

### The impact of the 2015–16 drought on staple maize markets in Southern and Eastern Africa

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#### Introduction

The Southern African region experienced the worst drought in more than a century in the 2015/16 production season, which had a severe impact on staple maize markets. Public and private sector response varied across the region and the level of accuracy on information with respect to crop estimates and the anticipated impact on stock levels, trade flow and prices became critical. To this end, the Regional Network of Agricultural Policy Research Institutes (ReNAPRI) has in recent years developed a multi-faceted approach to policy research that includes farm-level, sector-level and value chain analysis within a Strategic Foresighting frame-work. This initiative is supported by the capacity building and training in partial equilibrium modelling under the Feed the Future Innovation Lab for Food Security Policy (FSP).

ReNAPRI hosts an annual stakeholder conference where it seeks to provide relevant and timely national and regional policy support to national governments and Regional Economic Communities (RECs). As part of the conference, a 10-year outlook is presented that provides a baseline scenario and future projections of a range of agricultural commodities within the context of rapidly changing agricultural systems in Africa. The analysis includes horizon scanning, which identifies the emerging ‘megatrends’ currently shaping Africa’s agri-food systems, and impact assessments of domestic policy on regional trade flow patterns.

At the time of the annual Stakeholder conference in October 2015 in Maputo, the majority of weather forecasts indicated a high probability of an El Nino event for the 2015/16 summer production season. It was decided to utilize the ReNAPRI partial equilibrium model at an “early warning” tool to simulate the impact of the expected drought on regional production and

#### Key Findings

- The impact of the 2015/16 drought on food security in the region has reaffirmed the importance of:
  - a. Accurate and regular crop estimates within the region to plan in advance and avoid panic that leads to ad hoc policy interventions like exports bans.
  - b. Updated commodity balance sheets to analyse and anticipate the impact of a shift in production of staple food on stock levels, trade and consumption.
  - c. Continuous maintenance and upgrading of an infrastructure to ensure the efficient handling of grain trade (imports and exports).
  - d. Identify potential sources for staple food imports in time and ensure all protocols for importation are in place.
- The ReNAPRI partial equilibrium model has proven itself as an effective early warning tool to project the impact of exogenous shocks like an El Nino event on regional maize markets.

consequently the prices and the interregional trade flows. This would provide an understanding of the potential market dynamics that can unfold and have a major impact on food security in the region. Since most of the official statistics for the 2015/2016 production season are available, the objective of this policy brief is to assess the accuracy and the relevance of the projections under the drought scenario that were presented in October 2015 and an updated scenario in February 2016 and to relate these to the actual implementation of pro-active policies to mitigate the impact on food security.



## Impact of drought on maize markets

The impact of El Nino on yields in previous years was used as an indicator to impose the initial yield shocks in the model. Table 1 presents the initial shocks that were simulated as an alternative scenario in October 2015. Maize yields in South Africa and Zimbabwe were reduced by 15% and the yields in Zambia by 7.5%.

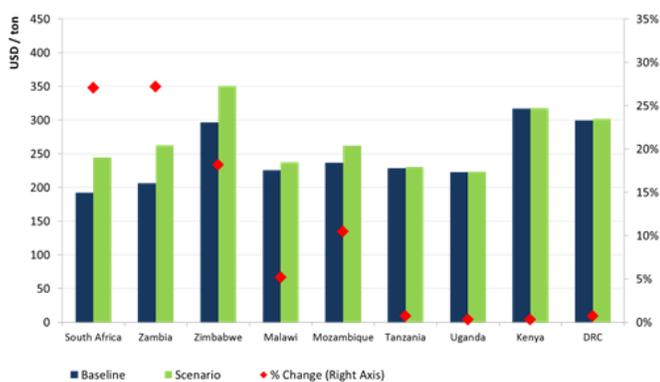
**Table 1: Estimated impact of drought on yields in 2015/16 season**

	2014	2015	2016 (Baseline)	2016 (Scenario)
<b>South Africa</b>	4.84 t/ha	3.35 t/ha	4.57 t/ha	3.88 t/ha
<b>Zambia</b>	2.36 t/ha	1.95 t/ha	2.32 t/ha	2.14 t/ha
<b>Zimbabwe</b>	0.85 t/ha	0.48 t/ha	0.80 t/ha	0.68 t/ha

Source: ReNAPRI, October 2015

Based on these yield shocks that were introduced in the model, the consequent impact on the equilibrium maize prices was simulated in the model. Maize prices were projected to increase by more than 25% in South Africa and Zambia and 20% in Zimbabwe above the baseline projections.

