Rainfall

The rainy season in Senegal lasts from mid-May to early November. The 2016 season was characterised by a high variability between regions in cumulative rainfall totals. Southern Senegal, and particularly the south-eastern (Kedougou) and south-western (Ziguinchor) regions, received up to over 1,000 mm of rainfall, while the cumulative rains in the central and northern parts of the country ranged mostly between 200 and 400 mm. At regional level, the rainfall totals ranged from 290 mm in St. Louis to 1,000 mm in Kedougou region. Compared to the long-term national average (1983-2015), normal to above normal rainfall was received throughout most of the country. However, central Senegal (Kaffrine and Kaolack regions) experienced a below normal season, with cumulative rainfall totals of 20% below average at regional level, and over 50% below average in localised areas along the Gambian border.

Regarding the spatial and temporal distribution of the rains, an analysis of dekadal (10-day) rainfall shows an unequal performance of the season across the country. In south-eastern Senegal, particularly in Kedougou and Kolda regions, the season experienced a start in line with long-term rainfall patterns, followed by a normal progression of the season until early October 2016. However, most other regions experienced a delayed start of the 2016 season, which effectively started with well above average rains in the last dekad of July (21-31 July). This was followed by a short dry spell in early August, and abundant rainfall between mid-August and early October. The season ended early in all regions with the exception of the far south-east (Kedougou region), with little to no rainfall received between mid-October and mid-November.

Drought

The in-country Technical Working Group (TWG) customised Africa RiskView to model the impact of drought on groundnut, the main cash crop for many households in Senegal, and an important crop for food security in the country. According to Africa RiskView, the planting criteria set by the TWG during the in-country customisation of the model were not met in many parts of central and north-western Senegal during the planting window (May-July). This can mainly be attributed to the switch to a triple planting threshold used in 2016, which assesses rainfall received during three consecutive dekads to determine optimal planting conditions. Due to the

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erratic rains in early August, this threshold was not met in many areas, thus leading Africa RiskView to assume that farmers did not plant their crops (or, if they did, expected yields would be low).

In areas where the planting conditions were met, Africa RiskView estimates that the crop water requirements were satisfied to varying degrees. In southern and eastern Senegal, the WRSI values were generally good to very good, meaning that the water requirements of groundnut were fully satisfied over the course of the 2016 season. However, in central and north-western Senegal, the values range from mediocre (60-80) to average (80-95), according to FEWS NET’s WRSI classification.

Compared to the benchmark set by the TWG to model normal conditions in Senegal (median of the previous 5 years), it appears that the end-of-season WRSI values are in line with normal conditions in areas where the planting conditions were met, namely most of southern and eastern Senegal. Well below normal conditions (below 50% of the benchmark) prevailed in central and north-western Senegal, where planting did not occur according to Africa RiskView. At regional level, the most adverse conditions were recorded in Fatick (25% of normal), Kaffrine (33% of normal), Thies (36% of normal) and Kaolack (52% of normal) regions in central and western Senegal. These were also the areas affected by poor and erratic rains during the 2016 season. Conversely, conditions were in line with the benchmark in Ziguinchor and Kedougou regions, and above normal in Matam (149% of normal). It is important to note that in these regions, groundnut cultivation is very localised, which is reflected in the calculation mask selected by the TWG, and which results in only a small number of pixels re-
tained for the calculation of the WRSI. Information from the field indicates that localised areas outside of this calculation mask experienced dry conditions; for instance, WFP’s R4 programme is planning to make payouts to farmers in Tambacounda region who enrolled in the micro-insurance initiative.

Because of the stricter planting criteria, Africa RiskView’s WRSI calculations are more pessimistic than those of other models. For instance, FEWS NET’s regional WRSI model for West Africa indicates that average to good WRSI conditions prevailed in most of Senegal at the end of the 2016 agricultural season. It is important to note, however, that this model uses millet as a reference crop, while Africa RiskView was customised to model the impact of drought on groundnut. FAO’s Agricultural Stress Index (ASI), a composite indicator based on vegetation and temperature information, also indicates that less than 10% of cropped areas in southern and northern Senegal were affected by crop failure, with 10-25% affected in the central regions (Kaffrine and Kaolack). Compared to the crop production statistics for the 2016 season, it also appears that Africa RiskView’s estimates suggest a more pessimistic assessment of the seasonal performance. According to the latest information available from the ground, it appears that cereal production in 2016 experienced a 4% increase compared to the previous season, and is 55% higher than the 5-year average. The production of groundnut decreased slightly compared to 2015 (-5%), but remains 38% higher than the 5-year average; groundnut yields decreased by 11% compared to 2015 (3% above average).

