







# Scientists: Agents of Change

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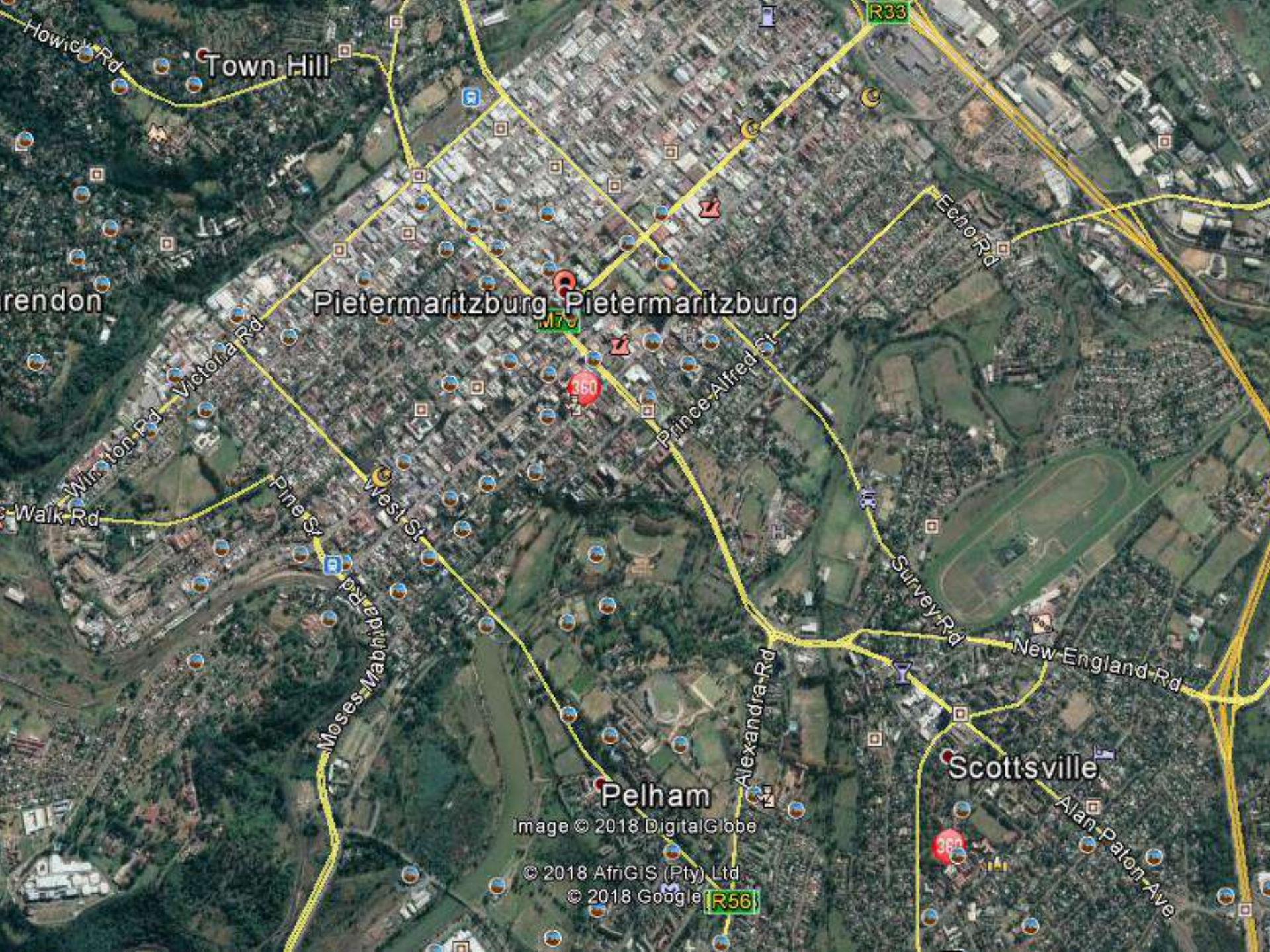
# Water use uMngeni – some basics

