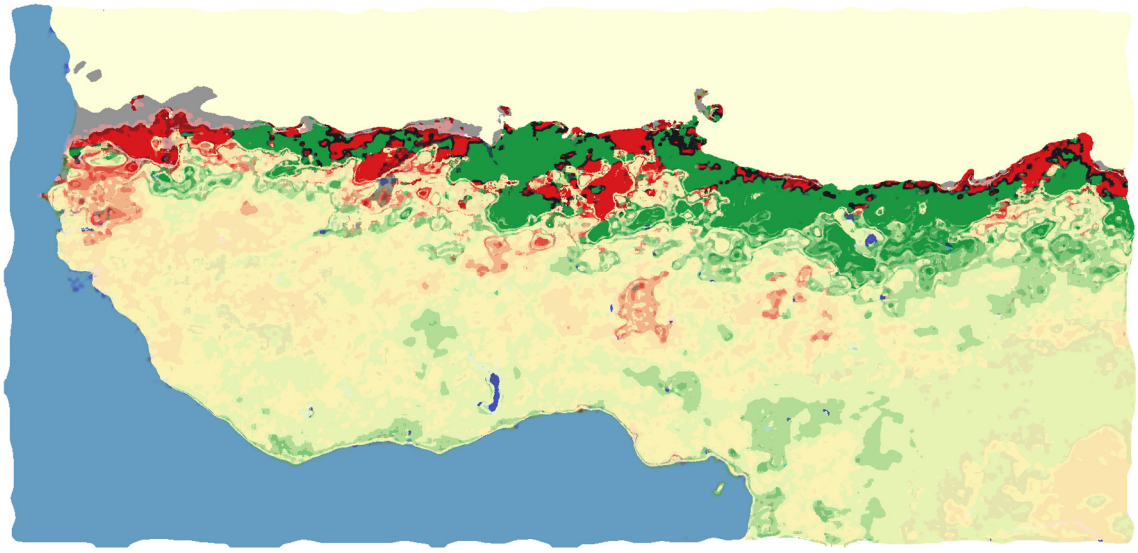
# 2018 RAINY MID-SEASON BIOMASS AND SURFACE WATER OVER SAHEL REPORT



## Key Summary

- The rainy season of 2018 benefited from a generally positive rainfall across the Sahel and biomass production follows this positive trend.
- The regions in the centre and north of Senegal has experienced a dry spell since the start of July, which has caused a biomass production deficit. This has negatively impacted the growth of pasture and crops. This is the 5th consecutive year of biomass deficits for Senegal.
- The western regions of Mauritania, in particular Brakna and Trarza ae in their 2nd consecutive year of biomass deficits.
- The centre and west of Mali (Mopti & Kayes) have experienced a moderate biomass production deficit, which might still be compensated by favourable rainfall predictions for the rest of the season.
- The west of Niger (Tahoua) saw a late start of the rainy season, translating into weak biomass production. But the situation is beginning to reverse itself since the start of august, which should lead to a favourable regeneration of vegetation to normal levels.
- Eastern Burkina Faso has experienced a light deficit in biomass production but has been trending towards normal production since mid-July.



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## Introduction

The West African Monsoon takes place between June and October. West Africa, and the Sahel in particular, is dependent on the Monsoon's rains for the production of pasture, agricultural production and surface water (lakes, rivers, ponds).

This report is the result of a real-time monitoring of biomass production from satellite images. This monitoring is the principal tool of ACF's early warning system.

The satellite data likewise allows for a real-time monitoring of the presence of surface water and the water levels in key pastoral points of interest.

This report covers the mid-season situation (end of august 2018), focusing on biomass production and surface water availability for this period of the year. This report presents likewise the rainfall forecasts for the end of the rainy season (September and October 2018).

## Data and Methods

The satellite data used by this report are from a series of acquisitions since 1998 by the satellites SPOT-VEGETATION 4 & 5, replaced in 2014 by PROBA-V. These satellites are part of the European Space Agency (ESA)'s space programs. The raw data is treated by the Flemish Institute of Technology (VITO) and then analysed by toolkits developed by ACF: the BioGenerator and HydroGenerator.

The BioGenerator quantifies the total annual biomass production in kg/ha and compares it to the average annual production for all years since 1998 to calculate the current anomaly.

The HydroGenerator allows to monitor the presence of surface water and calculate an index of water accessibility. An anomaly is calculated against the average of every year since 1998.

The precipitation forecasts in this report are produced by the Climate Prediction Center (CPC) of the National Ocean and Atmospheric Administration (NOAA) of the United States. The CPC publishes downloadable data from its global forecasts. The forecasts use a combination of different models. These predictions concern the 4-month period following August 2018.

## Biomass

The biomass anomaly map for 2018, expressed as percentage of average production from the 1998-2018 is shown in figure 1. Figure 2 is an expression of the same production anomaly, but calculated in number of standard deviation departure from the average production. These maps show surplus (above average) productions in green and deficit (below average) productions in red, whereas areas at the average are coloured yellow. In the north of the production areas are the desert areas which have never registered any biomass production according the data. The grey areas have normally not yet had enough biomass production to calculate a statistically reliable anomaly. These zones are mostly in the northern fringes of the Sahel, near the desert.

