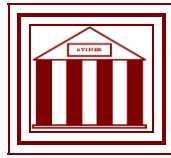


**Athens Institute for Education and Research  
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**The Status of Drought in the Winterveldt Area:  
A Case of Smallholder Farmers, South Africa**

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## **The Status of Drought in the Winterveldt Area: A Case of Smallholder Farmers, South Africa**

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Erika Van Den Heever**

### **Abstract**

South Africa is considered a semi-arid country vulnerable to water stress, particularly drought. In the previous 12 months, South Africa has experienced one of the worst droughts in history, where some provinces were declared disaster areas. During the last decade the frequency of natural disasters in the farming community in Winterveldt area increased significantly and the most common disaster was drought. The aim of this study is to identify sustainable solutions towards drought adaptation in Winterveldt area. The following objectives are identified: (a) To describe socio-economic characteristics of smallholder farmers in Winterveldt area (b) To describe the extent of drought impact on agricultural production in Winterveldt area. A representative sample of 31 productive farms participated in the study and they all fall under City of Tshwane Metropolitan. The purposive sampling method was used to select productive farms and to cover the uniform or homogeneous characteristics of farms. The sample frame was designed to meet the objectives of the study and to adhere to the statistical specifications for accuracy and representation. The questionnaire was administered to respondents. The study also used observations, current and past rainfall distribution maps as part of data collection. Data was coded, captured, and analyzed using SPSS. Descriptive and regression analyses were conducted. The results showed a bleak picture on drought impact in Winterveldt area where agricultural production has decreased significantly.

**Keywords:** Agricultural Production, Climate Change, Drought, Gauteng Province, Winterveldt.

**Acknowledgments:** Special thanks to the Gauteng Department of Agriculture and Rural Development for availing their affected smallholder farmers for the survey. The Agriculture Research Council-Institute for Soil, Climate and Water for the drought maps and the Agricultural Research Council-Vegetable and Ornamental Plants for funding the survey.

## **Introduction**

The previous El Nino, which faded in May 2016, brought widespread drought to Southern Africa, hitting crop production and fuelling inflation across the region while leaving millions in need of food aid. According to O'Brien (2017) millions of people in over a dozen countries in the Horn of Africa and Southern Africa are facing the peak effect of severe drought that hit the regions resulting in famine. O'Brien further discussed the crisis to the security council as the largest since the second world war in 1945, and an amount of \$4.4 billion is needed "to avert a catastrophe" in Somalia, South Sudan, Nigeria and Yemen in the Arabian Peninsula.

South Africa is considered a semi – arid country vulnerable to water stress, particularly drought (Hassan, 2013). In the previous 12 months, South Africa has experienced one of the worst droughts in history where some provinces were declared disaster areas. According to Poolman (2017) it has been predicted that the next summer has increased the likelihood for the development of El Niño, which are often associated with drought and water scarcity, a phenomenon that has been widely experienced in South Africa over the past two years.

According to Maponya and Mpandeli (2016) agriculture is one of the industries that has been hit the hardest by drought in South Africa. The researchers further indicated current and future drought estimates will have the most devastating impact on the agriculture industry because of the effects on the food production chain. The aim of the study was to identify sustainable solutions towards drought adaptation in Winterveldt area. The following objectives were identified: (a) To describe socio-economic characteristics of smallholder farmers in Winterveldt area (b) To describe the extend of drought impact on agricultural production in Winterveldt area.

## **Literature Review**

The most serious impact, other than dwindling water supplies, is the effect on staple crops and, ultimately, commercial crops. In 1992/1993, undoubtedly one of the most widespread droughts of the last 45 years, maize had to be imported to South Africa (as well as the rest of Southern Africa). The knock-on effect of crop failure could be seen in the population drift from rural areas into the cities, farm labour lay-offs and farm closures as well as an increasing indebtedness in the agricultural sector.

