Africa RiskView

Special Report: Senegal (End of Season)

December 2014

Highlights:

- ***Rainfall:***
  - **Poor and erratic rainfall** throughout most of Senegal during the 2014 agricultural season
- ***Drought:***
  - **Planting conditions** were **not reached** in most areas due to a very delayed start of the season
  - As a result, the **WRSI is below normal** throughout all agricultural areas, with the exception of pockets of southern Senegal
- ***Populations Affected:***
  - ARV estimates that **around 784,000 people are directly affected by drought** conditions in the country after the end of the 2014 agricultural season
  - The areas most affected include **Kaolack**, **Thies** and **Fatick** regions
- ***Insurance:***
  - Given the high modelled drought response costs, **Senegal is eligible for a pay-out of around USD 16.5 million by the ARC Insurance Company Limited**
  - These funds will be used to **activate a Final Implementation Plan** (FIP), which the country is currently finalising

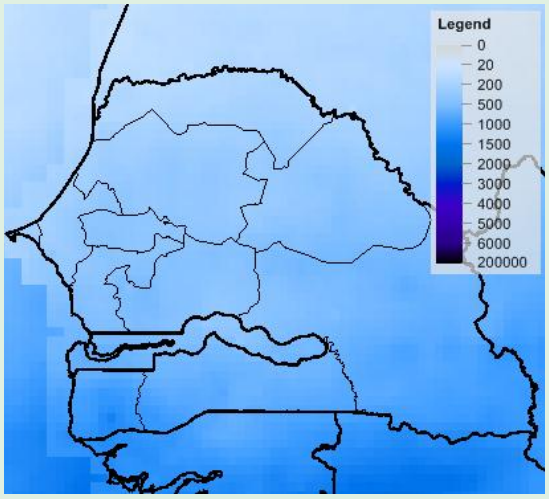
Introduction

This ***Africa RiskView*** **Special Report** will analyse the situation in Senegal at the end of the 2014 agricultural season, as detected by the software *Africa RiskView* (ARV). Senegal is amongst the five countries that form the **first risk pool** of the ***African Risk Capacity*** **(ARC)**, together with Mauritania, Mozambique, Niger and Kenya. These five countries insured their respective agricultural or rangeland seasons against the cost of a drought-related intervention, within the context and mandate of ARC. Before participating in the first risk pool, Senegal customised ARV to model the impact of drought on vulnerable populations as accurately as possible. The agricultural season in Senegal extends from **11 May to 10 December**, and the country chose **groundnut** as the reference crop for its participation in the insurance pool, given its importance as a main cash crop. During the customisation process of ARV, all the parameters of the drought index were adjusted to the conditions and agricultural practices on the ground, in order to allow for accurate modelling.

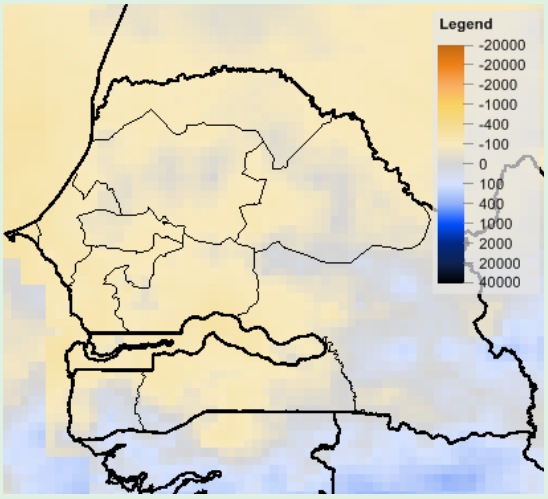
This **end-of-season report** will review the agricultural season in Senegal, and present ARV's modelled results. It is part of a **validation exercise** of ARV, which is conducted in each country after the end of each insured season. This exercise is aimed at verifying the model's performance in order to identify potential improvements for drought monitoring and insurance coverage. The ARV Special Report covers the following topics: **rainfall**, **drought**, **affected population and response cost estimates**, and discuss these in the context of **external sources**.

