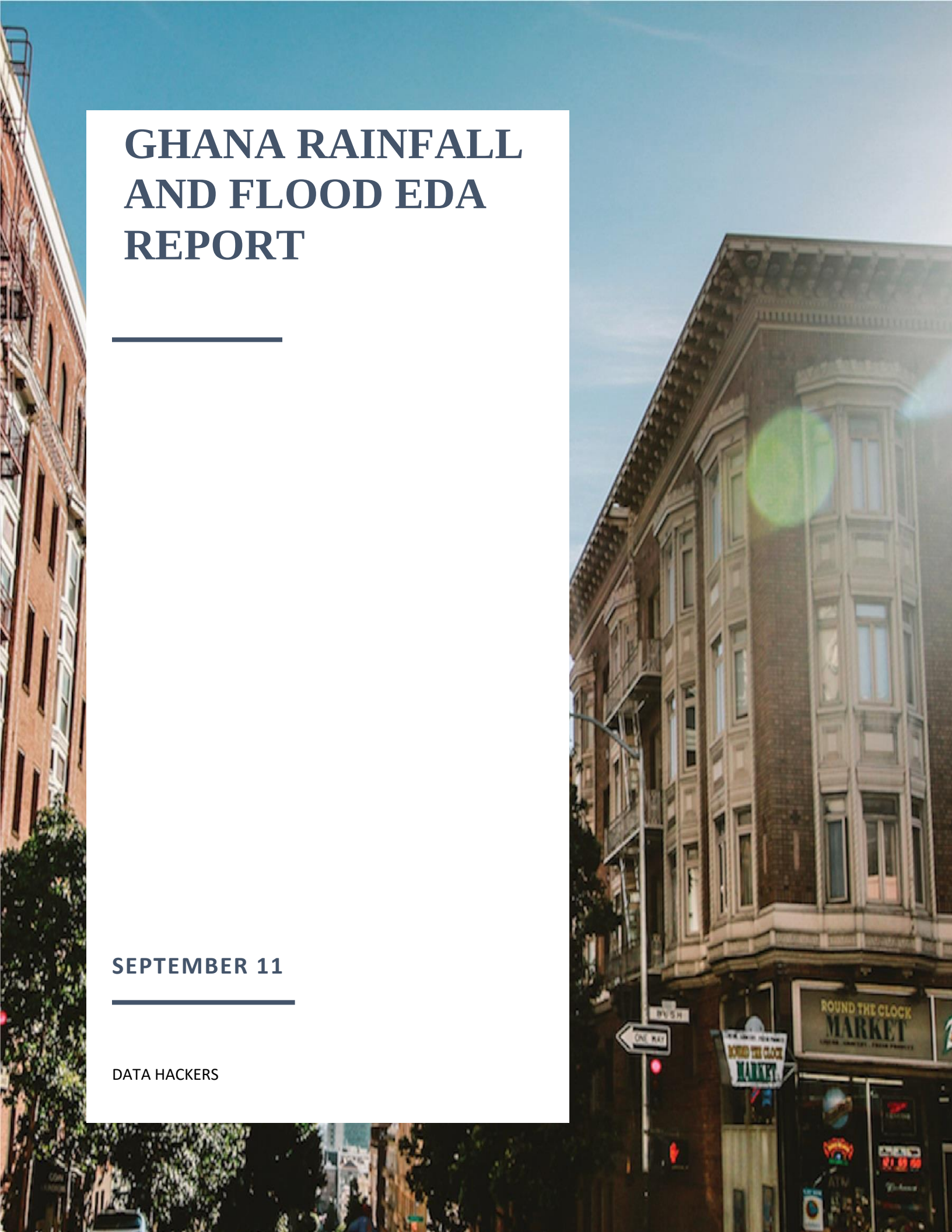
GHANA RAINFALL AND FLOOD EDA REPORT



SEPTEMBER 11

DATA HACKERS

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INTRODUCTION

In our analysis we used two datasets; one with rainfall data and another with flood data. The rainfall dataset is a structured dataset containing historical information on the average monthly rainfall in some districts and regions in Ghana, Uganda and Tanzania. The dataset originally contained 193004 rows and 12 columns of information. We cleaned the dataset to work with data from the 10 regions in Ghana from 1981 to 2016. The flood dataset is was a combination of 5 tables containing dates, locations and the estimated cost of damages incurred by the flood.

RESEARCH OBJECTIVE

The objective of this research is to conduct an exploratory analysis to answer some questions concerning rainfall in Ghana. The analysis from our dataset is intended to help visualise rainfall and flood occurrences in Ghana to help find a correlation between rainfall and flood. We also intend to predict the amount of rainfall to expect in future years.

RESEARCH QUESTIONS

1. Has there been a change in the rainfall patterns?
2. Which region records the highest rainfall average?
3. Which districts record the top 10 highest/lowest rainfall averages and what regions are they in?
4. What months have the highest rainfall volume?
5. What are the wettest and driest years?
6. Has the volume of rainfall in some districts increased/decreased substantially?
7. What locations have had flood occurrences in Ghana?