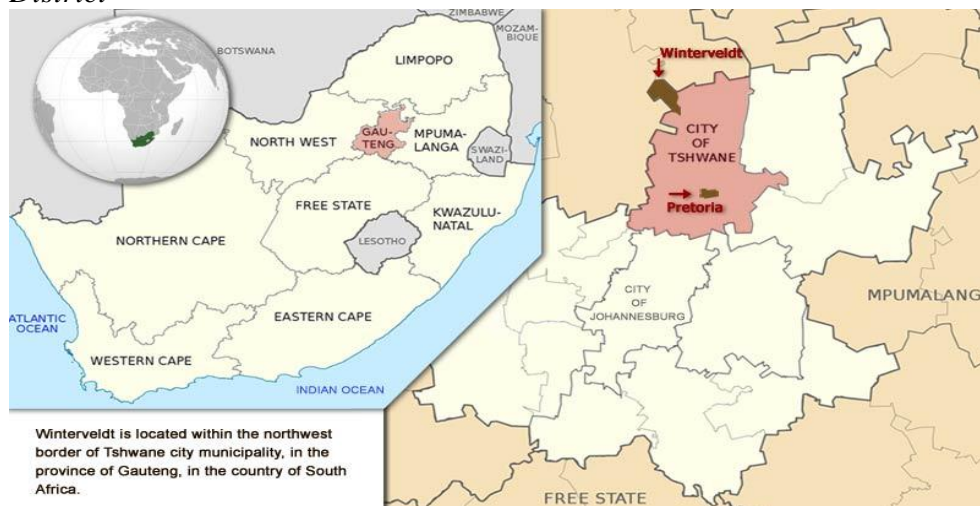
Literature has indicated that agriculture in rural areas of South Africa provides suitable options for smallholder farmers in terms of income generation (Maponya et al., 2014; Maponya et al., 2015). As a result, the National Development Plan of South Africa views smallholder farmers as a pathway to address poverty in rural areas. Therefore, it is important to exploit any opportunity availed by agriculture in order to improve the livelihood of smallholder farmers in rural areas.

The study generated new empirical information on the effects of drought on smallholder farmers in the Winterveldt area. Such new information is intended to serve as a guideline for the developmental agencies, such as the Agricultural Research Council (ARC), to direct attention to specific factors that can be used as indicators to mitigate the effects of drought incurred by the farmers in the Winterveldt area. Therefore, it was important to carry out the study with the purpose to develop targeted interventions that will assist those smallholder farmers to overcome those drought effects and be able to continue with production.

## Methodology

The study was conducted in the Winterveldt rural areas of the Tshwane Metropolitan District in the Gauteng Province. As indicated in Figure 1, the Winterveldt area is located within the northwest border of Tshwane Metropolitan District in South Africa. Quantitative and qualitative approaches were used for data collection. The permission to conduct research was granted by the Gauteng Department of Agriculture Rural and Development (GDARD). The research targeted 31 active smallholder farmers in the Winterveldt area (List given by GDARD). A purposive sampling method was employed to select farms in the Winterveldt area and the method was used to assess uniformity and homogenous characteristics of the farmers. Data was captured and analysed using the statistical package for social sciences (SPSS version 20) to generate results. Descriptive statistics was used to give some insights of the current characteristics of the smallholder farmers in the Winterveldt area. The study also used observations and current rainfall distribution maps as part of data collection.

**Figure 1.** *Winterveldt Area Map within the City of Tshwane Metropolitan District*



Source: StatsSA, 2011.

## Results and Discussion

The majority of beneficiaries interviewed were men. According to Table 1, twenty two men were interviewed as compared to nine females. As shown in Table 1 there is a participation of both men and females in the areas, which implied that any developmental strategy for the farmers in the area will benefit both females and males.

**Table 1.** *Winterveldt Farmers Gender*

	<b>Respondents'</b>	<b>% of Gender</b>
Male	22	71
Female	9	29
<b>Total</b>	<b>31</b>	<b>100</b>

Table 2 indicated that there were 174 direct beneficiaries from 31 agricultural projects visited. This is an indication that any intervention that can cater for all of these projects, as well as any future projects, will benefit more than 174 people in the area.