Rainfall

Overall, Senegal experienced a **poor rainy season in 2014**. The bulk of the rains were received in August and September in most regions of the country, and the cumulative rainfall map (see Map 1) indicates that the southern parts of the country such as Ziguinchor, Tambacounda and Kolda were the wettest areas of Senegal, with cumulative rains between 600 and 1,130 mm throughout the season. By contrast, the northern agricultural areas such as Louga and Saint-Louis only recorded cumulative rains of 150 to 320 mm.



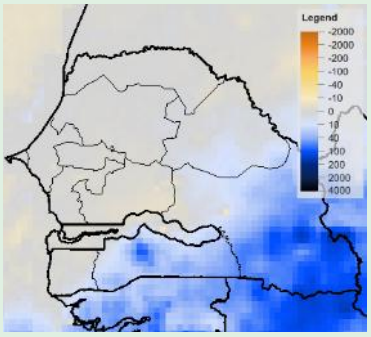
Map 1: Cumulative rainfall, Senegal, 11 May-30 Nov 2014 (RFE2)



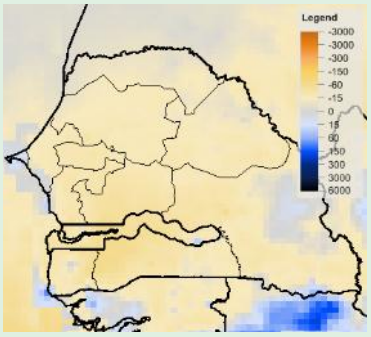
Map 2: Rainfall compared to normal, Senegal, 11 May-30 Nov 2014 (RFE2)

Compared to the 13-year average (2001-2013), **the cumulative rains were below average in most of northern, western and central Senegal**. Dakar, Fatick, Thies and Kaolack regions recorded rainfall deficits ranging from 100 to 200 mm, which is between 20 to 50% below normal. On the other hand, the south-eastern parts of the country and some areas in the south-west experienced a wetter than normal season, with localised rainfall surpluses of up to over 100 mm in Tambacounda region. Overall, Senegal has experienced one of its worst seasons in terms of rainfall in the last decade.

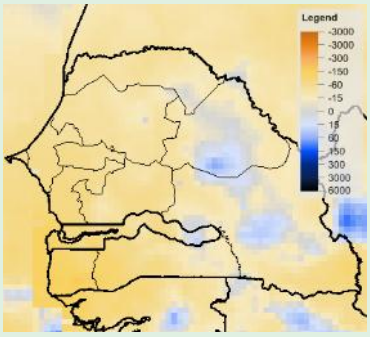
The **temporal and spatial distribution** of rainfall in 2014 indicates that Senegal **highlights the poor performance of the rainy season**. While some areas in the south-east experienced an early start of the season in May, normally dry conditions persisted in most of the country (see Map 3). However, this was followed by significant rainfall deficits in June (see Map 4) and July (see Map 5), which pointed towards a delayed start of the season in Senegal's main agricultural areas. Indeed, due to these deficits the sowing threshold defined by the country during the customisation of ARV was not reached in most areas. The potential effects of this on the drought index and on agricultural production will be discussed in the following sections of this report.



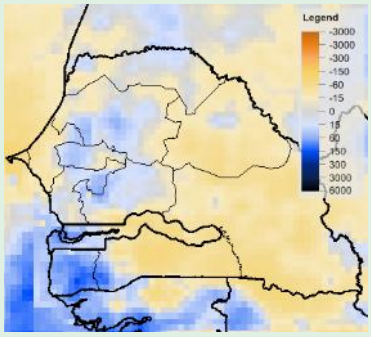
MAP 3: RAINFALL COMPARED TO NORMAL, SENEGAL, 11-30 MAY 2014 (RFE2)



MAP 4: RAINFALL COMPARED TO NORMAL, SENEGAL, JUN 2014 (RFE2)