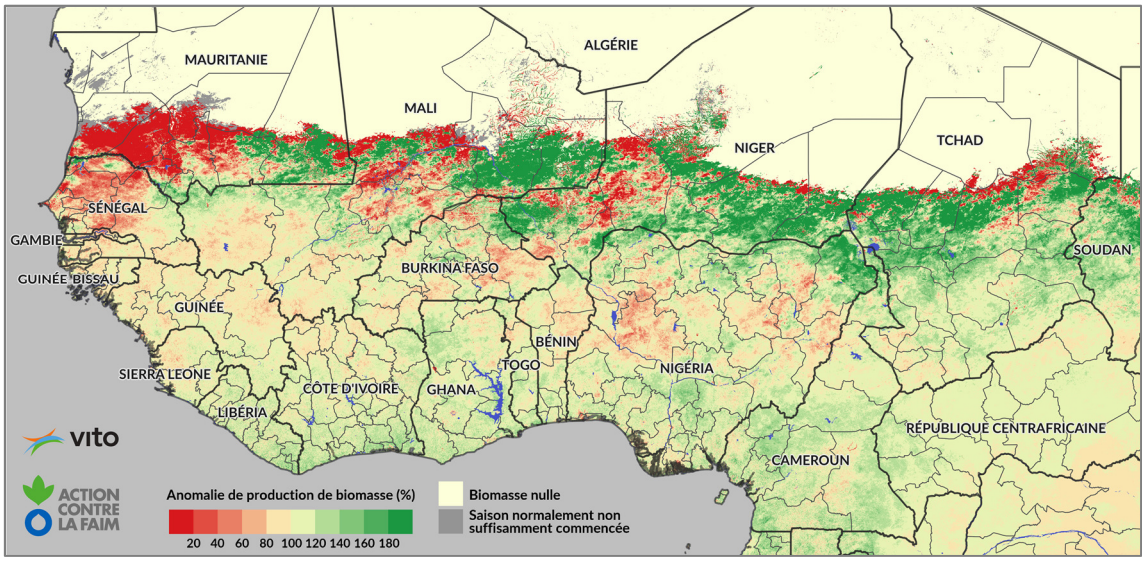


*Figure 1 – Biomass production anomaly for the 2018 West African rainy season as of the end of august 2018. Anomaly calculated as % of average production between 1998-2018*

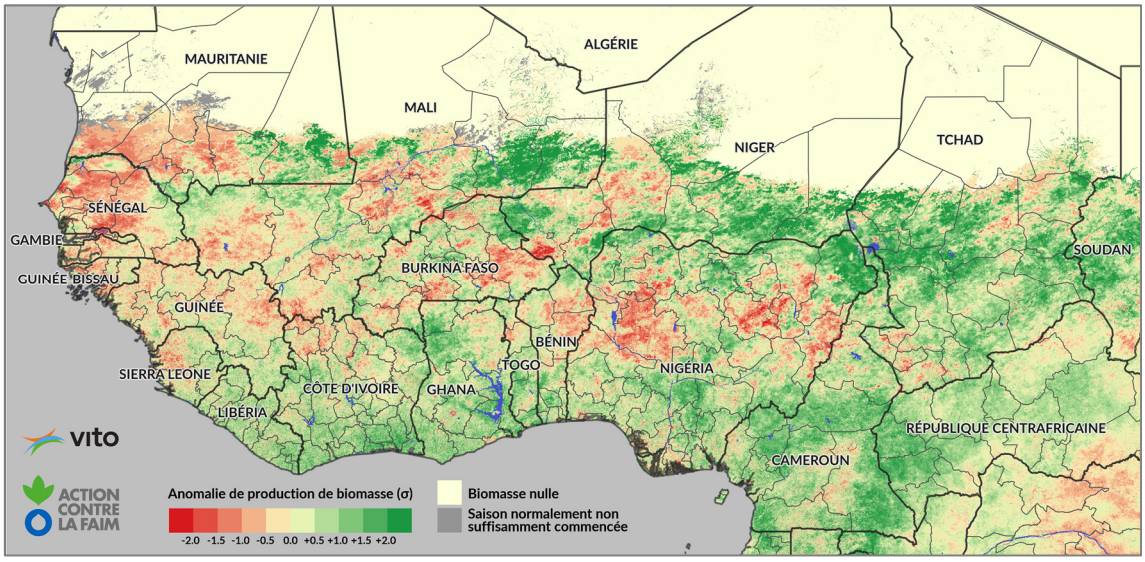


*Figure 2 – Biomass production normalised anomaly for the 2018 rainy season (end of august) calculated in standard deviations (σ) departure from the average production between 1998-2018.*



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Figures 1 & 2 show a significant negative biomass production anomaly in the west of Mauritania, northern Senegal and the west-central part of Mali. Other deficit areas appear, such as in the west of Niger. However, they are typically more isolated and limited.

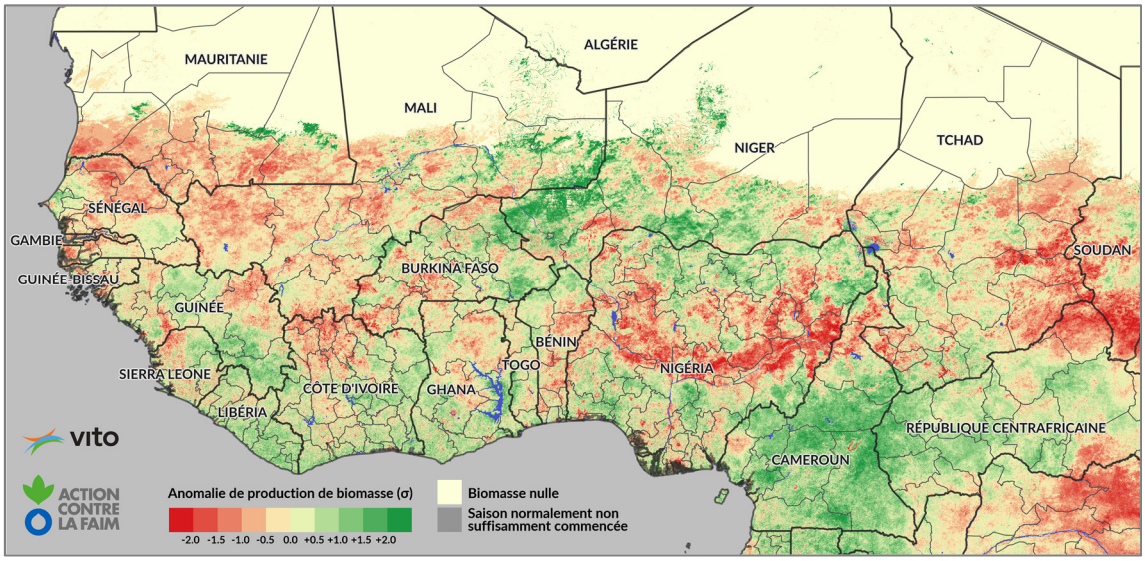


*Figure 3 - Biomass production normalised anomaly for the 2017 rainy season calculated in standard deviations (σ) departure from the average production between 1998-2018.*