- Mean annual runoff – 1 billion cubic metres
- Dam storage – 1 billion cubic metres
- Soil storage potential – 1.6 billion cubic metres
- Domestic & industrial use – 400 million cubic metres (4.5 million people)
  - Non-revenue water – 40% plus
  - Sewage – 20% not reaching WWTPs
  - WWTPs not effective
- Commercial forestry – 64 million cubic metres
- Agricultural irrigation – 58 million cubic metres
- Little to no groundwater exploitation

# Three distinct and linked issues

- Rural land degradation and conversion - agricultural
- Urban waste management
- Non-revenue water





Town Hill

Pietermaritzburg Pietermaritzburg

Pelham

Scottsville

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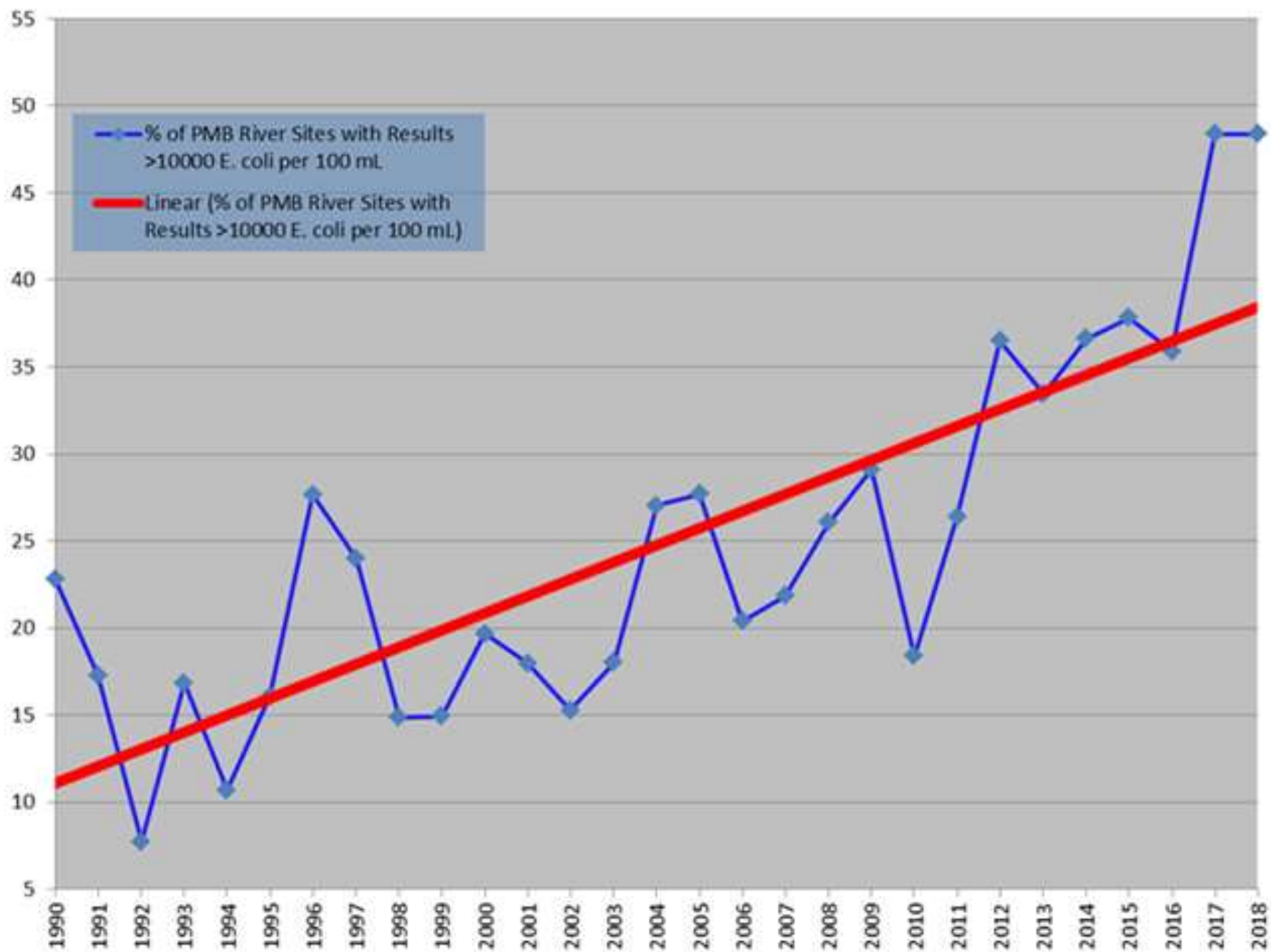
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**% of PMB River Sites with Results >10000 *E. coli* per 100 mL**