**Figure 1: Projected increase in maize prices (2015/16) from October 2015 baseline**



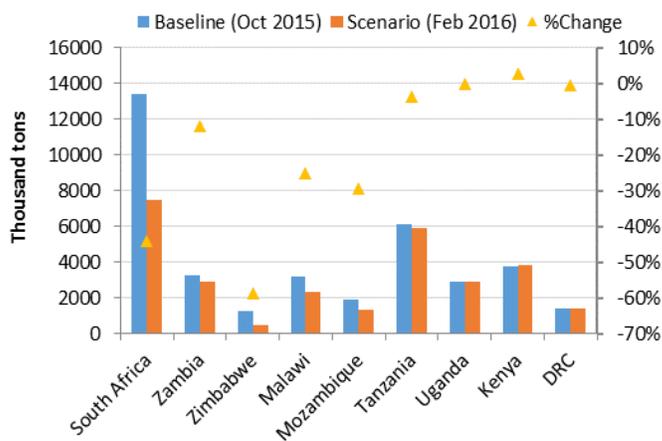
Source: ReNAPRI, October 2015

By January 2016, it became apparent that the possibility of an El Nino event that was anticipated in October 2015 was turning into a reality with very poor rainfall in most of the key maize production areas of the Southern

African continent. Therefore, ReNAPRI undertook a further update on the drought scenario. The latest estimates on plantings and expected yields were collected by the ReNAPRI researchers based on a combination of official estimates by Crop Estimates Committees or the ministries in case these numbers were available and other sources like the early warning groups from the FAO or FEWSNET and private sector.

Figure 2 presents a comparison between the baseline projections (normal rainfall) for the (2015/16) maize crop and the projected levels of maize production that included the February updates of the drought shock. The countries that were most affected were South Africa, Zimbabwe, Malawi and Mozambique. In South Africa, the 2015/16 season was officially declared as the worst drought in more than 100 years. From the analysis it is also evident that the Eastern and Central African countries (Kenya, Tanzania, Uganda, DRC) were not affected by the drought. In fact, in some areas, above normal crops were harvested. El Nino weather events normally have the tendency of inducing dry and hot conditions in the Southern regions of the continent and wet conditions in the Central and Eastern regions. For La Nina, the opposite is the case with wet conditions in the Southern parts and dry and hot conditions in the Central and Eastern parts. This serves as another motivation for a thorough and transparent understanding of regional market dynamics and the impact on prices and trade flows to avoid ad hoc policy responses, for example export bans.

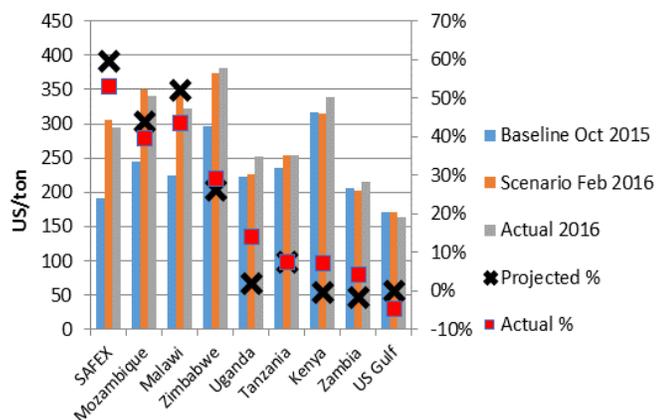
**Figure 2: Projected impact on maize production (2015/16) from October 2015 baseline**



Source: ReNAPRI, January 2016

The Zambian crop turned out better than originally expected, due to the above average crop harvested in the Northern Provinces, which more than offset the reductions in the drought affected Southern Region. However, due to the uncertainty of the potential impacts of the regional drought on food security, the Zambian government introduced an export ban on maize.

**Figure 3: Impact on regional prices due to drought 2015/16**



Source: ReNAPRI, January 2016

### Impact on prices and trade flow

Apart from projecting the impact of the drought on the maize crop, the partial equilibrium model simulated the consequent impact on prices and trade flows. For example, the model projected that the SAFEX maize prices will rise to import parity levels as SA is expected to import close to 1 million tons of white maize and 2.6 million tons of yellow maize. Figure 3 presents a comparison of the baseline projections in October 2015, the updated scenario in February 2016 and the actual average prices that were recorded at the end of the 2015/16 production season. The white maize price on the South African Futures Exchange (SAFEX) increased sharply to all time record levels of more than \$300/ton. The final increase in the maize price turned out to be more than 50%. Similar price increases are evident across the countries where the drought's impact was significant. Mozambique prices increased by more than 40%, being a net importer from South Africa. Zimbabwean prices increased by 30% and maize prices in Malawi also rose by 50%. Comparing the projected and actual changes to maize prices, it turned out that the ReNAPRI partial equilibrium model proved to generate accurate market projections well in advance and can therefore form part of a combination of early warning mechanisms to