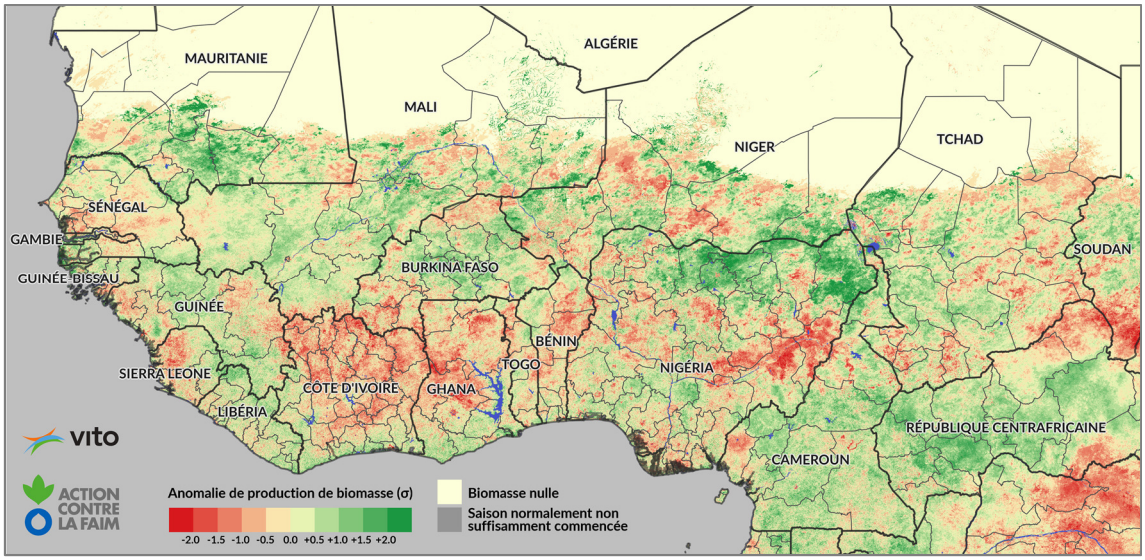


*Figure 4 - Biomass production normalised anomaly for the 2015 rainy season calculated in standard deviations (σ) departure from the average production between 1998-2018.*

Figures 3 & 4 show the biomass production normalised anomalies for 2017 and 2016, respectively. These maps allow for comparisons with previous rainy seasons, as the presence of multiple consecutive years of drought often has serious repercussions for farmers, herders and their animals. The negative production shown in the west of the Sahel (Senegal and Mauritania) for the 2018 rainy season are particularly troubling as both countries experienced a serious biomass deficit in 2017 and a smaller one in 2016.

Figure 5 shows time-series profiles of daily biomass production in kilogrammes of dry matter. Several specific regions have been chosen, as representations of the situation. The daily production of 2018 (dark green line) is compared to the average production (light green shaded area) as well as the variability (± standard deviation), minimum and maximum values. All values are calculated from the 1998-2018 period.

This figure shows a contrasting situation among different regions. The regions of Louga and Saint-Louis (Senegal) show a pause in biomass production for the month of July, that coincides with a dry spell observed over the same regions. Brakna (Mauritania) has still registered no biomass production at all and thus is trending towards an abnormally weak season. Tomboctou (Mali) experienced a late start of rains but the situation as evolved favourably and had above-average production in August. Gnagna (Burkina Faso) shows a light production deficit. The regions of Hodh El Chargui (Mauritania), Gao (Mali), Zinder (Niger) and Kanem (Tchad) all indicate a favourable situation of biomass production.

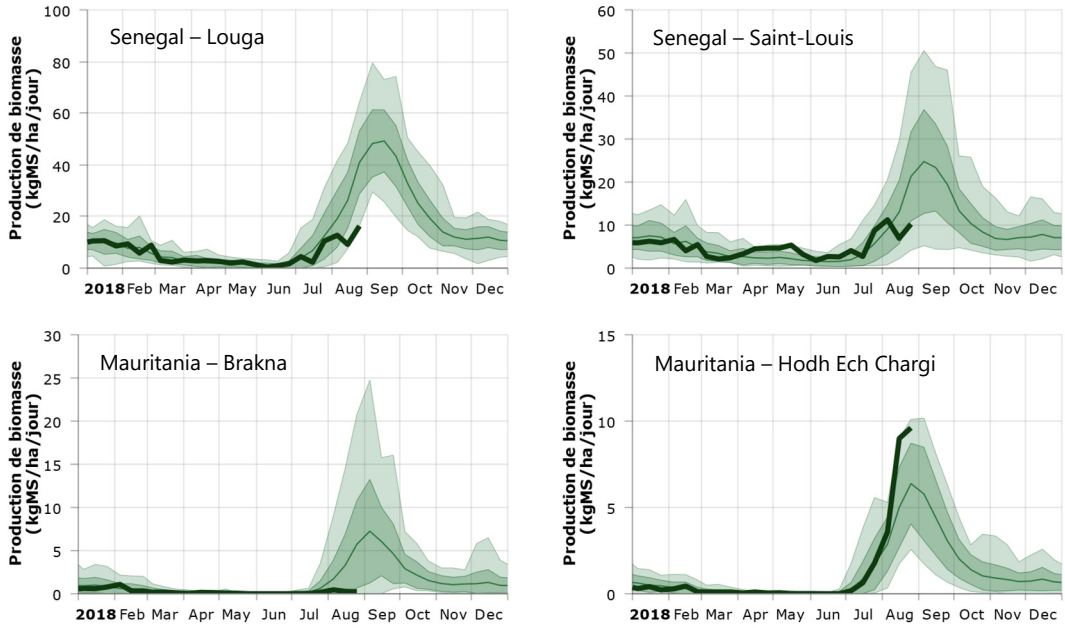


*Figure 5 – Instant biomass production profiles for year 2018 for different regions of Sahel countries. Biomass production profiles are compared with average and variation profiles retrieved over 1998-2018 time period.*

