eden pump station;
v. Telemetry was upgraded at the pump station and linked to the SCADA system for quick response in the event of emergency
and alerts personnel to potential overflows/spillages;
vi. George Municipality applied for a emergency directive at DEADP to construct a HDPE lined emergency overflow pond next
to the Eden Sewer Pump Station;
vii. A backup overflow pond was constructed within the confines of the existing sewer pump station;
viii. Valves and pipework in the pump station was upgraded during August and September 2022;

6.3. Gqeberha, Eastern Cape

In Gqeberha community activists from the Water Crisis Committee tested water in a few selected areas. The tests were done in Bloemendal at the Groenberg dam, a water source used by a small informal community. The tests showed high levels of E. Coli and coliform. The representative of the Water Crisis Committee that conducted the tests mentioned feeling empowered by the tests but also concerned for the people who depend on the dam for drinking and cooking.

At the end of September, the Water Crisis Committee held a meeting in Gqeberha to map out the way forward and an action plan. There was agreement on the following plan of action:

- Continue with monthly tests.
- Issue a joint statement on the high levels of E. Coli and ask the municipality to test and issue a boil notice to the communities living close to the dam.
- Use community radio to create awareness on the state of the water.
- Have speak outs in different areas to build awareness and mobilise.
- If the municipality does not respond, plan a protest at the municipal offices.

6.4. Winburg, Free State

WaterCAN tested tap water in Winburg and found high levels of coliform. This information was immediately shared with the local municipality. The municipality acted swiftly and issued a boil water notice as can be seen in Table 2 above. It will be useful to follow up on the actions that were subsequently taken to ensure that the water is clean as well as plans for ongoing monitoring and testing by the municipality.

6.5. Florida Lake, Gauteng

A group aligned to Canoeing South Africa tested the water in Florida Lake, Gauteng and found high levels of E. Coli and coliform in the water. The first response from City Parks was for the group to send tests to a laboratory – this after they were the ones to alert government in the first instance. WaterCAN advised that either City Parks or the local municipality should in fact test as per requirement of their roles and responsibilities.

Once again it was a case of being sent from pillar to post, but with a hopeful final outcome that included the following message from City Parks to Joburg Water:

> *As discussed telephonically, initial reports suggest there has been sewage pollution at Florida Lake impacting on the water quality. There are concerns regarding whether the current water quality status of the Lake supports the* ***Intended Use – Recreational/Sport*** *following the recent pollution event (s).*

Please facilitate the following:

a. *Investigation of possible/potential sewage ingress into Lake currently at the main inlets and*
b. *Collection of water samples (and analysis) at strategic points to ensure the water quality results are representative of the current water quality status of the Lake.*

This will be followed up in the coming weeks.

6.6. KZN Water Caucus

The water caucus in KZN involved a group of female scholars to test the water. The tests were done at the uMzimkhulu river in the Harry Gwala District. The chemical parameters were within necessary limits but once again the bacterial tests were positive for coliform in the water.

The coordinator Sibongile Munger, said “it took longer as it involved 13 girls as well. The beauty was in every minute of the process. The girls are so happy and will be coming together to analyse the results. Tackling science comes naturally to them. I must admit that they are much better than me.”

The key outcome was not only the results that showed high levels of coliform bacteria but also the fact that the tests involved school learners who were not only interested in the environment but also working with science.

The Water Caucus will issue a combined statement of the different groups that were involved in testing. This group requested more kits to test Hlokozi and Bulwer areas.

Figure 12: Photograph of the Water Caucus group walking to the testing site in KZN

7. CONCLUSION AND WAY FORWARD

South Africans don't know what they are drinking, and we don't know what the quality of our natural water resources are. It is for this reason that WaterCAN embarked on a citizen science process that empowers communities to monitor water quality on an affordable and sustainable basis.