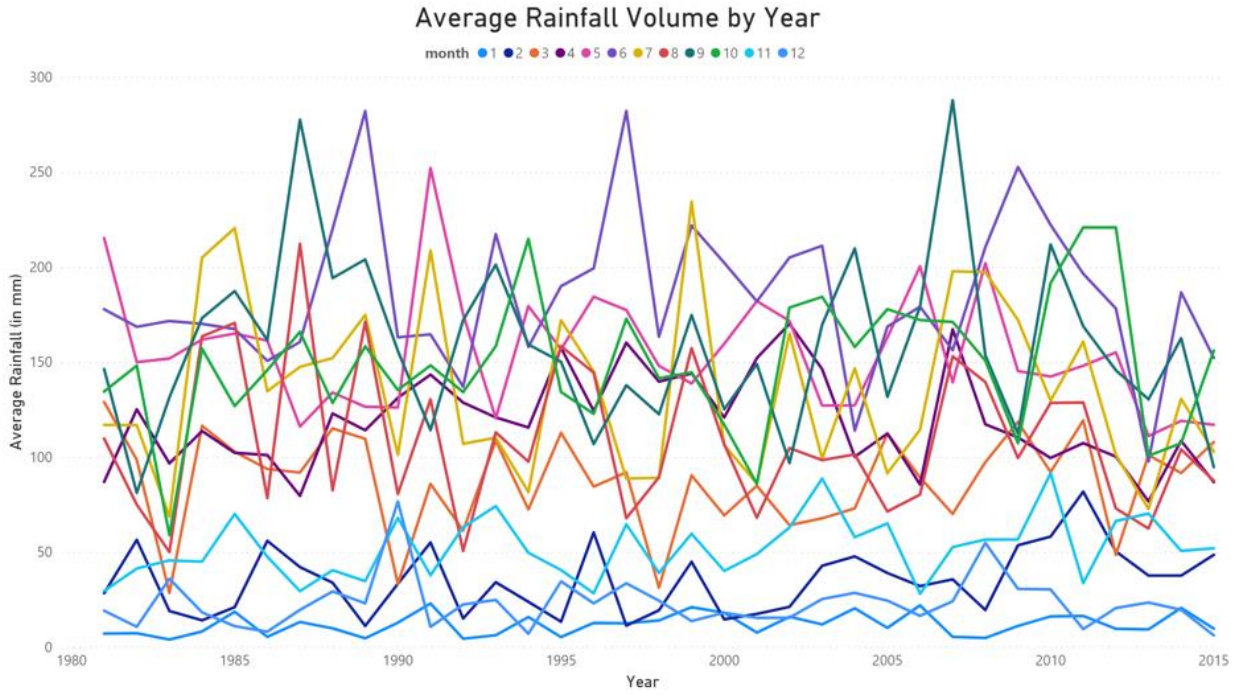
DATA PRE-PROCESSING

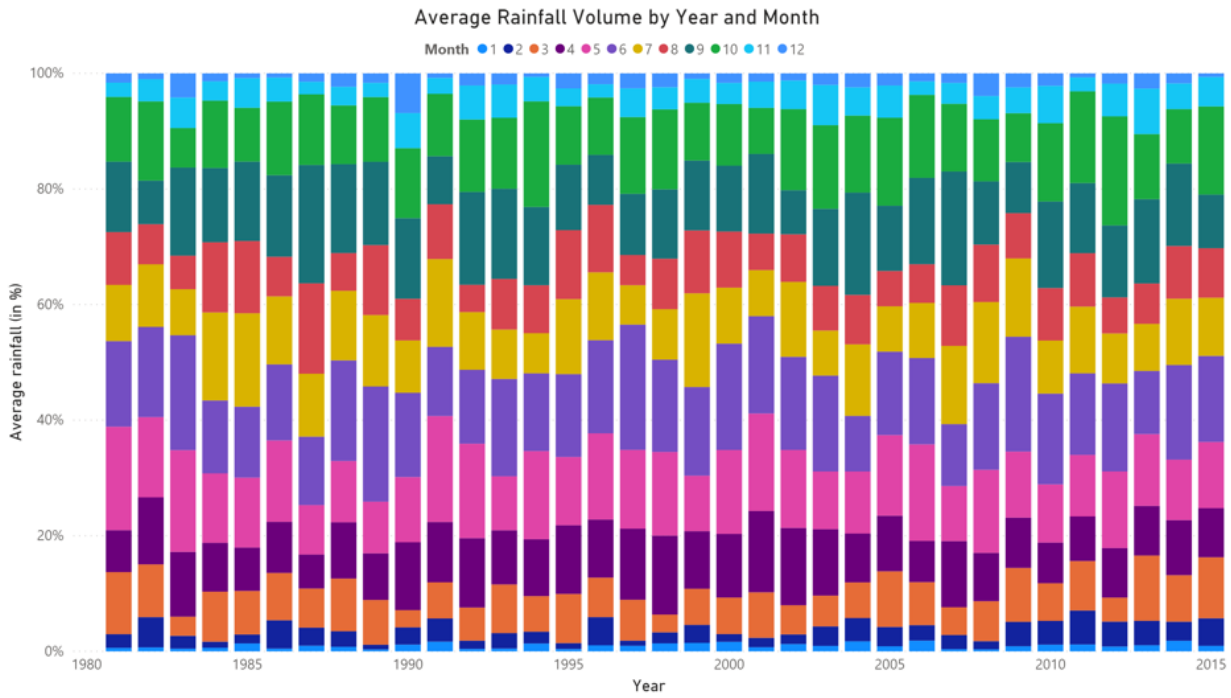
The dataset had no null values or duplicated rows of data but contained two columns with the same data for districts. Upon further examination, we decided to pick just 5 columns for analysis. The columns included data on the regions, districts, years and months (which we derived) and the average rainfall per month.