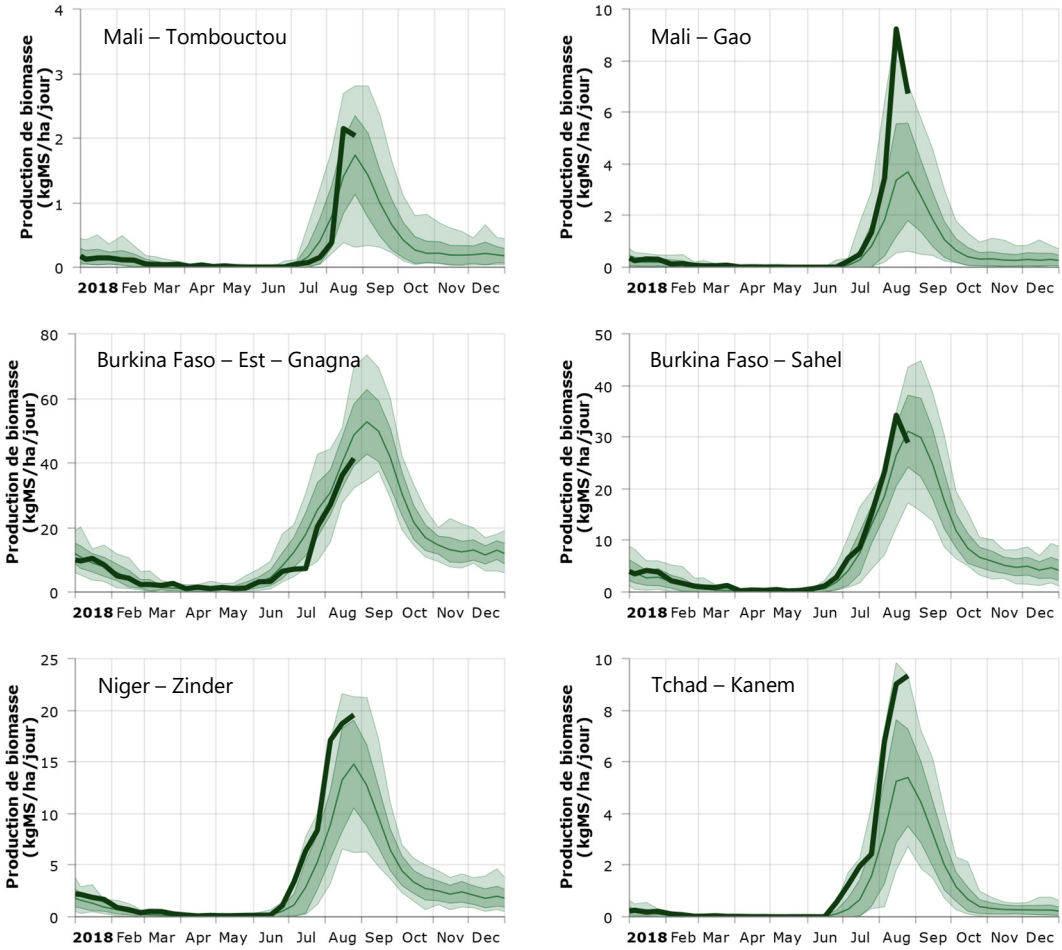


*Figure 5 (2nd part) – Instant biomass production profiles for year 2018 for different regions of Sahel countries. Biomass production profiles are compared with average and variation profiles retrieved over 1998-2018 time period.*

## Surface water

The surface water accessibility index is calculated by weighting of total distance to water, limited to 30km, defined as the maximum distance walkable daily by a herd in search of water.

Figure 6 shows the surface water accessibility index anomaly calculated for the July-August 2018 period, expressed in percent (%) of the average of the same two months period between 1998 and 2018.

Figure 7 shows time-series profiles of some important surface water points selected over the Sahel, representing the overall situation. The time-series is the evolution of the surface water in km². It is compared to the average and to the variation around the mean (± standard deviation, minimum and maximum) over the 1998-2018 period.



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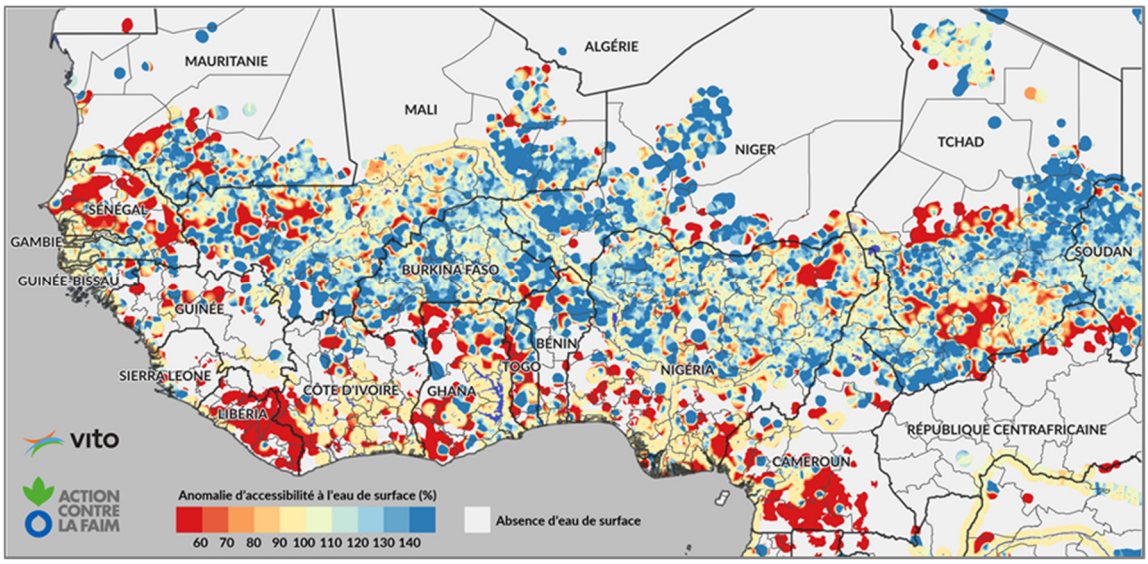


*Figure 6 – Surface water accessibility anomaly map for July-August 2018, calculated against average of 1998-2018 for the same time period*

In Mauritania, the pond of Aleg seems to be at a level under the normal situation, and the pond of Mbout, started from a very high level in 2017, trends to a normal situation reflecting a low filling rate for the start of the 2018 rainy season.

In Mali, the pond of Gossi, started from a low level in 2017, and the pond of Dori in Burkina Faso both trend to a normal or slightly above normal level.