**We are drowning in shit, we are drowning in the scale of the problem, and we are drowning in complexity. So, as scientists, what can we do?**

***“Lloyds are not interested in publications, it is interested in impact”.***

**Chad Staddon**

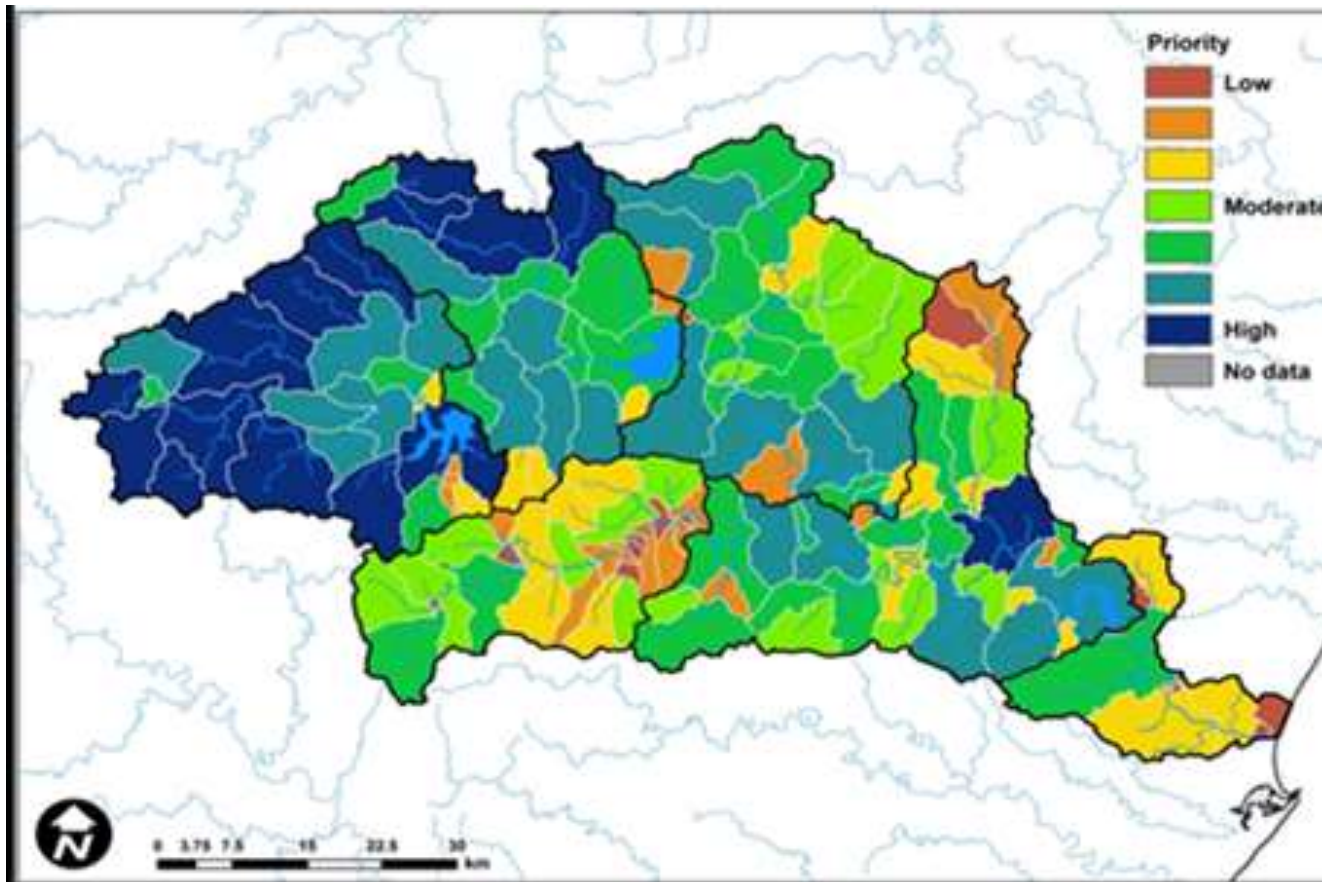


# Conceptualise and theorise

- Social-ecological systems
- Common property resources
- Property rights
- Governance models



# Apply



(a) Priority catchments to **maintain natural vegetation** to maintain streamflow, dry season base-flow and sediment retention

# What is the return?

- Reduce sediment loads by 1 million tons/year
- increase water supply by 7.2 million m<sup>3</sup>/year)
- increase base-flow by 1.65 million m<sup>3</sup>/year).

# Measure and monitor



# Activate, advocate and communicate

NATURAL WITNESS (NOVEMBER 23, 2016)



Despite the fact that 60% of last year's Dusk Canoe Marathon paddlers fell ill, that many paddlers took antibiotics as a prophylaxis before they paddled, and that recently some paddlers from a local school were hospitalised with an unusual viral infection that originated in one of our rivers or dams, the canoeing administrators are promoting Camps Drift as the venue for next year's World Sprint Canoe Championships.  
PHOTO: JONATHAN BURTON

## PADDLING IN POO

We may be risk-takers but using a river that could kill you is just crazy

DUNCAN HAY

I HAVE always thought that runners are a little crazy and paddlers are far more sensible — why brave Pietermaritzburg's delinquent drivers when one can meander safely down the Mousdun and Umgeni rivers? The Midlands canoeing fraternity appears to be a particularly sensible and well-organised bunch — I am a friend and colleague of many and even related to a few. Many hold down business, professional and academic leadership positions, keep fit and get out into and enjoy natural areas. They are also the originators and supporters of such noble causes as Dusk and highly successful development programmes that have transformed canoeing.