EXPLORATORY DATA ANALYSIS

The exploratory data analysis (EDA) is conducted to answer the research questions and the test hypothesis.

1. Has there been a change in the rainfall patterns?

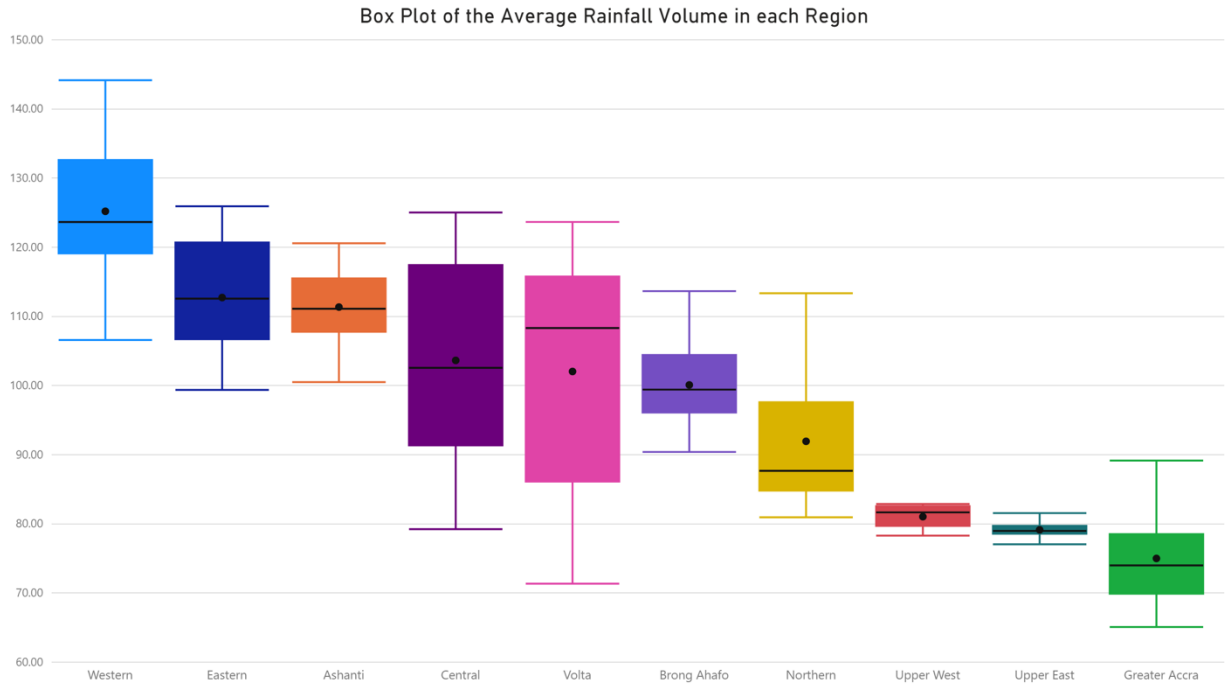




Results

From the graphs above, the rainfall patterns still remain the same with little rainfall in January, February, November and December (1, 2, 11 and 12 respectively) over the years.

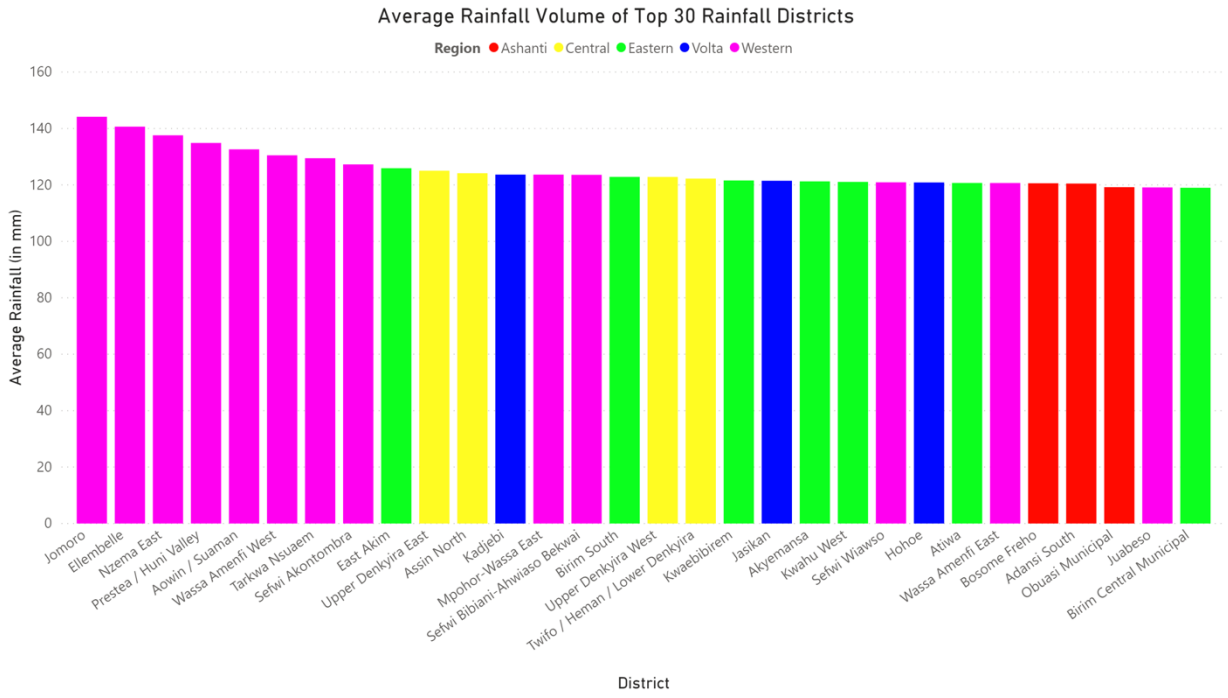
2. Which region records the highest rainfall average?