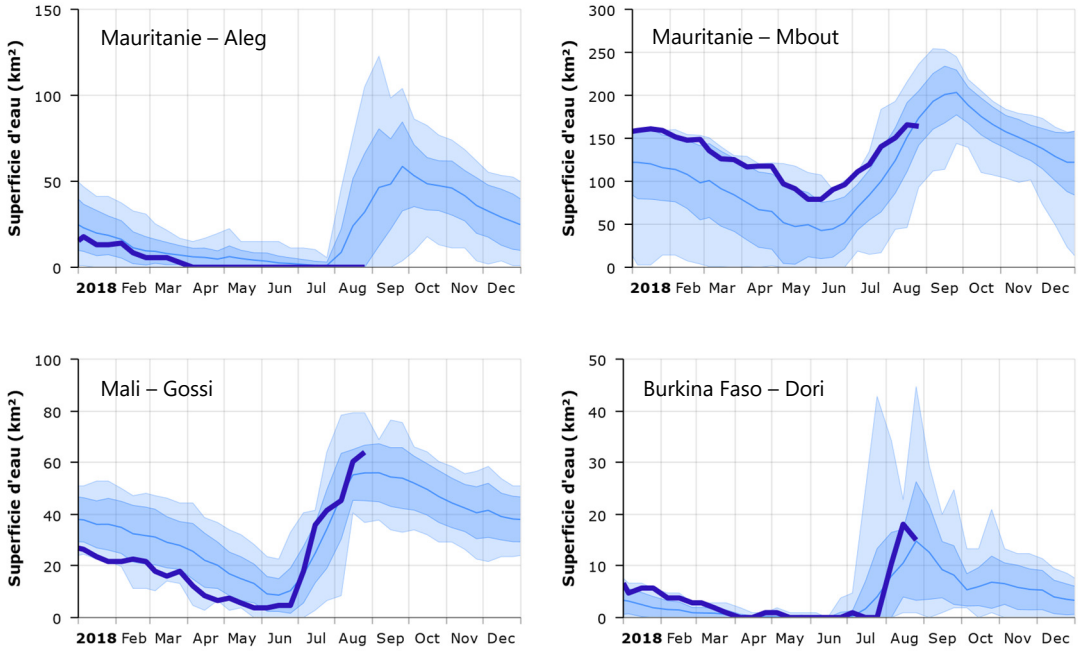


*Figure 7 – Time-series of several important water points in 2018, compared to the average profile and to its variation over the 1998-2018 period.*

## Rainfall forecast

Figures 8 and 9 show forecasts by NOAA´s CPC of 2018 September´s and October´s rainfall anomalies, as these months are the end of the rainy season. The anomaly is expressed as mm/day deviation from the average 1998-2018 period.

The month of September shows rainfall forecast everywhere positive excepted for the west area, western Senegal and western Mauritania.

The month of October, at the end of the rainy season, shows rainfall forecast close to or slightly above average.

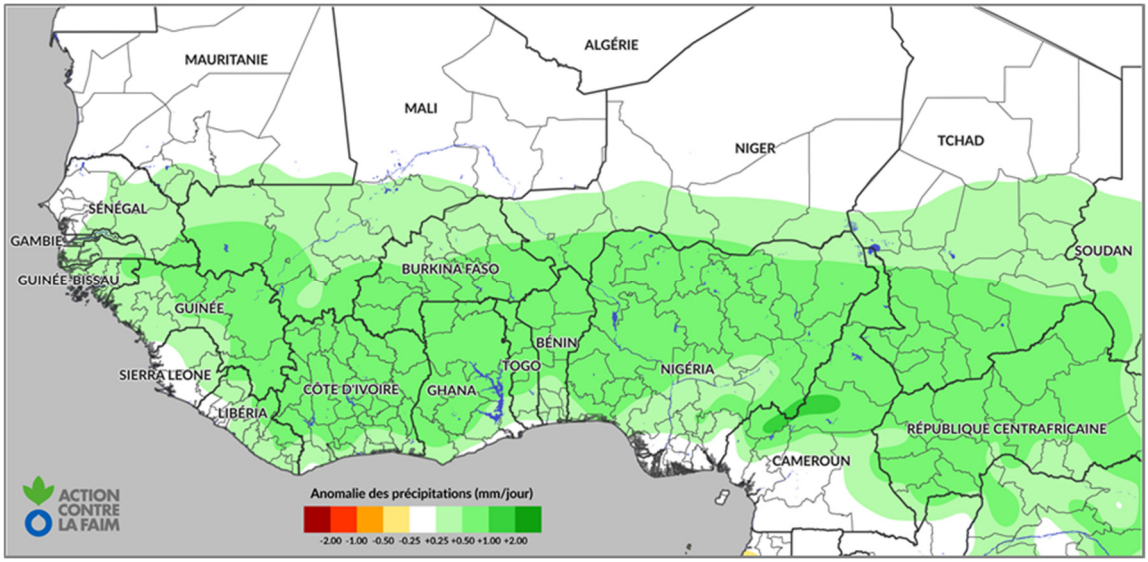


*Figure 8 – September 2018 rainfall anomaly forecast*

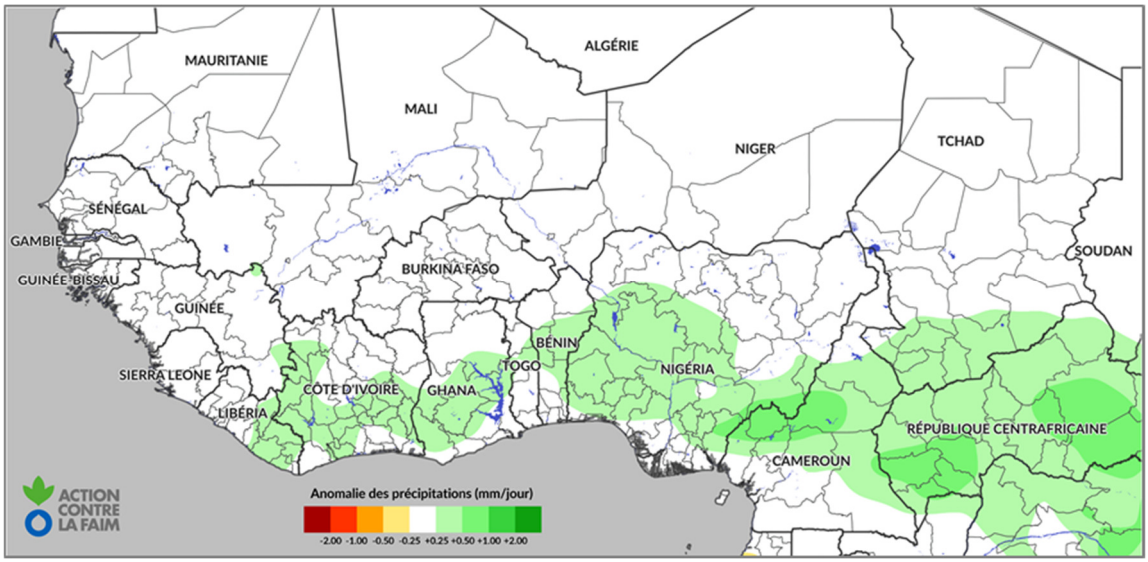


*Figure 9 – October 2018 rainfall anomaly forecast*

## Situation analysis by country

A composite analysis at the country's region level is provided below. Table 1 highlights each country and region´s biomass production anomalies for 2016, 2017 and 2018 (till August), and rainfall forecasts anomalies until the end of the rainy season (September and October 2018).