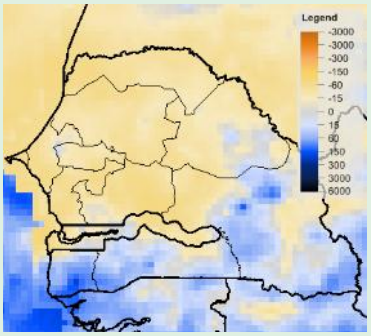


MAP 5: RAINFALL COMPARED TO NORMAL, SENEGAL, JUL 2014 (RFE2)

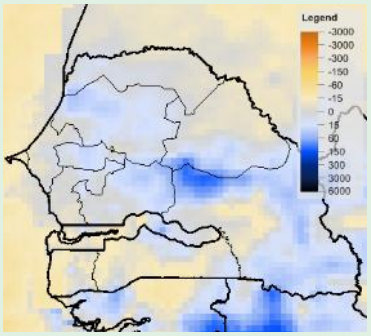


MAP 6: RAINFALL COMPARED TO NORMAL, SENEGAL, AUG 2014 (RFE2)

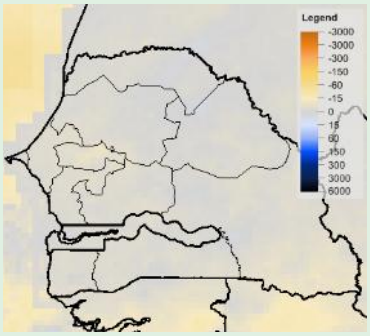
In the months following the sowing period, which are of crucial importance for the development of the reference crop, erratic rainfall patterns can be identified. In August, the western parts of the country experienced drier than normal conditions, while the east recorded below normal rains (see Map 6). In September, southern Senegal received above normal rains, with the northern half of the country remaining drier than usual (see Map 7), while in October, above normal rains were experienced throughout most regions (see Map 8). Finally, in November and December, normal conditions prevailed (see Maps 9 and 10), however it has to be noted that the rains are usually very limited in these last two months of the season. Overall, the maps above show how the rainy season started late in the main agricultural areas of the country, and was characterised by poor and erratic rainfall.



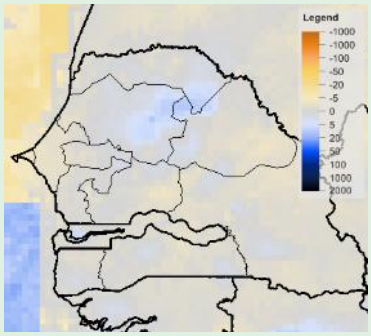
MAP 7: RAINFALL COMPARED TO NORMAL, SENEGAL, SEP 2014 (RFE2)



MAP 8: RAINFALL COMPARED TO NORMAL, SENEGAL, OCT 2014 (RFE2)

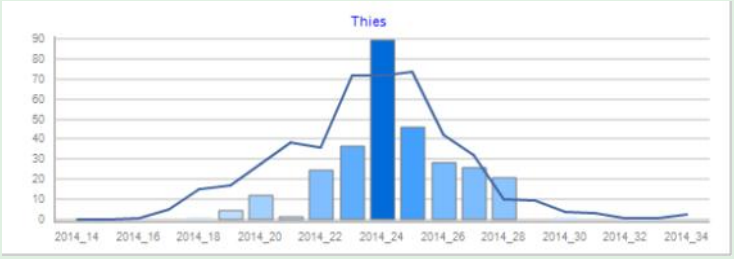


MAP 9: RAINFALL COMPARED TO NORMAL, SENEGAL, NOV 2014 (RFE2)



MAP 10: RAINFALL COMPARED TO NORMAL, SENEGAL, 1-10 DEC 2014 (RFE2)

The following two rainfall charts are indicative of the erratic rainfall patterns that characterised the 2014 season in Senegal. The western part of the country experienced a late start to the season, and a below normal progression of rains (see Graph 1). Particularly during the sowing period (11 May-31 July), significantly below average rains were recorded, which did not allow for sowing activities to start on time. On the other hand, in the south-west, the season started very early, with significant rainfall in May, and was followed by relatively consistent rains for the duration of the season (see Graph 2).