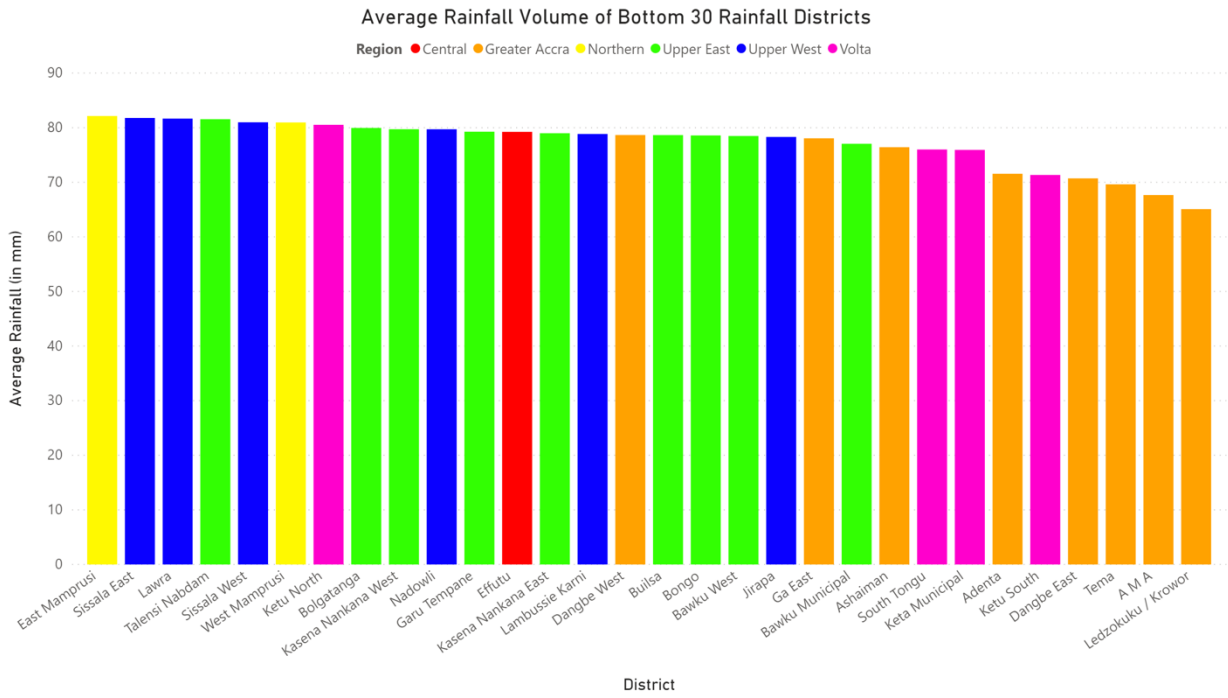


Results

From the graph above, the Western region records the most amount of rainfall with the Upper West, Upper East and Greater Accra regions recording the least amounts of rainfall.