But recently I have had reason to call into question the wisdom of the canoeing administrators, the recreational, development and professional paddlers, the parents of school-going paddlers, the coaches of these paddlers and the pupils themselves, in fact, the entire Midlands paddling community.

Why do I say this? I present as evidence this graph courtesy of Umgeni Water. What it shows is the steady deterioration in water quality in the Mousdun River over the past 18 years. The second piece of evidence I present is a quote from the Umgeni

Water scientist who compiled this graph. He refers to water quality at the Drift this week — anyone using the water there for recreation is at potentially significant risk if they have too much direct contact.

All this is common knowledge and the cause is common knowledge — a steadily deteriorating sewer and stormwater system. Actually, this is a symptom of a broader management failure within local government. It is also common knowledge that these concentrations of *E. coli* and associated gastro-intestinal pathogens make you ill, very ill. As an aside, there was a rather ironic celebration recently when concentrations of *E. coli* that exceed one million per 10 ml of water were detected in the Bayviewmat, which flows through Willowton into the Mousdun. A mouthful of that will make you very ill. It might even kill you.

I understand that following this year's Dusk, about 60% of the field fell ill, that many of the paddlers who did not get sick took antibiotics as a prophylaxis before they paddled, and that recently some paddlers from a prestigious local school were hospitalised with an unusual viral infection which originated in one of our rivers or dams. Despite this, the canoeing administrators are promoting Camps Drift as the venue for next year's World Sprint

Canoe Championships. And our sharpest legal, financial, science, business, agricultural and student minds happily dice, race and train on the river, and parents and coaches are quite happy to let pupils loose on and in the system. We know that South Africans are risk-takers but this is just plain crazy. That regulators allow any recreational use of the Mousdun at all renders them complicit in this craziness.

