

Are Gauteng's water troubles due to the drought?

Large parts of South Africa are currently gripped in a drought. In Gauteng we have been aware of the drought for some time due to below average rainfall last season and from what we see happening in the rest of the country. But, now all of a sudden we are also being impacted. We read in the press that the Department of Water and Sanitation has instructed the three Gauteng metros (Johannesburg, Tshwane and Ekurhuleni) to reduce water consumption by 15% and thus we had water restrictions instituted. We read in the press about phase two of the Lesotho Highlands Scheme being accelerated and even expanded – to make sure that Gauteng doesn't run out of water in the next 10 years. Yesterday, parts of Johannesburg experienced “water throttling” – when the water pressure is deliberately reduced to reduce the flow of water thereby indirectly causing reduced consumption. Apparently water throttling is on its way to Pretoria as well. This week on eNCA we saw the new mayor of Tshwane, Solly Msimanga, threatening fines of up to R20 000 for people guilty of transgressing the water restrictions. And then of course there is talk of water shedding...The general public mood around all of this is: yes we need to save water because there is this drought, you know? But what if the problem is not really the drought? What if there are other factors impacting far more heavily on our water resources than the drought?

When we talk about a drought there are two key parameters measuring its severity that we have to understand. The first parameter, is a measure of how little it rains during a given year. This is normally expressed as a certain percentage below the average annual rainfall for an area. Thus if Pretoria experiences 425 mm of rain in a year, we can say it is experiencing a mild drought as that is more than 25% below the annual average. A severe drought would feature a significantly higher percentage below the average. The second parameter concerns the period of time for which the drought persists. Clearly two or more years of low rainfall, constitutes a more severe drought than one year of low rainfall.

In South Africa, we have detailed rainfall statistics that go back to 1904. These statistics tell us that although there are wide fluctuations in annual rainfall, longer periods of persistent, low rainfall are more rare. For example, the year 2015 (January to December) recorded the lowest annual rainfall (403 mm) since 1904, but the driest period yet recorded is the four year period of 1930 to 1933. We have some way to go before we can speak of the current drought as one of the worst ever.

A single year of low rainfall in a specific area may cause what is termed “*an agricultural drought*” in that area. Low soil moisture will reduce crops (or even lead to complete crop failure) and will reduce fodder and grazing for animals. Due to the low rainfall of 2015 large areas of the country are currently experiencing an agricultural drought.

The rainfall statistics are invaluable as they assist water engineers to design reliable water supply systems. When water engineers design a water supply system that will supply water for domestic consumption (i.e. households), the design standard used is a “*98% assurance of supply*”. This means that over any 100-year period, the water supply system will be expected to deliver the design quantities of water in 98 of those years. Thus, one would only expect reduced water supply once in every 50 years – this has given rise to the term “*a 1-in-50 year drought*”. This highly conservative design standard is intended to reduce the vulnerability of domestic communities to drought. Much lower design standards are used for agricultural and industrial water supply systems. For agricultural systems, a 90% assurance of supply is used. This means that one would expect reduced water availability once in every 10 years, giving rise to the term: “*a 1-in-10 year drought*”

In any given area, a drought that will threaten failure of surface water supplies and thus any domestic water supply systems reliant on it, is termed a “*hydrological drought*”. A hydrological drought can be caused by two factors: (i) a 1-in-50 year drought or (ii) high water use. In this context, high water use means persistent consumption above the design level of the supply system.

As far back as the early 1980’s it was recognised that continuous (population) growth and increased consumption of water in Gauteng would inevitably lead to persistent hydrological drought. This was due to the fact that water consumption was projected to outstrip the 98% assurance of supply design level of the Vaal dam and various sub-supply systems. To counter this threat, authorities took two key steps. Firstly, the Lesotho Highlands Scheme was conceived, contracted and constructed. This increased the 98% assurance of supply volume to Gauteng significantly. Secondly, steps were taken to increase the utilisation of purified effluent for domestic water supply. This second step was a natural progression from the increased consumption of water. Purified effluent would flow into natural watercourses and would boost the 98% assurance of supply levels of any dams built in those watercourses. Thus today, more than 10% of the water in the Vaal River (at the Barrage) is (purified) effluent. Similarly, other dams in Gauteng such as Rietvlei -, Roodeplaat - and Hartebeespoort Dam all feature significant (30%+) volumes of effluent in their natural inflows and

thus significant increases in their 98% assurance of supply levels. The upshot of all of this, is that Gauteng boasts a reliable water supply with an assurance of supply of more than 98%. It should take a drought like nothing yet experienced since 1904 to threaten our water supply. Is that what we are facing at the moment? No, not even close! What is the problem then?