3. Which districts record the top highest/lowest rainfall averages and what regions are they in?

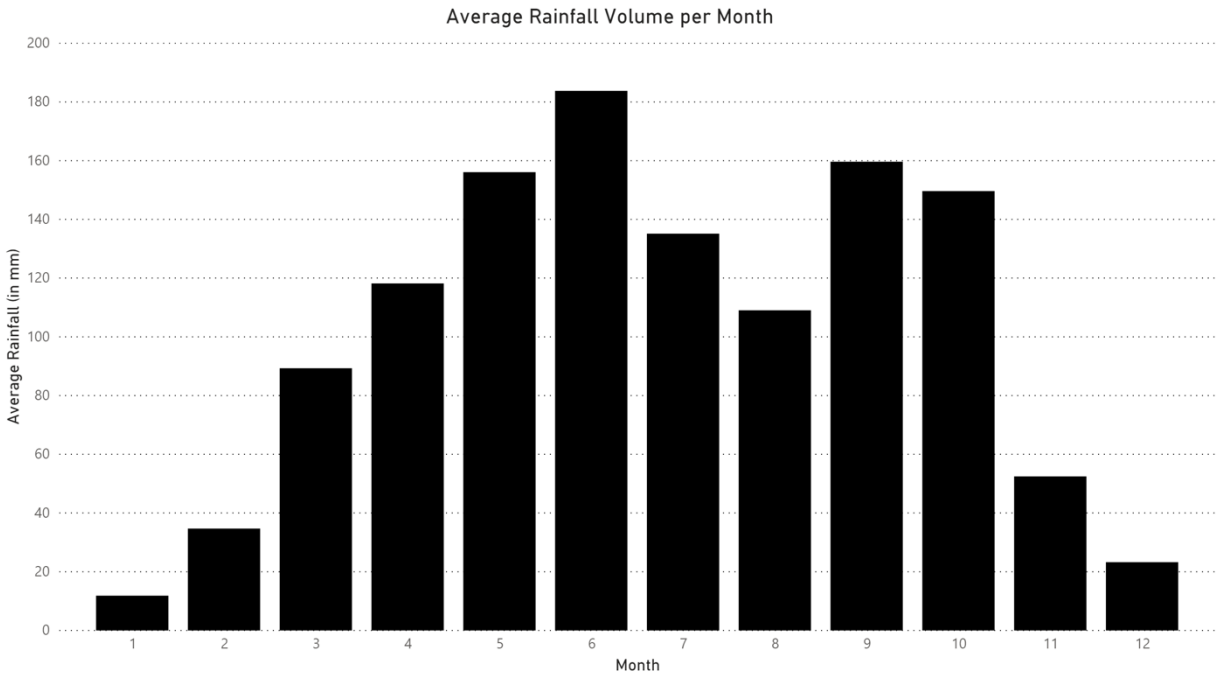


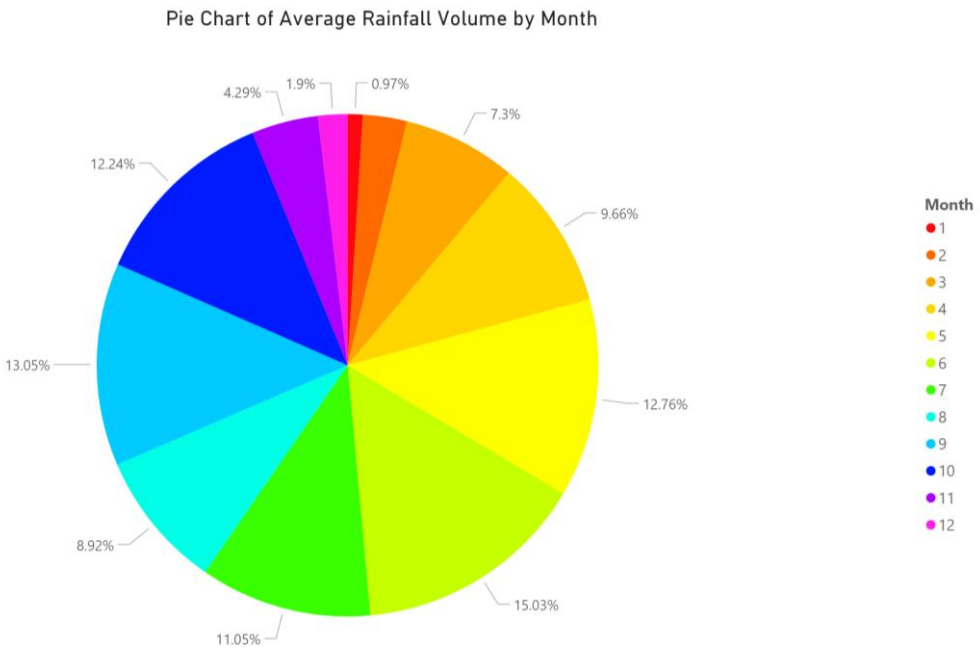


Results

From the graphs above, the districts with the highest amounts of rainfall are in the Western region and the districts with the lowest amounts of rainfall are in the Greater Accra region.