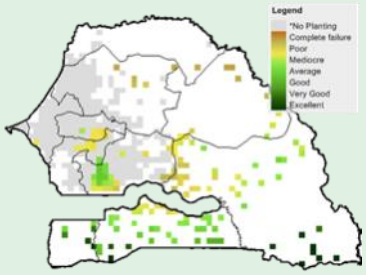


GRAPH 1: ACTUAL RAINFALL, THIES DISTRICT (THIES REGION), SENEGAL, 11 MAY-10 DEC 2014 (RFE2)

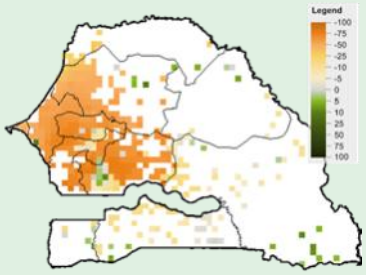
GRAPH 2: ACTUAL RAINFALL, KEDOUGOU DISTRICT (TAMBACOUNDA REGION), SENEGAL, 11 MAY-10 DEC 2014 (RFE2)

DROUGHT

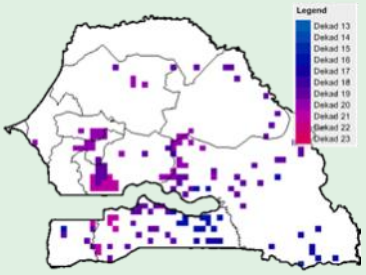
ARV uses the ***Water Requirements Satisfaction Index*** (WRSI) as an **indicator for drought**. The WRSI is an index developed by the *Food and Agriculture Organisation of the United Nations* (FAO), which, based on satellite rainfall estimates, calculates whether a particular crop is getting the amount of water it needs at different stages of its development. To maximise the accuracy of ARV, **countries intending to take out insurance customise the software's parameters** to reflect the realities on the ground, as discussed above.



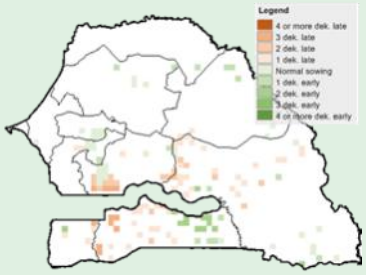
MAP 11: ACTUAL WRSI, SENEGAL (2014 AGRICULTURAL SEASON)



MAP 12: WRSI COMPARED TO NORMAL, SENEGAL (2014 AGRICULTURAL SEASON)



MAP 13: BEST PLANTING DEKAD, SENEGAL (2014 AGRICULTURAL SEASON)



MAP 14: BEST PLANTING DEKAD COMPARED TO NORMAL, SENEGAL (2014 AGRICULTURAL SEASON)

In the case of Senegal, the country decided to customise ARV to show the impact of rainfall on the yield progression of groundnut, its main cash crop. The main groundnut growing area is located in the central and western part of the country, with some localised growing areas in the south and east. Due to the significant rainfall deficits recorded particularly during the first part of the season, **ARV indicates that the conditions for the start of sowing activities were not reached in large parts of Senegal** (grey areas in Map 11). The WRSI at the end of the season varies across those areas where planting did occur. In the southern parts of Senegal, where the rains performed better, the WRSI shows higher values, given that the water requirements of the reference crop were fully satisfied. However, in most of central Senegal, the erratic rains received throughout the season resulted in low WRSI values even in those areas where sowing conditions were reached on time. Compared to the average (2001-2013), the WRSI is well below normal in most of Senegal, with the exception of some areas in the south-east (see Map 12). This indicates that even where farmers can be assumed to have planted their crops on time, it is unlikely that they will harvest substantial yields. Overall, the picture is that of a failed season in the main agricultural areas of Senegal.