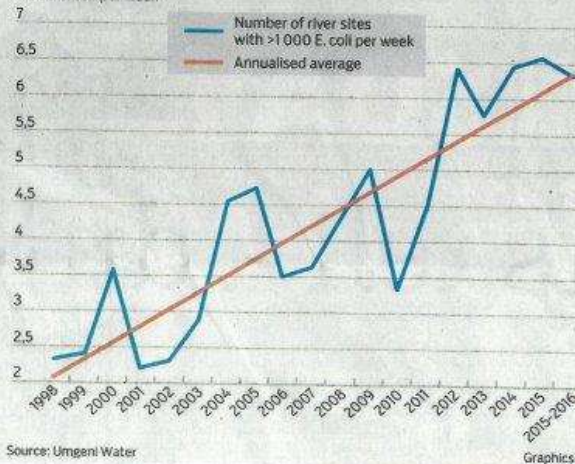
But what for me is the greatest concern is that this situation is apparently contained. I know that the Dusk gang, the Pietermaritzburg Chamber of Commerce and some administrators are working valiantly behind the scenes to influence decision-makers but, apart from that, I see nothing, no public outrage, no rejection of the situation, no toy-toting, no legal action, just passive acceptance and feigned ignorance. This is not the behaviour I would associate with intelligent and engaged people with a vested interest in preserving their sport and recreational interests.

There is a bottom-line here — quiet diplomacy will only get you so far. The time has come to mobilise, to take to the streets, to dump a few broken canoes on the steps of the city hall, to speak truth to power, to act.

Duncan Hay is executive director of the Institute of Natural Resources.

### Number of PMB river sites with *E. coli*

Average number of sites with >1000 *E. coli* per week



# Crossing the Rubicon

The Department of Water and Sanitation has released a brilliant plan for the future. But will it be implemented?

DUNCAN HAY

**C**CROSSING the Rubicon takes us back to Roman times. In 49 BC, Julius Caesar crossed the Rubicon River which led to the Roman Civil War, Caesar becoming dictator for life and the rise of the Roman Empire.

Excuse the pun, but has our much-maligned national Department of Water and Sanitation (DWS) found its own river to cross and will it lead us to drowning or redemption?

DWS has just released a draft of its National Water and Sanitation Masterplan for comment. It is brilliant and, like many brilliant things, it is flawed. I encourage you to download the "Call to Action" off the DWS website.

Why and how is it brilliant? First and foremost it is a well-written, logical and non-technical document — we can all understand it. Second, it candidly and honestly acknowledges that there is an approaching crisis in water-resource management in South Africa.

It has got past the Gupta refrain of deny, deny, deny. It is emphatic that if we don't address this water-insecurity crisis effectively we are all in trouble. Third, I get the sense that, on paper at least, DWS has turned a corner. Only time will tell if this is real or simply a naïve feel-good fantasy.

The document starts with some sobering statistics: 8.2 million people in South Africa still do not have access to safe drinking water; 14.1 million people do not have access to safe sanitation; 37% of households do not have access to a reliable water service; 41% of municipal water is not paid for; and 35% of municipal water is lost through leakage. On this basis I suggest to DWS that it is not an approaching crisis; the crisis has arrived.

As it relates to domestic water consumption, I discovered that the global average use is about 170 litres per person per day and yet we, in a water-scarce country, are using on average 230 litres per person per day. So, if in your home you are using more than 5 500 litres per resident per month, you are using too much. It is time to conserve.

There is a fundamental recognition that water, particularly water for agricultural irrigation, is too cheap and that the price does not reflect its true value. Also, the department recognises that everyone except indigent households must pay for water services. Increasing the price and securing revenue will provide the vital funding streams for reinvestment in infrastructure development and maintenance, and water conservation measures.

Speaking of conservation, the department at last recognises fully the critical role that nature plays in con-



The uMgeni River: Investing in its ecological integrity is essential if we wish to secure our water resources.

PHOTO: SUPPLIED

serving and supplying us with water; that water does not come from a tap and that a dam is only a storage system for water that has already been "made". In order for nature to sustain this role, we need to invest, particularly in the conservation of our critical water resource systems: our rivers and streams, indigenous grasslands and wetland water factories.