4. What months have the highest rainfall volume?

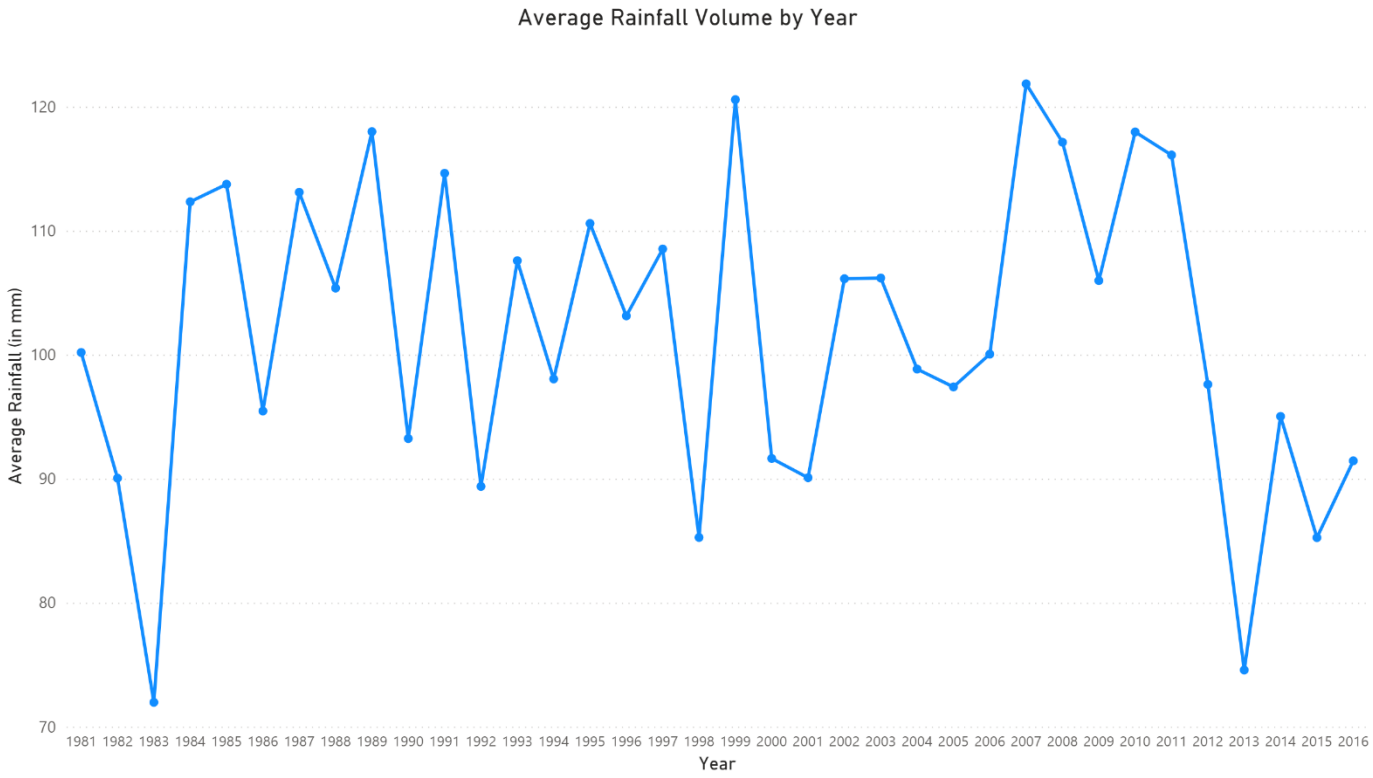




Results

From the graphs above, the highest amounts of rainfall are recorded in May, June, September and October (5, 6, 9 and 10 respectively).

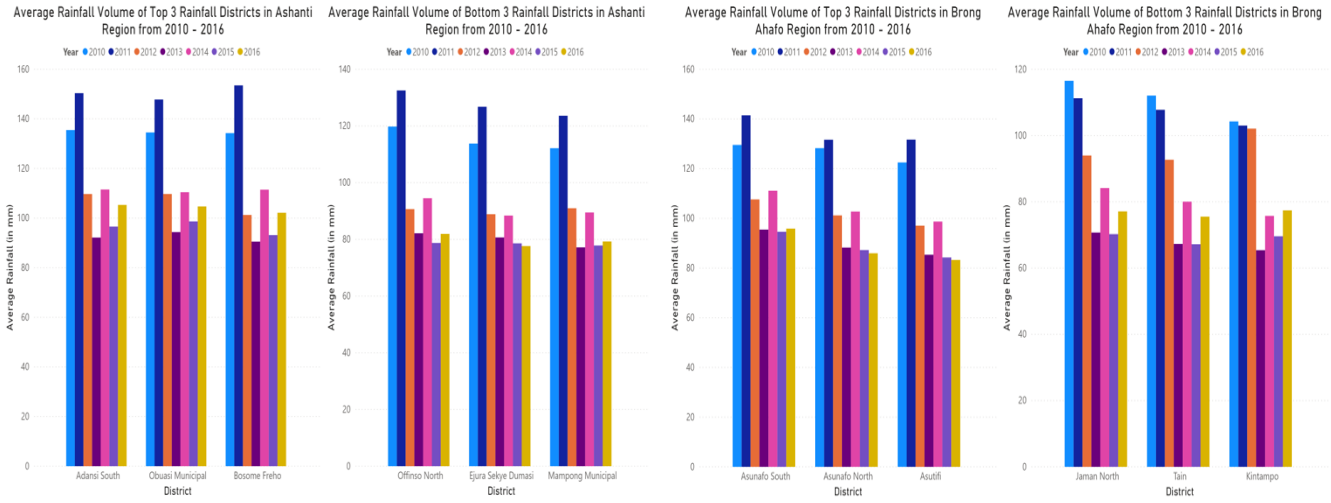
5. What are the wettest and driest years?

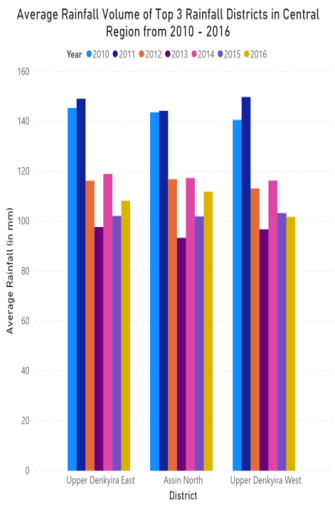


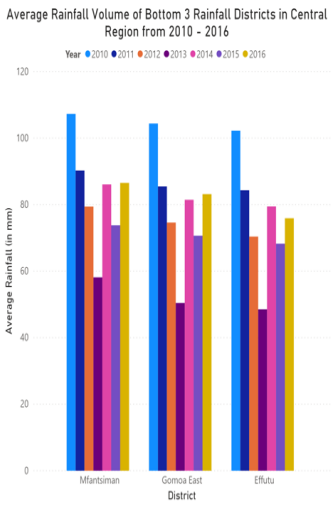
Results

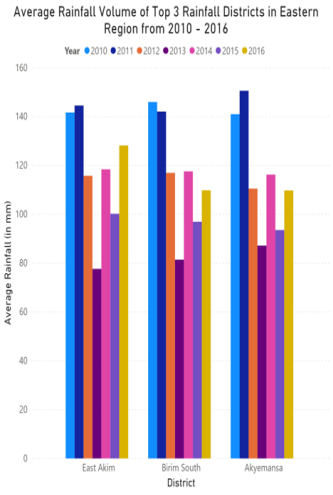
From the graph above, the wettest years were 2008 and 1999 and the driest years were 1983 and 2013.

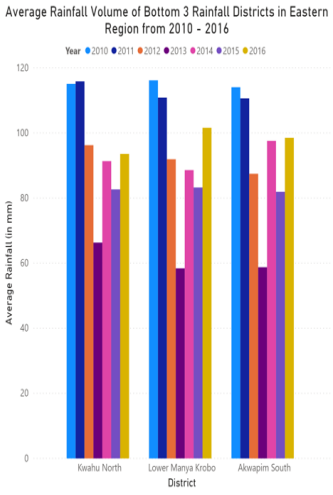
6. Has the volume of rainfall in some districts increased/decreased substantially?

