TECHNICAL BRIEF

**November 2017**
The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

# Quantification of drought shocks in SA industries – Agriculture

*In South Africa, drought is an important phenomenon that affects not only agricultural production, but also society. It is a recurring incident, with spatial and temporal characteristics that vary significantly from one region to another. Agriculture is a core component of the South African economy. It is also a sector that has experienced many droughts in the past. A recently-concluded Water Research Commission (WRC) short-term study investigated the economic impact of the latest drought on South Africa's main economic sectors by studying the available literature. The study found that although there is literature regarding the production decreases in agriculture as a result of drought, there is less information regarding the indirect impacts of drought on the country. The study also found knowledge gaps regarding the differential impacts of drought on subsistence farmers relative to commercial farmers. The study concludes with the recommendation that more is required to understand how repetitive droughts might shift the character of local, rural economies in South Africa.*

## Background and motivation for the study

Agriculture is a critical sector to South Africa's economy for food, employment and foreign exchange. The agricultural sector contributes 3% to national GDP and 7% to formal employment.

An estimated 8.5 million people are either directly or indirectly dependent on agriculture for employment and income. These statistics, however, hide the local, rural importance of the sector to communities.

The agricultural sector is made up of commercial farmers and subsistence farmers. These sectors experience drought risks differently. According to Statistics South Africa's Labour Force Survey (2000-2007), over six million households engage in smallholder agricultural activities. Over two million of these are females and state that the main reason for their participation in this form of agriculture is for obtaining extra food.

This group has a fundamentally different risk profile and response to the commercial farming sector that underpins that national food security of South Africa. Many of our farmers are also rain-fed.

Therefore, with the projected increased in climate intensity as a result of climate change, these farmers are especially at risk. There is a need to better understand what the impact of a shifting, mostly drying climate is on our rural economies that are so reliant on agriculture. Furthermore, there is a need to understand, as farmers shift to irrigation, what the competition for water will look like between and among different users and sectors.

The agricultural sector is the biggest user of water in South Africa. Agriculture accounts for 60% of water demand, followed by the municipal sector (27%), power generation (4.3%), mining (3.3%), and industrial demand (+/-3%).

The main driver of agricultural water demand comes from the 1,6 million hectares of land equipped for irrigation. According to the National Water Resource Strategy, water is the major limiting factor in the growth of this sector and poor water quality has a negative impact on agricultural exports and associated foreign income.

## Effect of drought on the agricultural sector

The WRC study focused specifically on the effect of drought on the maize, sugar and cattle agricultural sub-sectors. The study highlighted the following aspects with regards to the impact of drought on these sectors:

- In a normal (non-drought) year, South Africa is self-sufficient in its maize production, and exports excess maize. During the recent drought, however, South Africa moved from being a net exporter of maize to a net importer of maize. For instance, Grain SA – using the market price method – estimated that South Africa would need to import an unprecedented 3.8 million tons of maize in the 2016/17 season at a cost of approximately R3 800 per ton between May 2016 and April 2017.
- The Crops Estimates Committee (CEC) estimated that the area of maize planted for the 2016/17 season was likely to be around 2 million hectares, 25% lower than the area planted in the 2015/16 season (AgriSA, 2016).
- Cane production decreased in all cane growing areas and estimates of sugarcane production were estimated to decline from an annual norm of 19 million tons to 14 million tons. Further the South African Cane Growers Association estimated that more than 6 500 seasonal jobs would be lost because of decreased cane production.

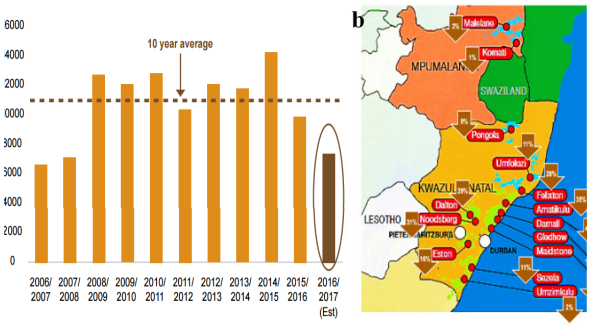


*Figure 1. (a) Maize crop harvested; (b) Changes in sugar cane production (2014/15 to 2015/16) in growing regions (Agri SA, 2016).*

The study also offers information on the impact of the drought on the livestock sector:

- The livestock sector is the largest contributor to total agricultural gross domestic product accounting for about 48% of South Africa's agricultural output in terms of value (GCIS, 2015). Further, cattle and calves slaughtered contribute about 9.7% to the total gross value of agricultural production. The sector supports about 500 000 jobs, with milk producers employing some 60 000 farmworkers and providing 40 000 indirect jobs within the milk processing value chain.
- In the livestock sector, drought resulted in natural grazing areas becoming seriously depleted leading to the forced slaughtering of livestock, and livestock deaths due to fodder unavailability. Increases in red meat slaughter rates of 23% (cattle), 37% (sheep) and 12% (pigs) were reported for November 2015 to December 2015.
- An estimated 40 000 cattle died in Kwazulu Natal in 2015.
- A slow increase on a year-to-year basis in the standing stock show that the national herd is slowly increasing. A sharp increase in the standing stock (as is evident in the figure below) from the year 2014 to 2015 may be an indication of a shock in the market such as drought, that causes primary producers to sell more of their animals to the feedlot. In 2015 there were on average 30% more cattle in feedlots at any given time than during 2014 per month. The large number of cattle that was fed during 2015 in comparison with 2014 shows that very little replacement stock was kept on farms. Farmers thus desperately decreased their herd size to survive the drought.