**Affected Populations**

Based on the in-country customisation of Africa RiskView, nearly 1.3 million people in Senegal are vulnerable to drought. Due to the below normal WRSI conditions in central and western Senegal, Africa RiskView estimates that out of these, around 370,000 people were directly affected by drought conditions in Senegal at the end of the 2016 agricultural season. The most affected regions are located in the central and western parts of the country and include Kaolack (around 175,000 people), Kaffrine (140,000), Thies (135,000) and Fatick (117,000). Another 160,000 people are estimated to be affected in Louga and Diourbel. This figure is well above the long-term average (1983-2015) of around 360,000 people at the national level. Nonetheless, the modelled drought impact remains lower than the magnitude of the major drought events in the country in 2002, 2011 and 2014 (which resulted in a payout of over USD 16 million by ARC Ltd in early 2015).

The 2016 Cadre Harmonisé food security analysis exercise, concluded in November 2016, found that around 345,000 people were affected by severe food insecurity in Senegal (Phase 3 and above) at the time of analysis. This figure was projected to increase to around 880,000 people during the peak lean season (June-August 2017). While these figures are largely in line with Africa RiskView’s estimates, it is important to note that the Cadre Harmonisé figures do not disaggregate between the different drivers of food insecurity. Indeed, discussions with the TWG in-country revealed that the estimates of food insecurity at the national level for 2016/17 are also impacted by market access limitations, chronic factors and the long-term effects of several successive droughts between 2011 and 2014, while drought and poor crop production do not appear to be the main drivers of food insecurity in 2016/17. It thus appears that Africa RiskView slightly over-estimates the number of people affected by drought, which can be attributed in part to the triple planting threshold used in 2016. It appears that farmers overall managed to plant and achieve adequate yields despite the late start, early August dry spell and early cessation of rains in some areas. Indeed, had the TWG opted for more lenient criteria (such as the one used in 2015), the number of affected people would have reduced to around 60,000 people directly affected by drought.

**ARC Risk Pool**

Senegal has been a member of the ARC Risk Pool since the first pool in 2014/15. In that year, the country benefited from a payout of over USD 16 million, due to the poor performance of the 2014 agricultural season in West Africa. During the current pool, the country did not qualify for a payout, given that the attachment level selected by the Government of Senegal (equivalent to around 770,000 people) was not reached.

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Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Senegal

Dakar

Diourbel

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Dakar, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Diourbel, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Fatick, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Kaffrine, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Kaolack, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Kedougou, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Kolda, Senegal

Dekadal rainfall in mm compared to 1983-2015 average (blue line), 11 May-10 Nov 16, Louga, Senegal

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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 software is the technical engine of ARC. It uses satellite-based rainfall information to estimate the costs of responding to a drought, which triggers a corresponding insurance payout.

The ARC Insurance Company Limited is the financial affiliate of the ARC Agency, which pools risk across the continent through issuing insurance policies to participating countries.

NOTE ON AFRICA RISKVIEW’S METHODOLOGY:

Rainfall: Africa RiskView uses various satellite rainfall datasets to track the progression of rainy seasons in Africa. Countries intending to participate in the ARC Risk Pool are required to customise the rainfall component by selecting the dataset which corresponds the best to the actual rainfall measured on the ground.

Drought: Africa RiskView 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 Africa RiskView, countries intending to take out insurance customise the software’s parameters to reflect the realities on the ground.

Affected Populations: Based on the WRSI calculations, Africa RiskView estimates the number of people potentially affected by drought for each country participating in the insurance pool. As part of the in-country customisation process, vulnerability profiles are developed at the sub-national level for each country, which define the potential impact of a drought on the population living in a specific area.

Response Costs: In a fourth and final step, Africa RiskView converts the numbers of affected people into response costs. For countries participating in the insurance pool these national response costs are the underlying basis of the insurance policies. Payouts 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.

Disclaimer: The data and information contained in this report have been developed for the purposes of, and using the methodology of, Africa RiskView and the African Risk Capacity Group. The data in this report is provided to the public for information purposes only, and neither the ARC Agency, its affiliates nor each of their respective officers, directors, employees and agents make any representation or warranty regarding the fitness of the data and information for any particular purpose. In no event shall the ARC Agency, its affiliates nor each of their respective officers, directors, employees and agents be held liable with respect to any subject matter presented here. Payouts under insurance policies issued by ARC Insurance Company Limited are calculated using a stand-alone version of Africa RiskView, the results of which can differ from those presented here.

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