The problem lies in the second factor listed above, that can cause a hydrological drought: high water use. In Gauteng, over the past ten years and more we have been using far more water than what we should have used. Or let me rephrase this: we have been shamefully wasting water! Our three metros, through poor operations and maintenance practice have allowed their water reticulation systems to deteriorate to the point where significant quantities of water are lost through leaks. Data on this is fairly sketchy. This week on eNCA, Tshwane mayor Solly Msimanga quoted a figure of 20%. I believe he is misinformed. He should rather have stated: 20% above acceptable norms. As I stated, data on this is sketchy, but what little analysis have been done indicates that for the three metros combined, this figure runs somewhere between 40% and 50% and even beyond. If we deduct 20% as an (absolute maximum) acceptable norm, you get the 20%+ above acceptable norms that mayor Msimanga should have referred to.

Whatever the true figure for this wastage, this is a shocking state of affairs in a dry and arid country such as ours. I think criminal is a better way of summing it up.... But unfortunately, that is not all. Apart from the significant volume of water that is simply wasted daily through leakages, another significant volume of water is lost through another form of wastage. I call this additional wastage “*over-consumption*”. To understand over-consumption, we have to delve a little into the theory of economics – more specifically the theory of economics that links the demand for any commodity to its price. Economic theory states that as the price of a commodity declines, demand for it will increase and *vice versa*. This theory also applies to consumption of commodities such as electricity and water. We have seen and experienced in recent years the dramatic decline in the consumption of electricity as its price rapidly increased.

What is the problem with water in Gauteng? There are many areas in all three of the Gauteng metros where the water consumption of households is not measured and/or where they are not billed for their water consumption. Economic theory tells us that under these conditions those households will consume significantly more water....and they do! Remember, if you are not measured or billed the price is zero. In these areas, water is wasted in huge quantities simply because it is free. Would you bother

to spend money to fix a leaking tap or cistern if the water was free? Enough said. This elevated consumption through the wastage of water defines my term: over-consumption. Also note that emergency measures instituted by authorities to reduce water consumption, such as water restrictions, have no impact on over-consumption.

The responsible authorities have been aware of this situation for more than a decade. Even more incriminating is the fact that they have known that the situation is steadily deteriorating. Given the situation sketched above it doesn't take a rocket scientist to work out that sooner rather than later, our water supply in Gauteng was going to hit the proverbial brick wall – and it has nothing to do with drought. And yet, they have consciously elected to do nothing, absolutely nothing. Why not? I cannot answer this question because it simply defies logic. But, it doesn't take a rocket scientist either to work out that trying to deal with over-consumption was never going to be politically expedient. No, far better to spend R40 billion on phase two of the Lesotho Highlands Scheme when the time comes. In fact, why not expand the scheme and spend even more?

Who are the responsible authorities that we have to thank for this situation? They are the previous three mayors of the metros: Parks Tau, Kgosientso Ramokgopa ([who featured in a previous article](#)) and Mondli Gungubele as well as their predecessors. For his sins, Parks Tau has recently been made the chairperson of SALGA. There are rumours that Ramokgopa are destined for even higher office. I feel sorry for and sympathise with Herman Mashaba and Solly Msimanga, the new mayors of Johannesburg and Tshwane. They have inherited this mess and the only way to sort it out, would be by making the tough political decisions that their predecessors did not have the guts for.

But ultimately, the buck stops with the minister of Water and Sanitation: Nomvula Mokonyane. The core brief of her ministry is simply to regulate and protect our country's scarcest and most valuable resource: our water. What has the department done during the past ten years to stop this irresponsible wastage? Nothing that is worth holding your breath for. I am sure if questioned on this, the department will point to all sorts of activities, discussions and wringing of hands. But at the end of the day, all of that really amounted to nothing meaningful. It is highly likely that the combined effect of wastage through leakages and over-consumption is substantially more than 50% of the total water consumed by the three metros in Gauteng. This puts the department's recent instruction to the same three metros to cut consumption by 15% into stark perspective.

Against this background, I believe any (legal) action against individuals failing to uphold the water restrictions, will be on shaky ground. This is for the simple reason that in these three metros we are not dealing with a major drought. Rather, we are dealing with bureaucratic bungling of epic proportions. It would have been laughable, if it wasn't so tragic and criminal.