To test this process, WaterCAN embarked on a week of testing the quality of our drinking water from 14-18 September 2022 across South Africa. This is an important task that was taken up by more than 100 people and citizen scientists throughout the country. The week launched the water quality testing project of WaterCAN with the medium to long term objective to not only build a network of citizen science activists to monitor and test water across South Africa but to also hold polluters accountable for the pollution of water sources.

Thanks to all the volunteers and groups that participated and will continue to participate, WaterCAN is one step closer to achieve our vision "*to help raise the level of civil society participation and action that seeks to ensure clean and safe water resources through democratising water quality information, for the ultimate purpose of holding authorities to account when standards and expected corrective actions are not being achieved.*"

The first round of results suggest that tap water in urban areas is generally safe to drink. Both the chemical tests and bacterial tests were mostly clear indicating safe drinking water. The water quality tests allow us to act and to go directly to the municipality. The examples mentioned above (like Winburg), is a success as the municipality was informed and acted immediately with a boil notice.

Tap water monitoring must become a priority in coming months as power cuts have impacted water treatment plants and reservoirs. As a result, there could be potential contamination of tap water. It would be useful for municipalities to test regularly and to keep people informed of their findings. Activist citizen scientists can then verify the findings. This will also help to build confidence in municipal water.

The raw water sources are in line with the findings in government's Green Drop and Blue Drop reports that suggest that the management of drinking water and wastewater is being affected by lack of skills, poor management, corruption and failing infrastructure. Another big concern for us is the lack of transparency, testing and action.

It can be argued that the sample size is small but this must be viewed as at least 100 testing points that are indicators of pollution across South Africa. The percentage of positive levels of E. Coli and coliform - 76% of the plates had E. Coli and/or coliform and 72% of all raw water sources were positive for total coliform – is an indication of a much bigger problem and challenge in the country.

The testing process and analysis of results highlights the need for a set of steps for people to follow when they do find something of concern in their test results. The following steps are suggested and have been compiled from the examples mentioned in the section above:

- Send results to the municipality and ask them to test immediately.
- Ask municipalities to share testing results publicly.
- If there are people using the water for drinking, they should be issued with a boil water notice, with clear actions to fix the problem.
- If there is no response from municipalities, groups and activists should issue press releases to make the issue a public one and to get media to investigate.
- In some areas, like Secunda where Sasol has been charged for polluting the Vaal, the utilities must go beyond and test for harmful chemicals in our drinking water and to make their findings public. South Africans need to trust the water that they are drinking.
- Build awareness and activism to hold all polluters accountable

Municipalities are sending people from pillar to post and to low level officials who cannot make the changes necessary. The DWS must play a stronger role to hold municipal managers accountable and responsible for engaging with citizen scientists. The DWS must also provide a point person for people to report the lack of action by the municipalities. The small number of activist citizen scientists have proven that continued pressure forces municipalities to respond.

In areas where access to water is being challenged, each district or municipality must clearly and publicly explain how it will ensure water for its communities. The plan to dig boreholes, use water tanks and other short-term plans should be shared. Water being provided by boreholes and tankers must also be regularly tested. Local government must also consult people and develop medium- and long-term plans that could include reducing water flow, creating a stepped tariff for water users, building networks of volunteer engineers, and working with citizen science groups and activists to help monitor water resources.

WaterCAN is working on creating an easier portal to upload results, and is working on a strategy to make testing sustainable and a continued action to build data that can give a picture of the state of our drinking water. This is only the beginning of our path to monitor and track the quality of our water supplies from taps, rivers, boreholes. As WaterCAN, we want to expand this project so that we have thousands of people regularly testing our water. And where there are concerns, we need to act fast and use our activism to hold those responsible accountable.

It is time for people to better monitor our water, as the government is failing to do so. As a network, we need to continue demanding that our water is tested, results made public and where this is not happening, activist citizen scientists, organisations and residents must think

of class action cases to hold municipal managers personally criminally responsible for the failing water system.

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Annexure

Chemical parameter here

Bacterial parameter here