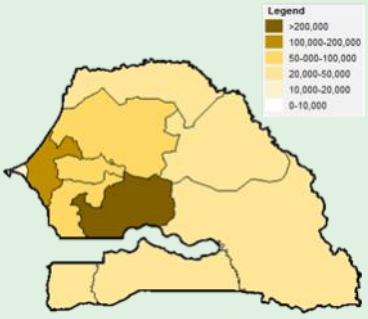
During the customisation of ARV, the country defined a sowing threshold of 20 mm of rainfall that needs to be reached within the sowing period (11 May to 31 July). Based on this, the best possible planting dekad within the sowing window is then calculated and used for the final WRSI. As discussed above, the sowing threshold was not reached in the majority of agricultural areas in the country. In those areas where it was indeed reached, the best sowing conditions were reached at different stages in the season (see Map 13). In some areas, sowing is expected to have started as early as mid-May (11-20 May), while in other parts of Senegal, sowing conditions were not reached before the end of the sowing window in late July (21-31 July). The different sowing dekads highlight the erratic distribution of rains, which is also underscored by the fact that normal sowing conditions were not reached in any of the areas where sowing occurred according to ARV (see Map 14).

POPULATION AFFECTED

Based on the WRSI calculations discussed in the previous section of this report, ARV estimates the **number of people potentially affected by drought**. As part of the in-country customisation process, **vulnerability profiles** are developed at sub-national levels for each country, which define the potential impact of a drought on the population living in a specific area. It is important to note that not all those affected by a drought might be in need of humanitarian assistance. Moreover, needs are often driven by a variety of factors including, but not limited to, the weather.

The outcome of the vulnerability profiling exercise in Senegal indicates that of the around 13.6 million people living in agricultural areas, about 153,000 are exposed to the risk of a mild drought, while about 402,000 and 1.05 million people are exposed to the risk of a medium or a severe drought, respectively. The areas with the highest proportions of populations at risk are Fatick, Kaolack, Kolda and Tambacounda regions, with an average of 6% of the population of these regions being exposed to the risk of a medium drought, and around 16% of the population being exposed to the risk of a severe drought. **After the end of the agricultural season in 2014, ARV estimates that a total of around 784,000 people are directly affected by drought conditions in Senegal**. In terms of geographical

distribution, Kaolack region accounts for the majority of affected populations (around 239,600), followed by Thies (107,400) and Fatick, where about 97,500 people are estimated to be affected (see Map 11). However, the regions are affected differently in terms of magnitude of the impact of the modelled drought. Indeed, in all but three regions, the populations estimated to be exposed to the risk of a mild or severe drought are expected to be affected in 2014. The impact of the drought is less pronounced in Kolda, Tambacounda and Ziguinchor regions in southern Senegal, where only between 20 and 40% of those at risk of a severe drought are affected according to ARV. Overall, around 75% of all people exposed to the risk of a severe drought in the country are estimated to be affected at the end of the 2014 agricultural season.



MAP 11: DROUGHT AFFECTED POPULATIONS, SENEGAL (2014 AGRICULTURAL SEASON)

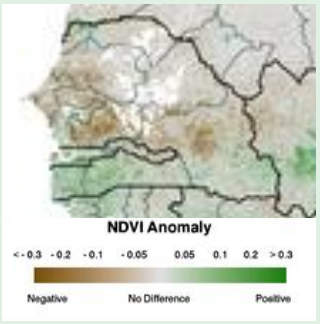
These figures highlight the magnitude of this year's drought in Senegal, and **place 2014 amongst the most severe droughts the country has experienced since 2001**. In terms of overall magnitude, assuming today's population experienced different rainfall seasons, the 2014 modelled impact is comparable to the drought in 2011, but remains slightly below that of 2002. It has to be noted, however, that these modelled population estimates only include the number of people directly affected by a drought in the country. They are not necessarily representative of the wider food security situation, which depends on various other factors such as non-rainfall related issues that affect agricultural production (locust invasions, floods, fertiliser use etc.), as well as broader food security indicators such as market prices, nutrition, food access etc. For instance, while the direct impact of the 2014 drought might be comparable to that of the drought in 2011, the 2011 food crisis in the Sahel might have been more severe, having been exacerbated by locust invasions, high food prices and other factors occurring in the region that year.