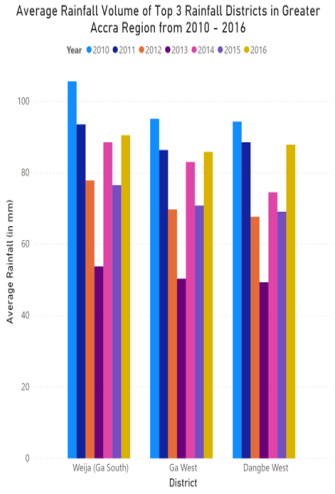


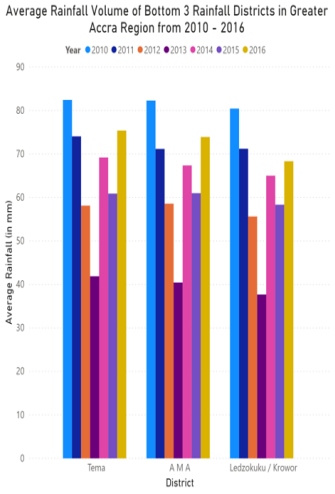

Average Rainfall Volume of Top 3 Rainfall Districts in Central Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Upper Denkyira East
Assin North
Upper Denkyira West
District

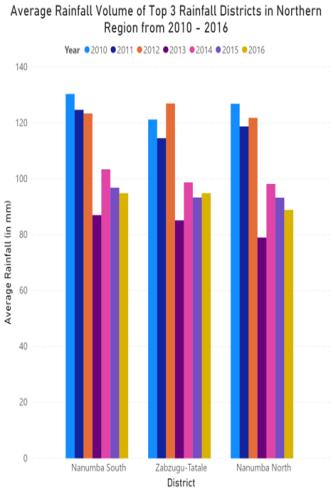

Average Rainfall Volume of Bottom 3 Rainfall Districts in Central Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Mfantsiman
Gomoa East
Effutu
District

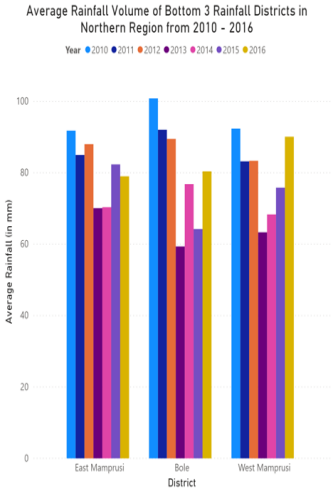

Average Rainfall Volume of Top 3 Rainfall Districts in Eastern Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
East Akim
Birim South
Akyemansa
District

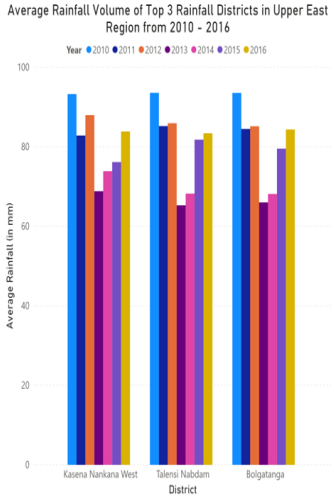

Average Rainfall Volume of Bottom 3 Rainfall Districts in Eastern Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Kwahu North
Lower Manya Krobo
Akwapim South
District

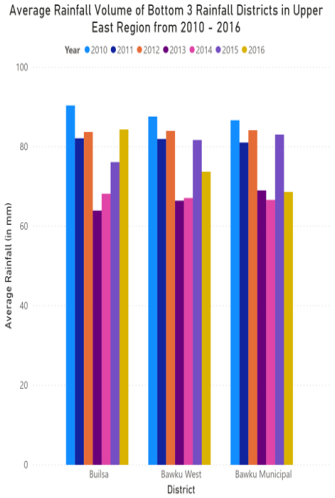

Average Rainfall Volume of Top 3 Rainfall Districts in Greater Accra Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Weija (Ga South)
Ga West
Dangbe West
District

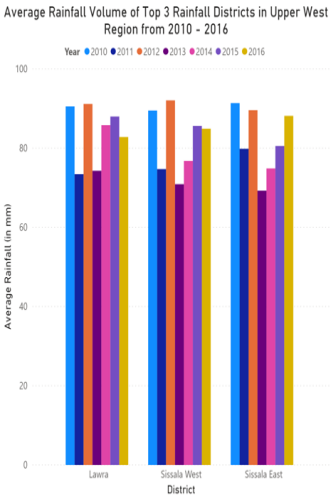

Average Rainfall Volume of Bottom 3 Rainfall Districts in Greater Accra Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Tema
A M A
Ledzokuku / Krowor
District

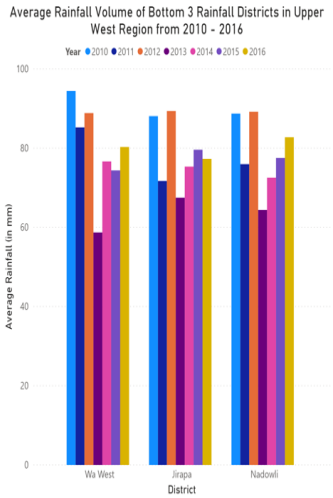

Average Rainfall Volume of Top 3 Rainfall Districts in Northern Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Nanumba South
Zabzugu-Tatale
Nanumba North
District

