

Forecast Performance Overview

Overall, rainfall information provided by the National Oceanic and Atmospheric Administration (NOAA), was provided from July 27, 2019 through November 8, 2019, inclusive. This data was compared against the forecasted conditions for each date. An 83% forecast accuracy rate was observed. This information is outlined below.

Performance Measure	Day 1 Forecast	Day 2 Forecast
Percent of Forecasts Correct	83%	75%
Percentage of Rainy Days Predicted	97%	96%
Rate of Rain Predictions with No Rain Observed	18%	29%

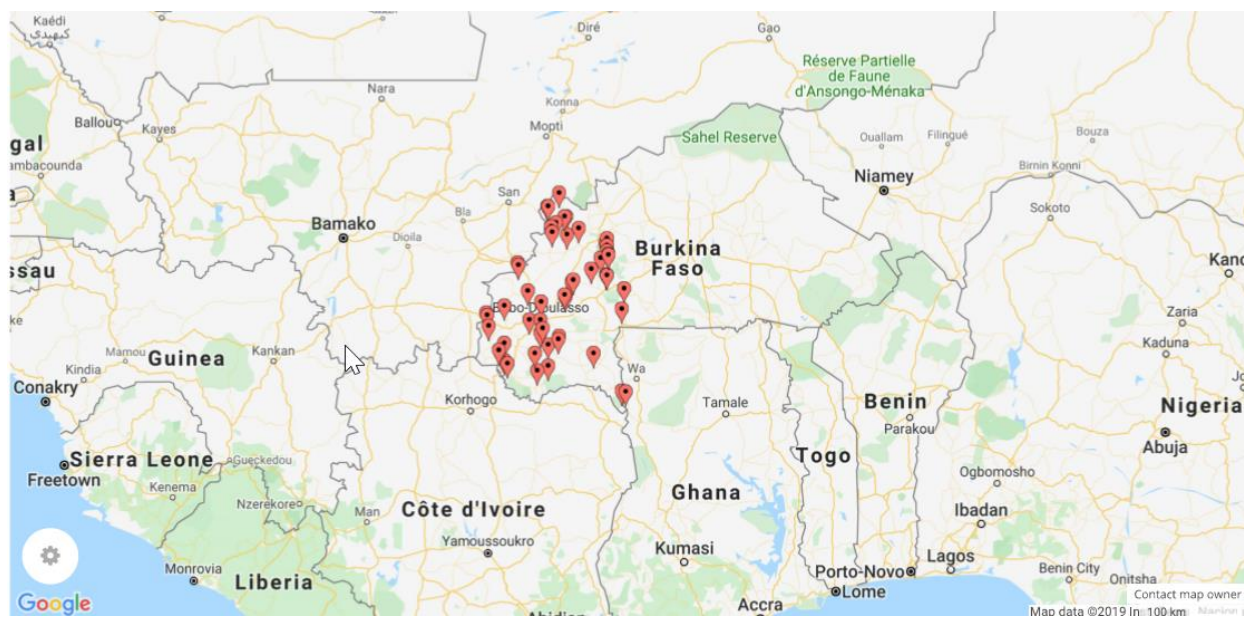
The possible rain forecast categories are: “Dry”, “Likely Dry”, “Rain Likely”, and “High Chance of Rain”. For the purposes of the above analysis, forecasts of “Rain Likely” or “High Chance of Rain” were considered to be predictions of rain. As observed in the chart, of all days with rain observed based on the NOAA satellite data, forecasts of rain were provided to the farmers. Additionally, in just 18% of cases in which rain was predicted did rain not actually occur.

Additionally, each category of rain forecast was compared to the actual conditions. Each forecast category has an expected chance of rain for the day provided, which is listed in the column “Expected Percentage of Rain”. For example, when a prediction of “Rain Likely” is made, there is about a 60% chance of rain or rain should occur 6 times for every 10 predictions of “Rain Likely”. The results of forecasted rain versus actual conditions for the 51-location sample can be seen below.