RESPONSE COST ESTIMATION

The response cost estimation, which ARV does in a fourth and final step, consists in the conversion of the numbers of affected people into **response costs**, based on a **pre-defined response cost per person** set by each country. The modelled response costs are the underlying basis of the insurance policies for countries that participate in the ARC insurance pool. Pay-outs will be triggered from the ARC Insurance Company Limited to countries where the estimated response cost at the end of the season exceeds a pre-defined threshold specified in the insurance contracts. Given the drought conditions modelled by ARV, and the associated high response costs in Senegal, **the country is eligible for a pay-out of around USD 16.5 million by the ARC Insurance Company Limited**. This pay-out is comparable to the pay-out the country would have received in 2011 (but remains below that of 2002), had it participated in the ARC insurance pool then. It will be used to activate a Final Implementation Plan (FIP), which is currently being finalised based on the pre-defined Operations Plan that the country prepared as a pre-requisite for its participation in the insurance pool. The funds can be used exclusively to fund the drought response as outlined in the FIP, a subset of activities that were included in Senegal's Operations Plan.

VALIDATION OF ARV WITH EXTERNAL SOURCES

The *Normalised Difference Vegetation Index* (NDVI) allows verification of ARV's estimates using satellite imagery that visualises the **progression of the vegetation** in West Africa. The latest NDVI images suggest that the current vegetation conditions in Senegal are well below normal in the central and northern parts of the country (see Map 12). The most affected regions are Kaolack and Thies, while the southern parts of Senegal are experiencing above normal vegetation growth. This is in line with ARV's findings, as the areas with a below normal NDVI are also affected by a poor WRSI.



MAP 12: EMODIS NDVI ANOMALY, WEST AFRICA (1-10 DECEMBER 2014)

The latest FEWS NET Food Security Alert for Senegal (published on 3 December 2014) also confirms the outlook of a significantly below average harvest due to the effect of poor and erratic rainfall. Large cereal and cash crop losses are forecast, which are likely to result in a deterioration of food security outcomes in central and northern Senegal. According to the report, Thiès, Louga, Matam and northern Tambacounda regions are expected to be classified as Stressed (IPC Phase 2) as of March 2015. In the absence of assistance, **approximately 850,000 people across central and northern Senegal will be in Crisis (IPC Phase 3) by May 2015**. These areas are the same areas highlighted by ARV as being the most affected (see Map 11). FEWS NET's negative outlook for Senegal highlights the need for a quick response to drought affected populations in Senegal, which the country will coordinate through the implementation of the Final Implementation Plan (FIP).

About ARC:

- The ***African Risk Capacity*** **(ARC)** is a specialised agency of the African Union designed to improve the capacity of AU Member States to manage natural disaster risk, adapt to climate change and protect food insecure populations.
- The ***Africa RiskView*** **(ARV)** software is the technical engine of ARC. It uses satellite-based rainfall information to estimate the cost of responding to a drought, which triggers a corresponding insurance pay-out.
- The ***ARC Insurance Company Limited*** is the commercial affiliate of the ARC Agency, which pools risk across the continent through issuing insurance policies to participating countries.

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Implementation of the Response

As a pre-requisite for its participation in the ARC insurance pool, Senegal was required to prepare a detailed Operations Plan which outlines the response options available to the country in case the trigger, or attachment level, defined in the country's ARV-indexed insurance contract is exceeded at the end of the season. This Operations Plan was reviewed and approved by the ARC Agency Governing Board, enabling Senegal to enter into an insurance contact with ARC Insurance Company Limited. Given the below normal progression of the 2014 agricultural season and the failed sowing conditions in parts of the country, the ARC Secretariat started discussions with the Government of Senegal before the end of the season. In view of the pay-out, **the in-country Technical Working Group is in the process of finalising the FIP**, which will determine which of the response options defined in the Operations Plan will be activated, taking into account ARV's modelled estimates and the situation on the ground. Once the FIP is submitted to and approved by the ARC Agency Governing Board Peer Review Mechanism, the pay-out will be released to the country. The implementation of the response will be closely monitored by the ARC Agency as well as through an external M&E process audit.