There is an admission that regulations have not been enforced and that, in future, the big polluters and the stolen of water will be prosecuted. Here DWS specifically includes municipalities, often our most delinquent

culprits. While I agree that we need to get tough and bold leadership to account, I am not sure that dragging a municipal manager or mayor into court will achieve anything except clog the courts even further and waste taxpayers' money. Perhaps, if some personal liability is attached, it could have a fairly significant impact.

But, perhaps the most telling comment comes in the detailed master plan — "you cannot drink paper plans". This is a clear admission that over the years the department has generated a plethora of policies and plans that are excellent but that have, for the most part,

remained on the shelf, unimplemented.

So the plan is brilliant but why is it flawed? First and foremost it does not account for the current state of the department itself and its ability to lead the charge. To use a personal analogy, it is a bit like me planning to run Comrades this year. The expertise and experience are all at hand and the planning is simple. But this body, battered by the excesses of life, is unable to comply. The department has to start by getting itself onto a strict diet and training regime so that it can implement its ambitious plan. If it does not, it will fail to make the distance in the required time and

we will relegate the plan to the level of idle bar room banter.

Second, the department persists in wanting to govern for the people rather than with the people. It speaks glibly of engaging with civil society and the private sector but it says very little about how this is going to happen. When responsibilities are apportioned we — Joe Public and Joe Business — are listed nowhere.

A classic example is desalination. It is expensive so let the private sector establish it and negotiate prices with water service authorities.

Then it costs the state and the tax-

payer nothing for infrastructure development.

Returning to our analogy, one can't train for and run Comrades on one's own. You need training friends, a supportive partner, a physio, running shoes, a cool watch and crowds on the side of the road cheering you on.

So, DWS, tell us how we can support you on this long and tough crossing of the Rubicon — or are we crossing the uMgeni?

Duncan Hay is an associate research fellow of UKZN and the executive director of the Institute of Natural Resources.

al Water  
network

# Duzi 'dirtiest in years'

## Leaking sewers blamed for deteriorating water quality

CHELSEA PIETERSE

WHILE the army has been called in to help clean the heavily polluted Vaal River, water quality in the dirty Duzi continues to deteriorate.

And while the Vaal River is seeing *E. coli* counts currently of 24 196 per 100 ml in the Vaal Barrage Reservoir area of over 50 kilometres, sampling on the Duzi reveals *E. coli* levels 10 times higher. (See graphic on Page 2)

Seeping sewers which aren't being fixed promptly have been partly blamed for the deteriorating water quality of the Duzi over the past two years.

A source within the water quality industry, who asked not to be named, said the City is taking much longer to fix leaking sewers and manholes than previously.

He said the water quality had deteriorated "significantly" recently.

"It's quite tragic and shocking," Shami Harichunder of Umgeni Water said water quality does vary naturally during the course of a year.

"However, Msunduzi

River quality over the past two years — 2017/18 — appears to have deteriorated when compared to previous years. This is evidenced in the outcomes of *E. coli* — or *Escherichia coli* — monitored as a general indicator at 18 sample sites throughout the Pietermaritzburg area."

Harichunder said notable elevation in *E. coli* results had been recorded in the Pietermaritzburg area of the Msunduzi River, both in terms of the number of sample sites recording above 10 000 *E. coli* per 100 ml, as well as the magnitude of the results.

"In 2017/18, the number of sample sites that recorded results greater than 10 000/ml amounted to 61. In 2016 this figure was 33."

But he said this was because in 2016 the entire Umgeni System catchment — of which the Msunduzi River is a component — had been in a state of water shortages caused by drought.



Tarek Farla (15) paddles up Camps Drift past litter in the water near the canoe club yesterday. PHOTO: IAN CARBUTT

PAGE 2:

• GRAPHIC: *E. coli* prevalence in Duzi

• Msunduzi to renew Duzi-Umgeni Conservation Trust contract

"In times of drought, river water quality is generally of a higher standard due to reduced volumes of run-off and consequently reduced presence of *E. coli* and other contaminants. In the first quarter of 2018 good rains led to increased run-off volumes in the Umgeni System catchments, including the Msunduzi River. Run-offs are generally accompanied by heightened levels of contaminants, including *E. coli*, resulting in deterioration of water quality."