Forecast Category	Expected Percentage of Rain	Actual Percentage of Rain
Dry	<=10%	10%
Likely Dry	30%	38%
Rain Likely	60%	62%
High Chance Rain	>=80%	77%

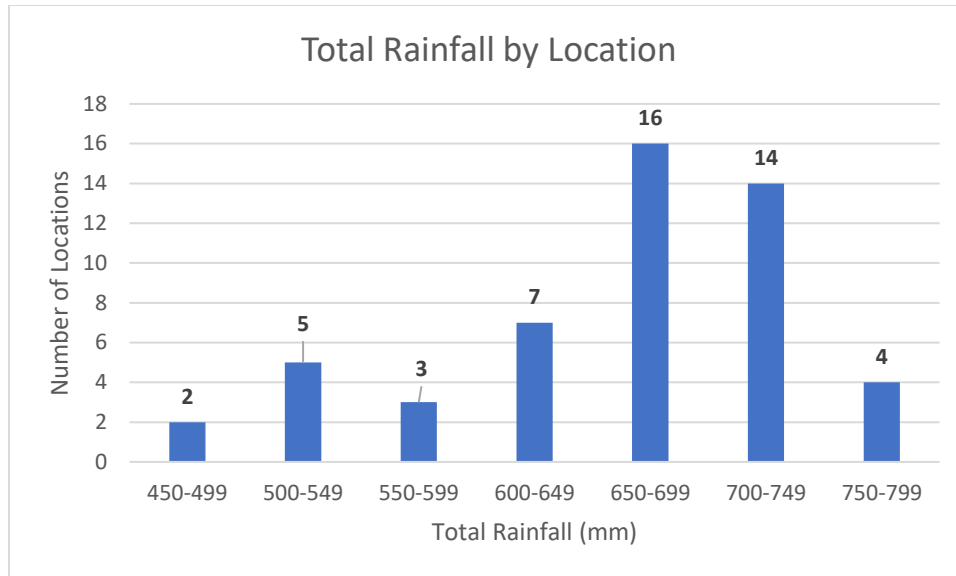
Overall Rainfall Analysis

The 51 locations involved in this analysis of rainfall are spread across the intervention area. These locations have been mapped below. For each location, the daily rainfall from NOAA satellite data over the 105 days was recorded. The raw data has been provided in a separate .csv file.



Total Rainfall

Total rainfall for each location over the 105 day period was calculated. The minimum total rainfall observed was 497.19 mm in Doumbala, in the north-west part of Burkina Faso just a few kilometers from the Mali border. The maximum total rainfall observed was 753.54 mm in Kenedougou, north-west of Bobo-Dioulasso. The mean observed rainfall for the 51 locations was 661.57 mm while the median was 665.94 mm. The distribution of total rainfall can be observed below:



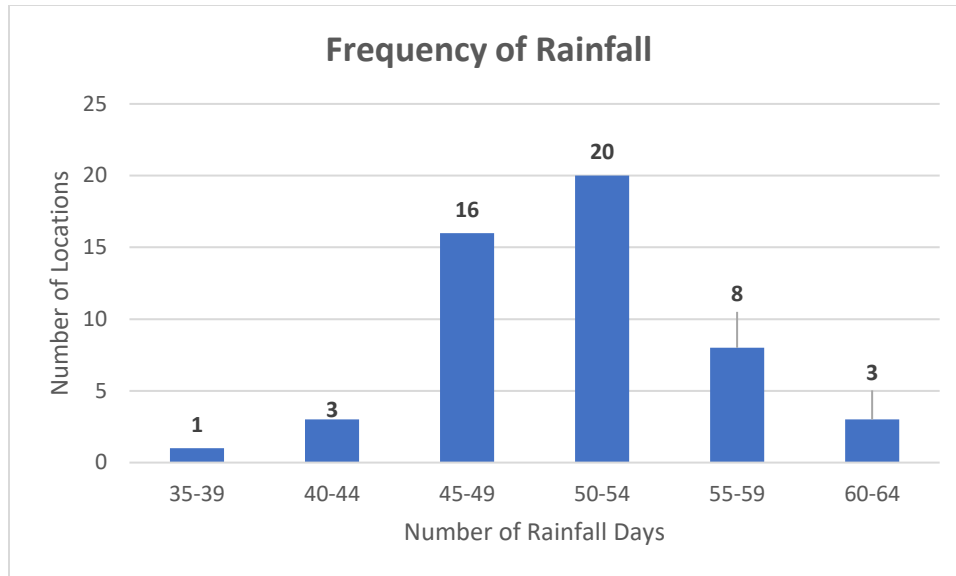
The distribution of total rainfall was concentrated between 650-749 mm of rainfall over the 105-day period. However, there were some locations in which rainfall was significantly lower than average. It would be worth evaluating whether farmers in these locations experienced different results from the rest of the farmers receiving forecasts. The locations for which total rainfall below 550 mm include:

Coordinates	Location Name	Total Rainfall (mm)
12.91, -4.16	Doumbala	497.19
12.92, -4.17	Doumbala	497.19
9.53, -2.78	Noumbiel	520.94
13.16, -3.95	Kossi	530.53
9.51, -2.71	Noumbiel	532.12
12.55, -4.11	Dokui	541.61
12.74, -3.86	Nouna	546.39

The above locations are scattered around the intervention area. However, there do appear to be primarily located in North-West Burkina Faso aside from Noumbiel, which is located near the border to both Ghana and Cote d'Ivoire.

Rainfall Days

Days of rainfall are defined as a day in which a location received at least 2 mm of rainfall. The distribution of number of rainfall days within the 105 day period can be observed below. The minimum number of rainfall days was 36, which was observed for the coordinate 11.17, -4.29 in Bobo-Dioulasso. The maximum number of rainfall days observed was 61, which was observed for the coordinate 9.99, -4.16 near Mado in the Dida Forest.



The mean number of rainfall days was 51.02 while the median number of rainfall days was 52; combined with the distribution above, it suggests a relatively normal distribution. With a standard deviation of 4.91, 96.1% of all locations experienced a number rainfall days within two standard deviations of the mean, between 41.2 days and 60.8 days.

Overall, in the 105-day period, there were a total of 12 days in which rain did not occur (2 mm rain or greater) in any of the 51 locations. These days include: July 27, August 4, September 29, October 13, 21, 24, 29, November 1, 4, 5, 6, and 8. Additionally, there were 10 days in which rain occurred in all 51 locations: August 8, 19, 30, September 1, 4, 14, 27, 30, October 12, and 30.

Additionally, the rainiest day of the 105-day period occurred on August 23. 50 of the 51 locations received rain with these locations receiving an average of 37.05 mm. The largest amount of rain a single location received in a day was 112.89 mm on August 8 in Bobo-Dioulasso. This accounted for 15.8% of the location's total rainfall over the 105-day observation period. This was the only instance of a single location receiving more than 100 mm of rainfall in a day. The next highest was 91.45 mm near Kosso on August 23.

Results Summary

Overall, satellite rain data recorded by NOAA was observed for 51 different locations over the 105-day period provided. The analyses performed were to contextualise some of the information both for individual locations as well as for all of the selected locations. This information can be further used to evaluate agricultural outputs that the participating farmers experienced. Additionally, it may be most beneficial to obtain these rainfall and forecast information for all of the farmers surveyed in the end-of-season evaluation in order to conduct a deeper analysis on the impacts of the provision of the weather forecasts. Provided alongside this brief of the rainfall data is the raw rainfall data including some analysis of rainfall for each location as well as the daily forecast information for each location. The daily forecast data lists numbers that correlate with different predictions. The numbers and their corresponding predictions can be seen below.

1:dry.
2:likely dry.
3:rain likely.
4:high chance of rain.
5:likely dry.
6:heavy rain likely.
7:high chance of heavy rain.
8:likely dry.
9:rain likely, morningtime.
10:high chance of rain, morningtime.
11:likely dry.
12:heavy rain likely, morningtime.
13:high chance of heavy rain, morningtime

14:likely dry.
15:rain likely, afternoon.
16:high chance of rain, afternoon.
17:likely dry.
18:heavy rain likely, afternoon.
19:high chance of heavy rain, afternoon.
20:likely dry.
21:rain likely, nighttime.
22:high chance of rain, nighttime.
23:likely dry.
24:heavy rain likely, nighttime.
25:high chance of heavy rain, nighttime.