| | | Biomass production anomalies | | | Rainfall forecast | |
|---|---|---|---|---|---|---|
| **Country** | **Region** | **2016** | **2017** | **2018 (August)** | **September 2018** | **October 2018** |
| **Burkina Faso** | Boucle du Mouhoun | +0.3σ (105%) | +0.0σ (101%) | +0.1σ (102%) | +21% (2.3mm/j) | +13% (0.7mm/j) |
| | Cascades | -0.5σ (95%) | -0.5σ (96%) | +0.0σ (100%) | +19% (3.8mm/j) | +12% (1.4mm/j) |
| | Centre | +0.9σ (117%) | +0.3σ (104%) | +0.3σ (109%) | +24% (2.3mm/j) | +16% (0.7mm/j) |
| | Centre-Est | +0.4σ (107%) | +0.4σ (105%) | -0.2σ (95%) | +25% (2.6mm/j) | +18% (0.8mm/j) |
| | Centre-Nord | +0.4σ (109%) | +0.3σ (106%) | +0.1σ (104%) | +26% (1.8mm/j) | +20% (0.5mm/j) |
| | Centre-Ouest | +0.6σ (109%) | -0.4σ (95%) | -0.1σ (100%) | +25% (2.6mm/j) | +14% (0.8mm/j) |
| | Centre-Sud | +0.7σ (110%) | +0.2σ (104%) | +0.3σ (106%) | +25% (2.7mm/j) | +15% (0.9mm/j) |
| | Est | +0.3σ (105%) | +0.5σ (107%) | -0.3σ (91%) | +26% (2.2mm/j) | +22% (0.7mm/j) |
| | Hauts-Bassins | -0.2σ (98%) | -0.2σ (98%) | +0.1σ (102%) | +22% (3.1mm/j) | +14% (1.0mm/j) |
| | Nord | +0.4σ (108%) | +0.2σ (103%) | +0.4σ (110%) | +23% (1.8mm/j) | +15% (0.5mm/j) |
| | Plateau Central | +0.9σ (117%) | +0.3σ (105%) | +0.1σ (103%) | +25% (2.2mm/j) | +17% (0.6mm/j) |
| | Sahel | +0.0σ (96%) | +0.1σ (98%) | +0.4σ (112%) | +27% (1.4mm/j) | +21% (0.3mm/j) |
| | Sud-Ouest | -0.3σ (97%) | +0.1σ (101%) | +0.2σ (104%) | +23% (3.4mm/j) | +11% (1.3mm/j) |
| | **Entire country** | **+0.2σ (104%)** | **+0.1σ (102%)** | **+0.1σ (102%)** | **+24% (2.4mm/j)** | **+16% (0.8mm/j)** |
| **Mali** | Gao | +0.3σ (100%) | +0.6σ (118%) | +1.5σ (158%) | +21% (0.6mm/j) | +14% (0.1mm/j) |
| | Kayes | +0.3σ (106%) | -0.5σ (89%) | -0.0σ (103%) | +22% (2.3mm/j) | +20% (0.7mm/j) |
| | Kidal | +1.1σ (127%) | +0.8σ (105%) | +0.5σ (85%) | +26% (0.3mm/j) | +19% (0.1mm/j) |
| | Koulikoro | +0.4σ (108%) | -0.4σ (92%) | +0.1σ (104%) | +21% (2.2mm/j) | +21% (0.7mm/j) |
| | Mopti | +0.5σ (119%) | -0.3σ (89%) | -0.2σ (90%) | +25% (1.3mm/j) | +16% (0.3mm/j) |
| | Ségou | +0.3σ (106%) | -0.2σ (93%) | +0.3σ (111%) | +21% (1.8mm/j) | +15% (0.5mm/j) |
| | Sikasso | +0.2σ (103%) | -0.3σ (97%) | -0.0σ (100%) | +16% (3.4mm/j) | +12% (1.2mm/j) |
| | Tombouctou | +0.1σ (97%) | -0.1σ (75%) | +0.2σ (92%) | +24% (0.3mm/j) | +17% (0.1mm/j) |
| | **Entire country** | **+0.3σ (105%)** | **-0.1σ (94%)** | **+0.3σ (110%)** | **+21% (1.0mm/j)** | **+17% (0.3mm/j)** |
| **Mauritania** | Adrar | -0.0σ (23%) | -0.3σ (6%) | +1.5σ (94%) | +27% (0.3mm/j) | -0% (0.1mm/j) |
| | Assaba | +0.9σ (145%) | -0.6σ (53%) | -0.4σ (59%) | +24% (0.9mm/j) | +15% (0.3mm/j) |
| | Brakna | +0.3σ (121%) | -0.7σ (27%) | -0.7σ (8%) | +25% (0.7mm/j) | +14% (0.3mm/j) |
| | Dakhlet-Nouadhibou | -0.3σ (1%) | -0.3σ (1%) | -0.2σ (25%) | +12% (0.3mm/j) | +3% (0.2mm/j) |
| | Gorgol | +0.0σ (93%) | -0.8σ (43%) | -0.5σ (52%) | +22% (1.1mm/j) | +14% (0.4mm/j) |
| | Guidimakha | +0.7σ (125%) | -0.5σ (79%) | +0.5σ (119%) | +22% (1.4mm/j) | +14% (0.5mm/j) |
| | Hodh Ech Chargi | +0.1σ (99%) | -0.2σ (80%) | +0.8σ (129%) | +26% (0.5mm/j) | +11% (0.2mm/j) |
| | Hodh El Gharbi | +0.8σ (146%) | -0.5σ (69%) | -0.0σ (90%) | +25% (0.8mm/j) | +18% (0.3mm/j) |
| | Inchiri | -0.3σ (2%) | -0.3σ (0%) | -0.3σ (0%) | +18% (0.3mm/j) | +6% (0.2mm/j) |
| | Tagant | +1.0σ (141%) | -0.2σ (31%) | -0.4σ (12%) | +26% (0.4mm/j) | +3% (0.2mm/j) |
| | Tiris-Zemmour | +0.7σ (82%) | -0.3σ (1%) | -0.3σ (0%) | +27% (0.2mm/j) | +2% (0.1mm/j) |
| | Trarza | +0.1σ (89%) | -0.5σ (32%) | -0.7σ (18%) | +21% (0.6mm/j) | +13% (0.3mm/j) |
| | **Entire country** | **+0.5σ (113%)** | **-0.4σ (51%)** | **-0.0σ (73%)** | **+25% (0.4mm/j)** | **+8% (0.2mm/j)** |