**Table 2.** *Winterveldt Number of Beneficiaries*

	<b>Beneficiaries'</b>	<b>% of Beneficiaries</b>
Winterveldt	174	100
<b>Total</b>	<b>174</b>	<b>100</b>

The results from Table 3 showed different ages of beneficiaries. As indicated in table 3, the average age of the beneficiaries was 47 years, which indicated the need for youth involvement in farming business as any future agricultural development in the area should be tailor made to attract youth.

**Table 3.** *Winterveldt Farmers Age Categories*

<b>Age</b>	<b>Respondents</b>	<b>% of Age</b>
18 – 35	5	16.1
36 - 45	5	16.1
46 - 60	8	25.8
61>	13	41.9
<b>Total</b>	<b>31</b>	<b>100</b>

Beneficiaries used different water sources for irrigation as indicated in Table 4, with borehole being the most utilized (20 beneficiaries), followed by taps (11 beneficiaries). Due to drought occurrence in the area, it is not surprising to find most farmers relying on groundwater through drilling of

boreholes. The groundwater has many benefits to farmers as it is cheap to develop and it is generally of a good quality and widespread occurrence. It is generally more reliable source than surface water in times of drought.

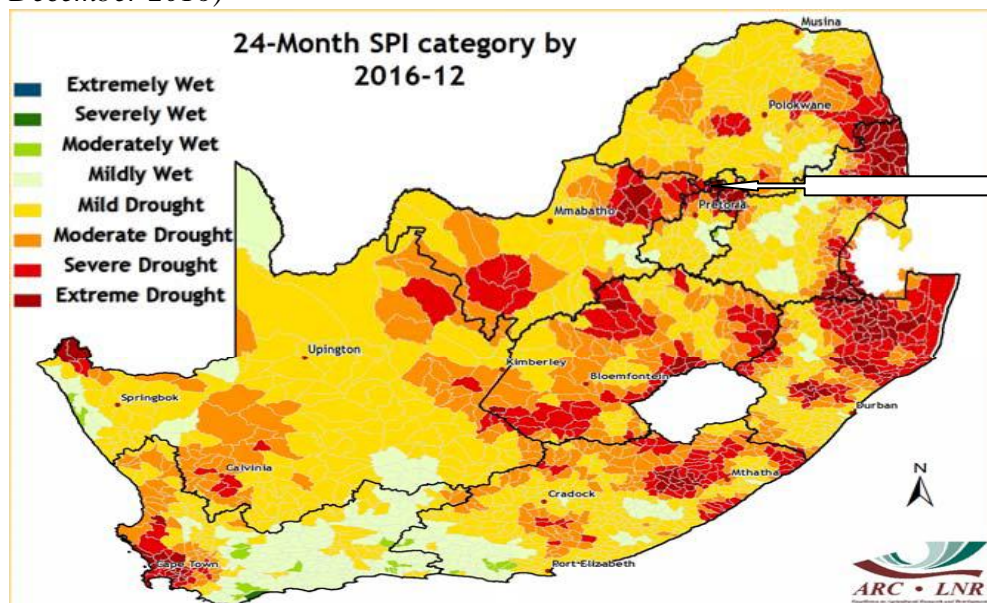
**Table 4.** *Winterveldt Farmers Water Source*

Source	Projects	% Water Source
Borehole	20	48.4
Taps	11	51.6
<b>Total</b>	<b>31</b>	<b>100</b>