Msunduzi River quality of 2017-18 can also be attributed to a number of other factors, including challenges relating to sewer and infrastructure in the city area and challenges associated with effluent quality from Darvill Wastewater Works, said Harichunder.

In January this year, out of the 16 river sites tested, 10 of the rivers' *E. coli* results came back higher than 10 000 (10 000 *E. coli* particles per 100 ml of water). On October 10 this year, 13 of the 16 sites were recorded as having *E. coli* levels above 10 000 per 100 ml of water.

The water quality of the Duzi is tested throughout the year. This year so far, the tests have shown that just over 59% of the times the Duzi and its tributaries were tested, the levels were above the 10 000 particle level.

Harichunder said one particular problem area is upstream of Darvill sewage works as a result of inputs from the Baynespruit stream.

He said the stream is experiencing a high level of pollution.

However, it is not all bad news for the water quality of the Duzi.

Harichunder said proactive measures are "continuously implemented to manage water quality risks in the river."

"Water quality data and other information are provided to various stakeholders, including the Department of Water and Sanitation and local and district municipalities."

"In a proactive move, Umgeni Water has begun preparations to undertake additional river and dam monitoring in the period preceding the 2019 Dusi Canoe Marathon."

"Monitoring will be increased from weekly to twice weekly and then even daily just before and during the marathon at key river and dam sample points, including upper Msunduzi, Camps Drift, downstream of the Baynespruit and Darvill waste water works, Eddie Hagan and Inanda Dam."

"Data will be provided to regulators, municipalities and other key stakeholders to assist with identification, resolution and management of problems that may pose challenges to recreational fitness for use. However, in the weeks ahead, water quality is expected to further improve through the predicted

good rains in December 2018-January-February 2019 and dilution through water releases from Henley Dam."

Harichunder said Umgeni Water has begun preparations to undertake additional river and dam monitoring in the period preceding the 2019 Dusi Canoe Marathon.

Harichunder added that the Darvill sewage works is being upgraded in a R950 million expansion project.

He said the upgrade will take the treatment capacity from 60Mld (megalitres per day) to 100Mld.

"After construction, the intention is to achieve compliance of 90%, in line with requirements for Green Drop certification (excellence in wastewater treatment plant operation)."

He said "significant work" is being done to make sure the plant operates smoothly during the upgrade process.

The Msunduzi Municipality had not responded to media queries.

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## Duzi now 'a health hazard'

LOCAL canoeist Steve Curry said he had been paddling on the Duzi for the past 30 years, however, he said the water quality over the last two years was the worst he had experienced.

Curry said he has to be extra careful getting in and out of the water and tries to keep water from splashing on to him while paddling.

"My daughter is 15 and she is doing the Dusi with me next year but I am terrified she is going to get sick and never want to compete again," said Curry. "The water quality has been immeasurably better in previous years. If things continue as they are, I fear there could be a cholera outbreak or some ecological disaster."

"People still cannot believe that we still take part in the Dusi, but it is becoming a bit of a health risk."

Almost three weeks ago, the Camps Drift to Bishopstowe Canoe Race, one of the Dusi seeding races, was held.

Curry said he pulled out of that race purely because of how bad the water quality was.

"A friend's son took part in the race and he has been very sick ever since."

Curry said the pollution of the river could all be prevented if leaks and blockages were fixed on time and if people paid more attention, which

**“If things continue as they are ... there could be a cholera outbreak or some ecological disaster.”**

"they choose not to do."

Mearwhile, The Witness reported on a massive sewer leak pouring into the Duzi at Camps Drift last week.

Msunduzi municipal spokesperson Ntobeko Ngoboko said on Thursday last week

that the water and sanitation unit was aware of the sewer leak in Camps Drift and "they are attending to it."

Another local paddler, Gavin Dundas-Starr, said he had walked by the leak on Saturday morning and it was still "flooding out at full force."

— Witness Reporter.