*Table 1 – Country and region´s biomass production anomalies means of the 2016, 2017 and 2018 (till August) rainy seasons and rainfall forecasts for September and October 2018.*



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| | | Biomass production anomalies | | | Rainfall forecast | |
|---|---|---|---|---|---|---|
| **Country** | **Region** | **2016** | **2017** | **2018 (August)** | **September 2018** | **October 2018** |
| **Niger** | Agadez | +0.5σ (108%) | +0.5σ (97%) | +1.0σ (137%) | +51% (0.1mm/j) | +26% (0.0mm/j) |
| | Diffa | +0.7σ (129%) | -0.1σ (84%) | +1.4σ (160%) | +46% (0.4mm/j) | +59% (0.1mm/j) |
| | Dosso | +0.0σ (104%) | -0.0σ (96%) | +0.4σ (109%) | +34% (1.6mm/j) | +35% (0.4mm/j) |
| | Maradi | -0.1σ (95%) | +0.8σ (124%) | +0.8σ (135%) | +36% (1.1mm/j) | +34% (0.2mm/j) |
| | Tahoua | -0.1σ (82%) | +0.3σ (112%) | +0.1σ (94%) | +34% (0.7mm/j) | +30% (0.1mm/j) |
| | Tillabéry | +0.3σ (114%) | +1.0σ (143%) | +0.4σ (117%) | +30% (1.2mm/j) | +26% (0.3mm/j) |
| | Zinder | +0.2σ (105%) | +0.3σ (115%) | +1.1σ (152%) | +41% (0.7mm/j) | +45% (0.1mm/j) |
| | **Entire country** | **+0.2σ (104%)** | **+0.5σ (114%)** | **+0.7σ (128%)** | **+39% (0.4mm/j)** | **+34% (0.1mm/j)** |
| **Senegal** | Diourbel | -0.1σ (96%) | +0.2σ (104%) | -0.6σ (70%) | +8% (1.7mm/j) | +5% (0.7mm/j) |
| | Fatick | -0.2σ (96%) | -0.2σ (96%) | -0.2σ (89%) | +8% (2.1mm/j) | +7% (0.8mm/j) |
| | Kaffrine | -0.3σ (94%) | -0.4σ (91%) | -0.9σ (67%) | +13% (2.1mm/j) | +12% (0.8mm/j) |
| | Kaolack | -0.6σ (89%) | -0.3σ (94%) | -0.1σ (93%) | +10% (2.3mm/j) | +9% (0.8mm/j) |
| | Kédougou | +0.4σ (106%) | -0.2σ (97%) | -0.4σ (93%) | +18% (3.1mm/j) | +13% (1.1mm/j) |
| | Kolda | -0.1σ (98%) | -0.1σ (98%) | -0.3σ (94%) | +15% (2.9mm/j) | +12% (1.1mm/j) |
| | Louga | +0.1σ (104%) | -0.4σ (84%) | -0.9σ (57%) | +13% (1.4mm/j) | +10% (0.5mm/j) |
| | Matam | -0.0σ (100%) | -0.8σ (75%) | -0.4σ (78%) | +18% (1.5mm/j) | +12% (0.5mm/j) |
| | Saint Louis | +0.4σ (117%) | -0.8σ (57%) | -0.3σ (79%) | +19% (1.1mm/j) | +12% (0.4mm/j) |
| | Sédhiou | +0.3σ (104%) | -0.3σ (94%) | -0.5σ (89%) | +11% (3.0mm/j) | +10% (1.1mm/j) |
| | Tambacounda | -0.1σ (98%) | -0.0σ (99%) | -0.2σ (94%) | +18% (2.3mm/j) | +13% (0.8mm/j) |
| | Thiès | +0.2σ (105%) | +0.6σ (115%) | -0.5σ (78%) | +5% (1.7mm/j) | +4% (0.7mm/j) |
| | Ziguinchor | +0.8σ (108%) | -0.4σ (98%) | -0.1σ (99%) | +9% (3.0mm/j) | +9% (1.1mm/j) |
| | **Entire contry** | **+0.1σ (102%)** | **-0.3σ (89%)** | **-0.4σ (82%)** | **+15% (2.1mm/j)** | **+11% (0.7mm/j)** |
| **Tchad** | Barh-El-Gazel | +0.2σ (105%) | -0.2σ (84%) | +1.1σ (153%) | +47% (0.6mm/j) | +57% (0.1mm/j) |
| | Batha | +0.2σ (104%) | -0.2σ (80%) | +0.8σ (132%) | +38% (0.9mm/j) | +46% (0.2mm/j) |
| | Borkou | +0.0σ (41%) | -0.1σ (41%) | -0.1σ (37%) | +76% (0.2mm/j) | +48% (0.0mm/j) |
| | Chari-Baguirmi | +0.5σ (109%) | +0.2σ (104%) | +0.9σ (121%) | +30% (2.0mm/j) | +35% (0.6mm/j) |
| | Ennedi Ouest | -0.4σ (9%) | -0.4σ (12%) | +0.7σ (118%) | +53% (0.2mm/j) | +70% (0.0mm/j) |
| | Ennedi-Est | -0.3σ (35%) | -0.4σ (29%) | +0.3σ (90%) | +68% (0.1mm/j) | +45% (0.0mm/j) |
| | Guera | +0.1σ (101%) | -0.2σ (96%) | +0.8σ (117%) | +26% (2.1mm/j) | +30% (0.7mm/j) |
| | Hadjer-Lamis | +0.3σ (109%) | -0.2σ (94%) | +1.7σ (152%) | +36% (1.3mm/j) | +46% (0.3mm/j) |
| | Kanem | +0.6σ (130%) | -0.1σ (78%) | +1.5σ (162%) | +47% (0.5mm/j) | +61% (0.1mm/j) |
| | Lac | +0.3σ (108%) | -0.0σ (96%) | +1.1σ (138%) | +41% (0.8mm/j) | +58% (0.2mm/j) |
| | Logone Occidental | -0.3σ (98%) | -0.3σ (98%) | -0.0σ (101%) | +22% (3.3mm/j) | +27% (1.3mm/j) |
| | Logone Oriental | +0.1σ (101%) | +0.5σ (104%) | +0.3σ (104%) | +19% (3.8mm/j) | +25% (1.6mm/j) |
| | Mandoul | -0.3σ (98%) | +0.2σ (102%) | +0.5σ (108%) | +20% (3.6mm/j) | +26% (1.5mm/j) |
| | Mayo-Kebbi Est | -0.1σ (100%) | -0.7σ (94%) | +0.3σ (105%) | +25% (2.9mm/j) | +24% (1.1mm/j) |
| | Mayo-Kebbi Ouest | +0.2σ (103%) | -0.1σ (99%) | +0.5σ (111%) | +29% (2.4mm/j) | +30% (0.8mm/j) |
| | Moyen-Chari | +0.2σ (102%) | +0.2σ (102%) | +0.9σ (114%) | +21% (3.3mm/j) | +25% (1.3mm/j) |
| | Ouaddaï | -0.1σ (97%) | -0.7σ (83%) | +0.9σ (129%) | +30% (1.3mm/j) | +45% (0.3mm/j) |
| | Salamat | -0.2σ (98%) | -0.7σ (92%) | +0.7σ (114%) | +21% (2.6mm/j) | +27% (0.9mm/j) |
| | Sila | -0.2σ (97%) | -0.9σ (85%) | +1.2σ (128%) | +21% (2.0mm/j) | +32% (0.5mm/j) |
| | Tandjile | +0.1σ (102%) | -0.0σ (100%) | +0.5σ (111%) | +25% (2.9mm/j) | +29% (1.1mm/j) |
| | Tibesti | -0.3σ (15%) | +0.3σ (46%) | +1.6σ (96%) | +94% (0.1mm/j) | +10% (0.0mm/j) |
| | Wadi Fira | -0.2σ (77%) | -0.6σ (50%) | +0.6σ (129%) | +52% (0.7mm/j) | +72% (0.1mm/j) |
| | **Entire country** | **+0.1σ (97%)** | **-0.3σ (84%)** | **+0.8σ (125%)** | **+30% (1.0mm/j)** | **+32% (0.3mm/j)** |