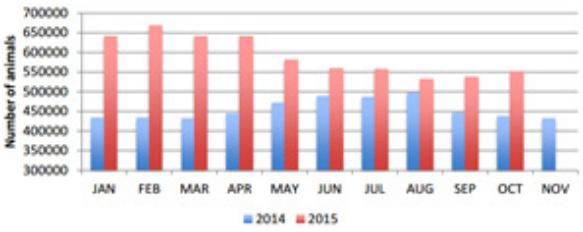


*Figure 3. Monthly cattle feedlot standing stock in South Africa.*

There is a ripple effect through the economy as a result of agriculture suffering a drought. For instance, the South African Agricultural Machinery Association reported that due to the drought, yearly tractor sales were down 11% and sales of combine harvesters declined by 30% as at January 2016.

Producers of seeds reported severe increases in unsold maize seed stocks that will not be fit for resale in the next production season. Maré and Willemse (2016) established

that the cost of the basic food basket was likely to increase by 30%. This increases the burden on consumers, as unemployment and inflation are at the highest level, which makes people with limited resources more vulnerable to food insecurity.

The maize industry stimulates the economy directly by providing secondary industries with over R1.5 billion worth of business each year. White maize is important for human consumption while yellow maize is mostly used for animal feeds.

South Africa is the largest producer of maize on the African continent and, in a normal production season, 40% of maize produced in South Africa is traded in the Southern African Development Community (SADC) region. Therefore, a drought in South Africa also affects the region of SADC more broadly.

**A window into the life of a small-scale maize farmer**

I am a small scale maize farmer, who had 0.25 ha of land in 2011 and 0.5 ha of land in 2016, 3 employees in 2011 and 2 employees in 2016. I used 1 bag of manure in 2011 and 1.5 bags of manure in 2016, and had an output of 3 (50 kg) bags of maize in 2011 and 5 (50 kg) bags of maize in 2016.

As a result, my white maize output decreased by 2 bags per hectare, consistent with my expectation of the drought.

As a result of the dams drying up and reduced river water levels, irrigation water was not enough, leading to the maize crop being burnt. As a short-term response, I joined with others and volunteered to dig up furrows to bring water to the dams. Because of the drought there was livestock encroachment into maize fields and this led to conflicts. Fences around maize fields were reported stolen. In response, the farmers as a group discussed these problems with livestock owners and almost took the issue to court. However, it was possible to find out of court resolutions.

The drought has been very difficult. In the future, it would be easier if we could: (i) expand the storage capacity of existing dams, (ii) build more dams and boreholes, (iii) conserve water especially when irrigating. To be specific, farmers should be compelled to irrigate for not more than three hours per day.

## Conclusions

Droughts are not new to the agricultural sector of South Africa. Neither are they going to stop or get smaller. According to the National Water Resources Strategy, South Africa has low levels of rainfall relative to the world average, with high variability and high levels of evaporation due to the hot climate, and increasing challenges from water pollution.

With this variable and stressed climate, the agricultural sector has often had to deal with water shortages. As a result, there is significant literature in South Africa regarding the impact of drought on agriculture. However, there is less literature on the downstream effects of this drought on the broader economy of the country.

There is also less understanding on what the possible scenarios are for agriculture under a shifting climate going forward. This is especially important for the rural economies that are wholly dependent upon agriculture.

South Africa's diverse climate in addition to substantial water infrastructure provide some form of hedging against climate impacts in South Africa. South Africa is home to a series of diverse hydro-climatic zones that result in droughts impacting the country at different times or intensities.

This provides a form of hedging. For example, while the northern parts of the country experience drought, the southern parts of the country, driven by different rainfall and climate regimes, do not experience the same drought. In addition, water infrastructure in South Africa, provides an additional level of security for irrigation farmers.

Those that practice rainfed agriculture are especially at risk of variable and erratic rainfall patterns.

We critically need to better understand the following aspects of agriculture and drought to ensure that our future risks can be mitigated:

- How does drought impact agriculture indirectly (we have a good understanding of indirect impacts)?
- How does drought impact upon the agricultural economy? It is critical that we understand this from a hydro-climatic zone aspect, so that we can make climate-appropriate decisions regarding action.
- How does drought impact upon the rural economy? Many national-level studies hide the fact that urban centres are protected in many ways from the impact of drought. Rural areas, deeply connected to the agricultural sector will experience drought impacts

differently. The same is also true for the relative impact of drought on commercial farmers vs. subsistence farmers.

## Recommendations

The study recommends a greater understanding of the impact of drought on the broader agricultural sector, and not only the changes in production. There is also a need to consider the nature of farming in South Africa going forward. Both in terms of climate, and also politics.
As a country that knows that drought is going to be its reality, particularly with the risk of climate change, it is critical that the necessary structures are put in place to support the diverse makeup of the South African agricultural sector.

**To order the report,**
*Impacts of drought induced water shortages in South Africa: Areas for future research,* **(Project No. K5/2604**) and *Impacts of drought induced water shortages in South Africa: Economic analysis* (**Project No. K5/2604**), contact Publications at
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