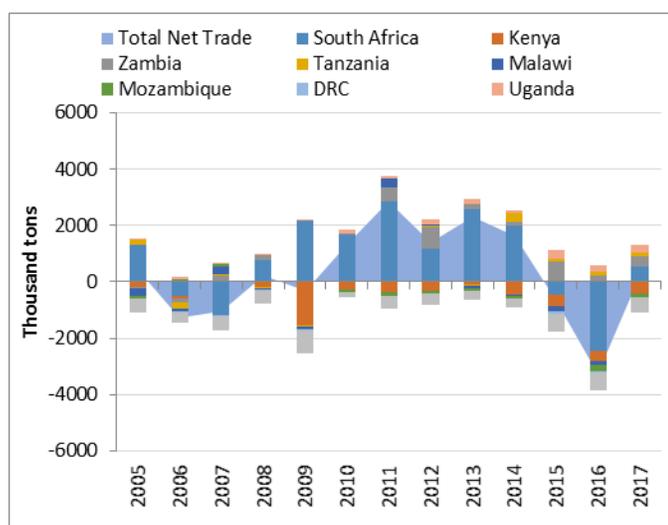
simulate the potential impact of exogenous shocks on markets and thereby trigger and inform pro-active policy response.

The impact of the drought on regional prices is not only important to policy-makers due to the shock on food prices, but also since regional prices together with trade policies drive regional trade flow patterns and consequently the required logistics. Figure 3 presents an overview of the regional tradeflow patterns of maize since 2005. Whereas the region managed to produce a net surplus from 2010 to 2014, the drought in 2015 already had an impact on the maize crop and some maize had to be imported. From the graph it is evident that this situation was expected to become much worse in the 2015/2016 production season with large volumes of maize that would have to be imported. In other words, the major regional deficit in maize of almost 4 million tons was already projected in October 2015. Apart from the estimated net imports of 1 million tons of white maize by SA, countries like Zimbabwe, Mozambique and Malawi all had to import white maize. Zambia introduced an export ban and supplied only some of the shortfalls experienced in Zimbabwe.

By means of analysing these potential trade flows, the real challenging question that governments had to ask themselves emerged; where will the white maize imports be sourced from? There are only a handful of white maize surplus producers in the world and imports had to be sourced from outside of the region. Yellow maize is freely available in the world market, but white maize represents a very small share of total production in the global context. Consequently, the premium for white maize over yellow in the world market increased rapidly. Mexico and the United States were identified as potential sources for white maize, however in the case of the US imports, GM certification posed a challenge, leaving Mexico as the most likely alternative for white maize imports.

When these projections were presented to the South African government, an emergency meeting was called in January 2016 between government and private sector and a Grain Logistics Coordination Committee was formed in an attempt to reduce logistical bottlenecks as far as possible. Port authorities were notified to increase operational hours and the private sector responded to the high prices and secured the available stocks of white maize on the world market to ensure consistent supplies. Since its peak in 2016, SAFEX white maize prices has plummeted by more than 50% on the back of favourable rains.

**Figure 4: Impact on trade-flows due to drought 2015/16**



Source: ReNAPRI, January 2016

## Conclusion

In its annual report on the state of the global climate, the World Meteorological Organisation (WMO), confirmed previously released figures showing that 2016 was the warmest year on record and the drastic shifts seen in the global climate system appear to be continuing unabated. Greater climate variability can be regarded as a mega trend that will have an impact on the evolution of the agricultural sector in the region. The precise impacts of climate change on African farming systems are likely to vary spatially in ways that are difficult to predict, but it is critical for governments in the region to develop proactive measures.

This policy brief clearly illustrates the value of the partial equilibrium framework as a tool to trigger and guide necessary interventions by policymakers and private sector. Taking proactive measures in a year of a drought is critical. The impact of any likely intervention from government and industry is far less effective if introduced after the harvest. Instead, if the potential impact of a drought on the overall commodity balance sheet (production, consumption and trade flow) can be projected, the necessary measures and planning can be undertaken to marginalize the impact of a drought. These pro-active measures should amongst others include:

- Develop a spatial map that identifies the strategic “hot spots” of potential surpluses and shortfalls. This map can be used to anticipate future trade flow within a country and also within the region.

- Apart from standard crop estimates during the season, ensure that comprehensive supply and demand estimates are undertaken and updated frequently. These estimated should include an assessment of stock levels and the ownership of these stocks.
- Ensure that the required maintenance and upgrading of al infrastructure is undertaken to ensure the efficient handling of grain. This specifically relates to harbours, ports and silos that are strategically positioned to handle an increased volume of trade flow.
- With only a few countries producing white maize outside of the African continent, potential sources of surplus white maize for exports are limited on the world market. Therefore, it is critically important to identify potential sources for white maize imports in time and that all protocols are in place to import the maize from that specific source of origin.

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