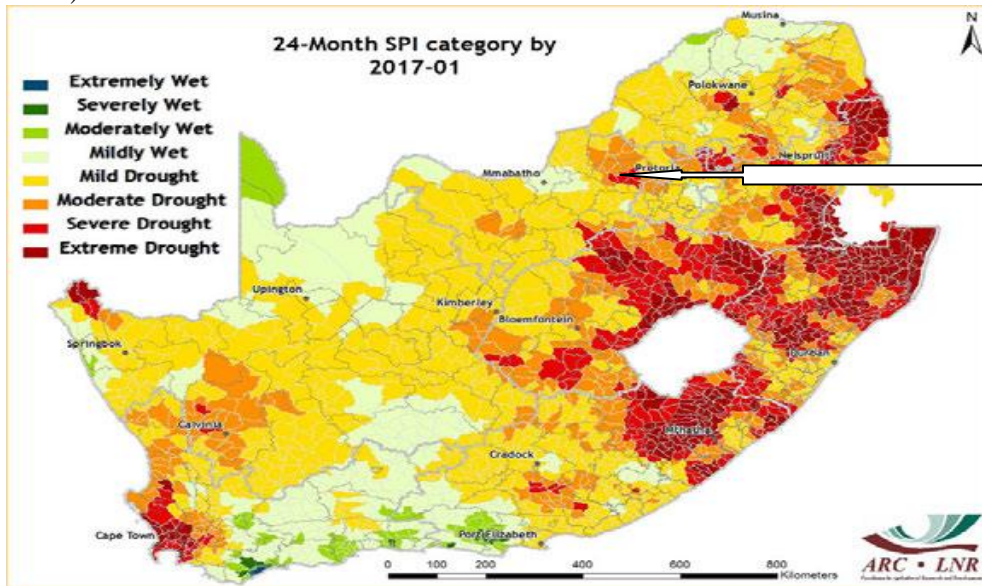
The Standardized Precipitation Index (SPI) was developed to monitor the occurrence of droughts from rainfall data (McKee et al., 1993). The index quantifies precipitation deficits on different time scales and therefore also drought severity. It provides an indication of rainfall conditions per quaternary catchment (in this case) based on the historical distribution of rainfall.

At short and long time scales, the current SPI maps (Figures 2-5) showed that severe to extreme drought conditions are present over some parts of South Africa. Over some parts of the country, a recovery of the drought conditions visible on the longer time scales can be seen. The Winterveldt area (study area) drought condition for December 2016-April 2017 is shown in Figures 2-5. As indicated by the arrow on each map, it is clear that Winterveldt area was affected by drought i.e. Figure 2 (Severe drought); Figure 3 (Mild drought); Figure 4 (Mild drought) and Figure 5 (Mild drought to mildly wet).

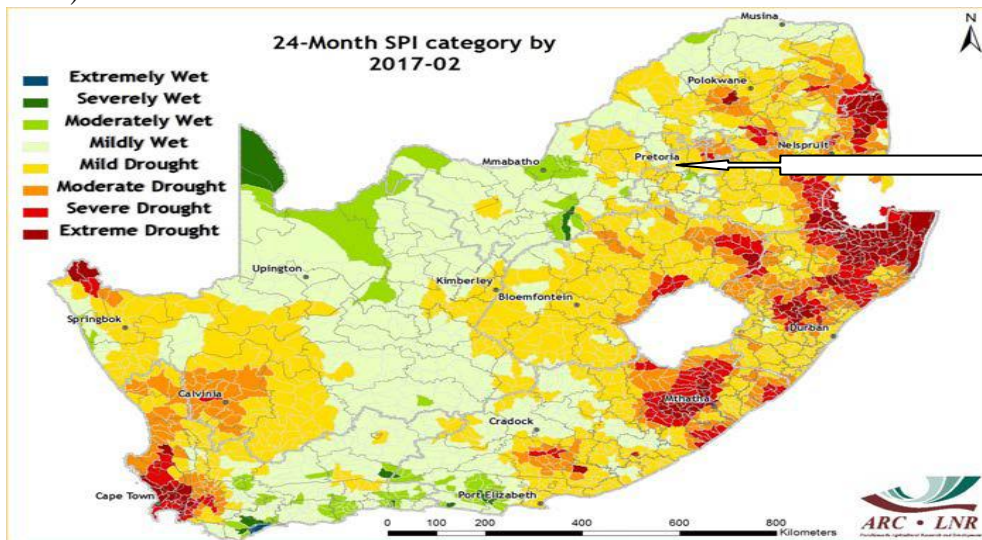
**Figure 2.** *24 Month Standardized Precipitation Index (1 December-31 December 2016)*