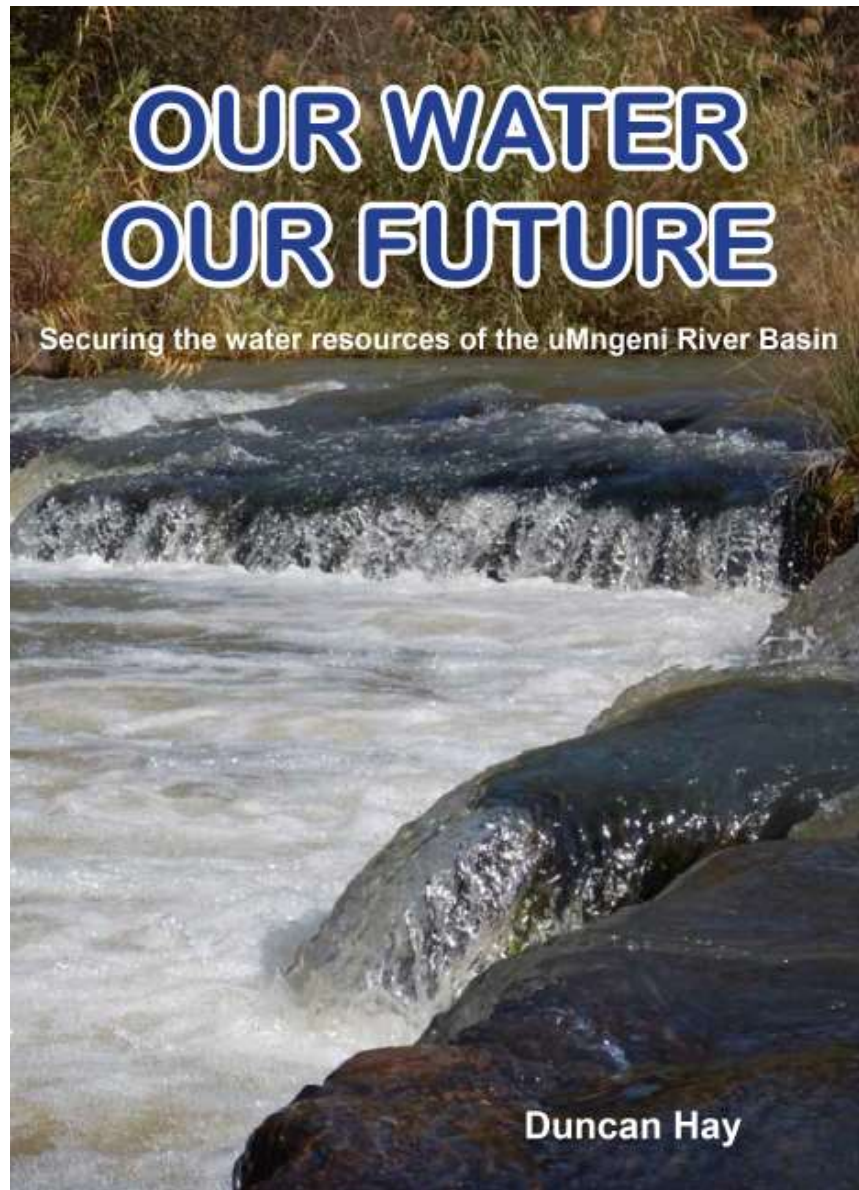
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# Inform and educate



# Develop capacity



# Question and provoke

- A little bit about water pricing
  - Valpré - ₹ 150 000 per cubic metre
  - Retail - ₹ 100 per cubic metre
  - Wholesale - ₹ 30 per cubic metre
  - Raw - ₹ 0.0815 per cubic metre

# Innovate and Influence

- Umgeni Water (our local water utility)
  - catchment management charge as part of a tariff
- Establishment of a Water Fund

# Leverage investment

- IWSN
- Department of Environment Affairs
- SANBI
- Water Research Commission
- Internal streams



# Integrate and coordinate

- uMngeni Ecological Infrastructure Partnership
- 24 Organisations
- 5 years old



- **We need to create the world we want to see**

**We need to start in our own homes and our own organisations**

**We need to go to scale**



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For more information, see: [www.lrfoundation.org.uk](http://www.lrfoundation.org.uk)