*Table 1 (2nd part) – Country and region´s biomass production anomalies means of the 2016, 2017 and 2018 (till August) rainy seasons and rainfall forecasts for September and October 2018.*

### Burkina Faso

In spite of a delayed start of the rainy season (Figures 1 & 2, Table 1), the situation has mostly recovered to normal values, both for biomass production (Figure 5) and surface water availability (Figures 6 & 7).

The rainfall forecast is also positive. East region shows a slight biomass deficit (90%) (Table 1). Though, it will probably compensate with more generous rains near the end of the season (Figures 8 & 9).

### Mali

The situation is positive, overall (Figures 1 & 2, Table 1). The start of the rainy season was slightly delayed but finally caught up and grazing land has been regenerated, specifically in Gao and Menaka regions (Figure 5).

Only the Western region, Kayes, shows a biomass deficit (Figures 1 & 2, Table 1). Surface water accessibility is slightly below the average (Figure 6), but should be compensated, according to the positive forecasts for the end of the season. Nevertheless, the situation over those regions could be problematic regarding the unfavourable past year 2017.

### Mauritania

Mauritania shows an uneven situation, with a positive anomaly in the East and a below average biomass production in the West (Figure 1 & 2).

Brakna and Trarza regions are the most affected by the deficit in production (Table 1) with biomass production respectively of 8% and 18% of the average production over the same period.

The situation in the West is worrying: rainfall forecasts at the end of the season are only slightly favourable (Figures 8 & 9), following up from a particularly dry 2017 season (Figure 3).

Likewise, the ponds of Aleg and Gossi are below their normal levels (Figures 6 & 7).

Given that the rain season has thus far been so short in Mauritania, it is important to pay particular attention to the coming weeks.

### Niger

The situation in Niger is globally positive, taking in account both the biomass production (Figures 1 & 2) and the accessibility of surface water (Figure 6).

Only the Western regions (Tahoua and Tillabery) show areas of biomass production below the average (Table 1), although rainfall in August should compensate for this deficit (Figures 8 & 9).

### Senegal

Biomass production in the country is globally below the normal level, particularly in Louga, Kaffrine, Diourbel, and West of Matam and Tambacounda regions (Figures 1 & 2). Over Louga, we measure a biomass production of 57% of the average production for the same period, 64% over the region of Kaffrine and 70% over the region of Djourbel.

This deficit is considering that the rainfall forecasting for the end of the season is average or at best moderately favourable (Figures 8 & 9). Like Western Mauritania, the below average production in Senegal follows disastrously weak biomass production in 2017 (Figure 3) and, to a lesser extent, 2016 (Figure 4).

Surface water accessibility is likewise below average, particularly in the centre of the country (Figure 6).

Senegal is in its 5$^{th}$ year in a row of biomass deficits. The last surplus year was 2013.

### Tchad

The situation in Tchad is globally positive.

Biomass production across the country is above-average (Figures 1 & 2), with the exception of some areas (Table 1) that should recover after the forecasted rains (Figures 8 & 9).

Surface water accessibility remains above average (figure 6).

## Conclusion

The mid-season (end of August) observations indicate a globally positive 2018 rainy season. Grazing land is being regenerated and ponds are being refilled with rain water. Moreover, rainfall forecasts are positive for the remainder of the season.

The western part of the Sahel (Senegal and Mauritania) is suffering from below average biomass production and surface water accessibility with a normal rainfall forecast for September. Furthermore, the current situation reflects a 3 to 5 years trend.

## Information et contact

For further information please visit the following websites:

- www.sigsahel.info for access to reports
- www.geosahel.info for map visualisation

For further information on data and methods, please contact:

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## References

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