**Figure 3.** 24 Month Standardized Precipitation Index (1 January-31 January 2017)

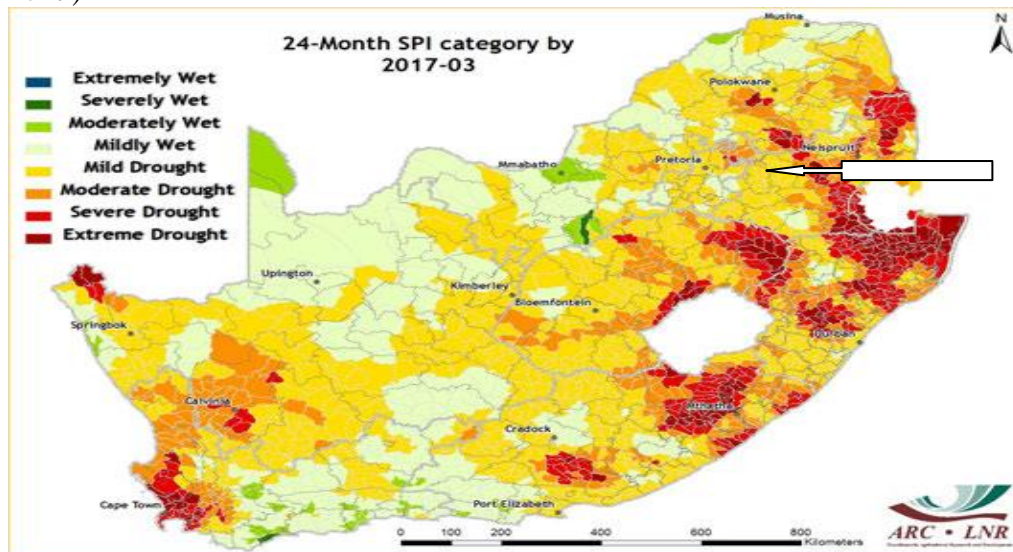


**Figure 3.** 24 Month Standardized Precipitation Index (1 February-28 February 2017)

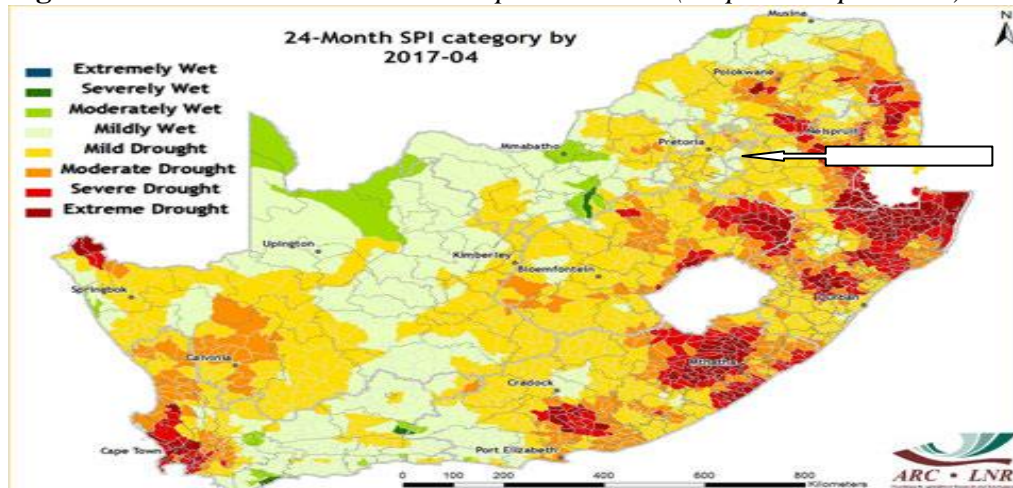




**Figure 4.** 24 Month Standardized Precipitation Index (01 March-30 March 2017)



**Figure 5.** 24 Month Standardized Precipitation Index (1 April-30 April 2017)

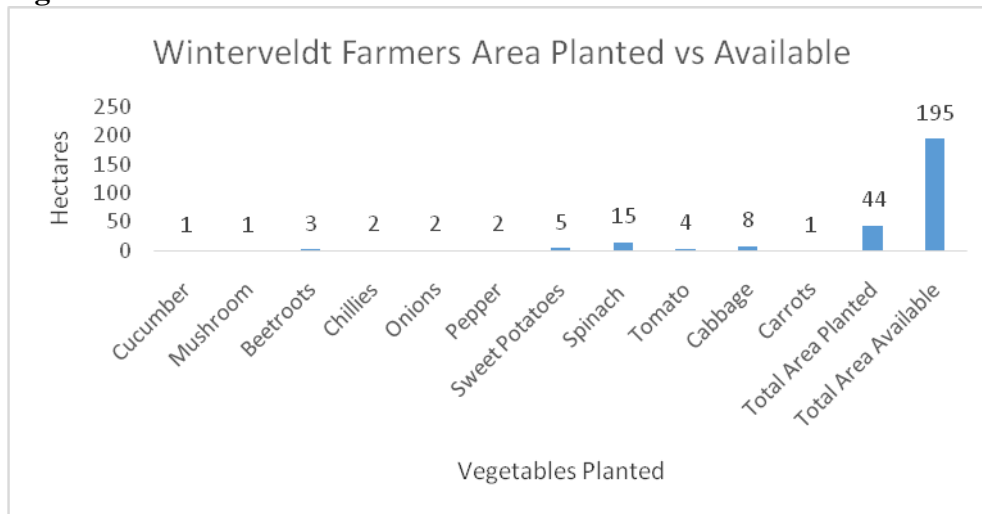


It is clear from Figures 2-5 that most farmers suffered the effects of the drought in the Winterveldt area. It is as a result of this worrying situation that vegetable production declined in the area as indicated in figure 6, and hence the government and the private sector are needed to develop and implement some serious interventions.

Furthermore, the results indicated that only 44 hectares out of the available 195 hectares of land is under production. This indicated that there is still a large area of underutilized land. This situation has also affected some of the provincial fresh produce markets like Johannesburg fresh produce market. According to Madima (2016) the city food resilience programme was under threat because of drought. He further emphasized that most of the farmers in Gauteng province have been severely affected by drought, but smallholder farmers are worse off as some commercial farmers have insurance to cover impact of drought. Overall production went down. When supplies drop, prices go up, especially for vegetables (Madima, 2016).

This has resulted in prices like potatoes going up by 95 percent, tomatoes 97 percent, onions by 41 percent (Madima, 2016).

**Figure 6.** *Winterveldt Farmers Area Planted vs Available*



## Conclusions

Drought is a recurring problem in South Africa. According to Mpandeli (2005) and Maponya and Mpandeli (2012) and Maponya and Mpandeli (2013), in times of drought, different coping strategies should be gathered, understood and shared amongst a range of end users for example, either by the national agro meteorological committee, research institutions such as Agricultural Research Council and the South African Weather Service. The Winterveldt farmers should be encouraged to use drought-resistant cultivars during drought periods and be taught how to conserve water. The government should also improve the poor state of water infrastructure and to make resources available on time for immediate response measures.

This study examined the drought status overtime which resulted in low agricultural production as seen in Winterveldt area. The results from the present study could be used as a baseline in understanding the consequences of drought on food production in some parts of South Africa.

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