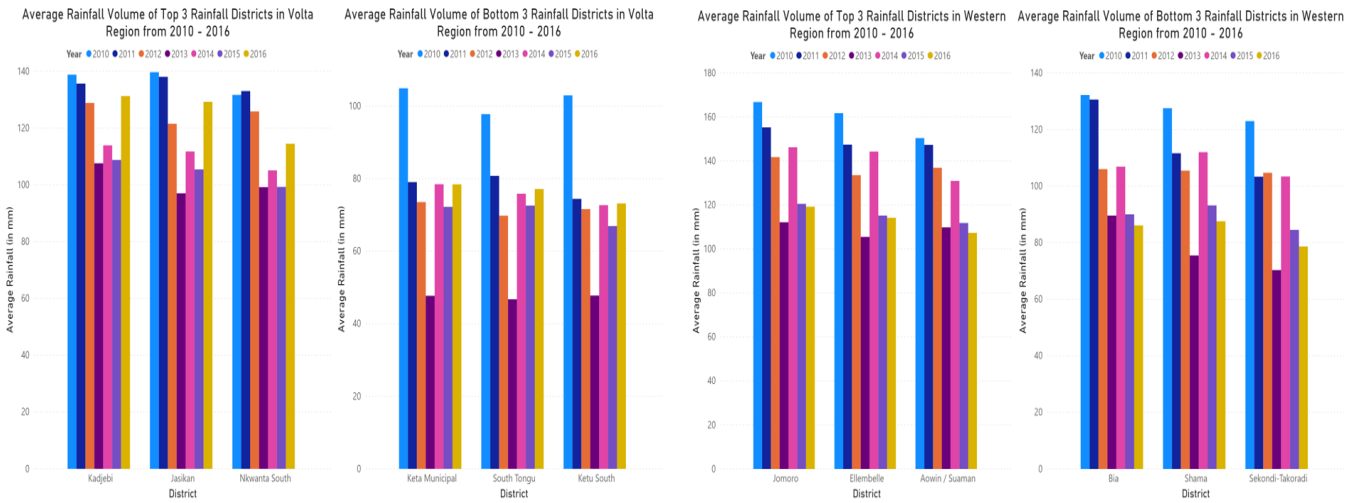

Average Rainfall Volume of Bottom 3 Rainfall Districts in Northern Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
East Mamprusi
Bole
West Mamprusi
District


Average Rainfall Volume of Top 3 Rainfall Districts in Upper East Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Kasena Nankana West
Talensi Nabdam
Bolgatanga
District

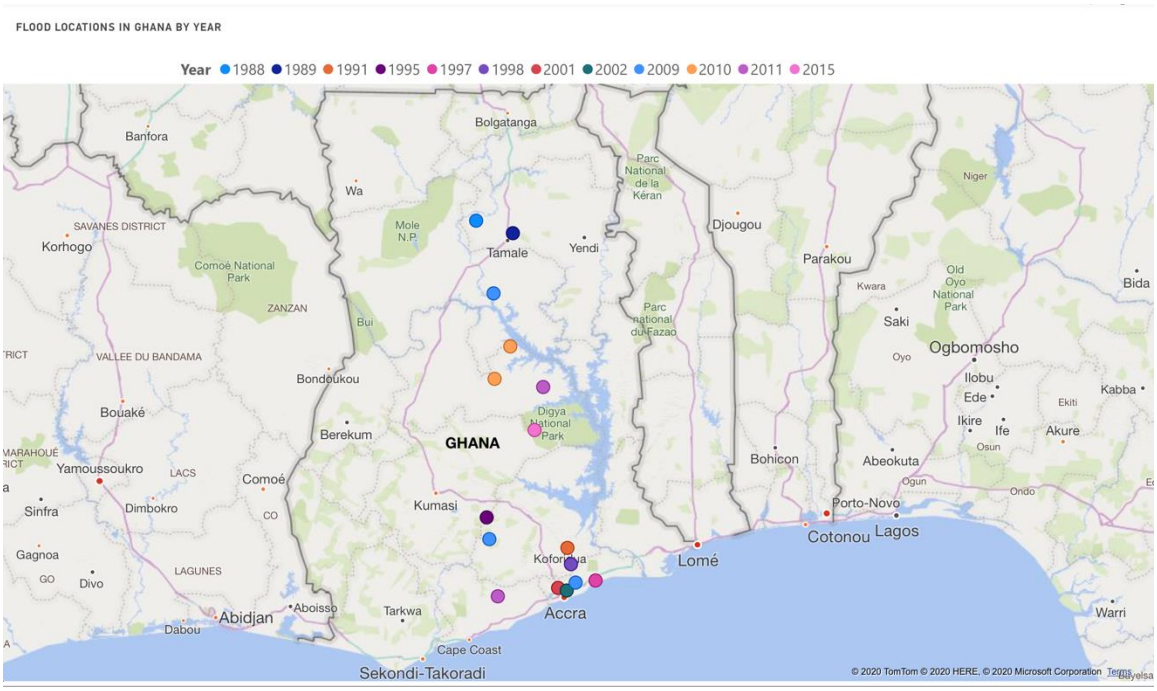

Average Rainfall Volume of Bottom 3 Rainfall Districts in Upper East Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Builsa
Bawku West
Bawku Municipal
District

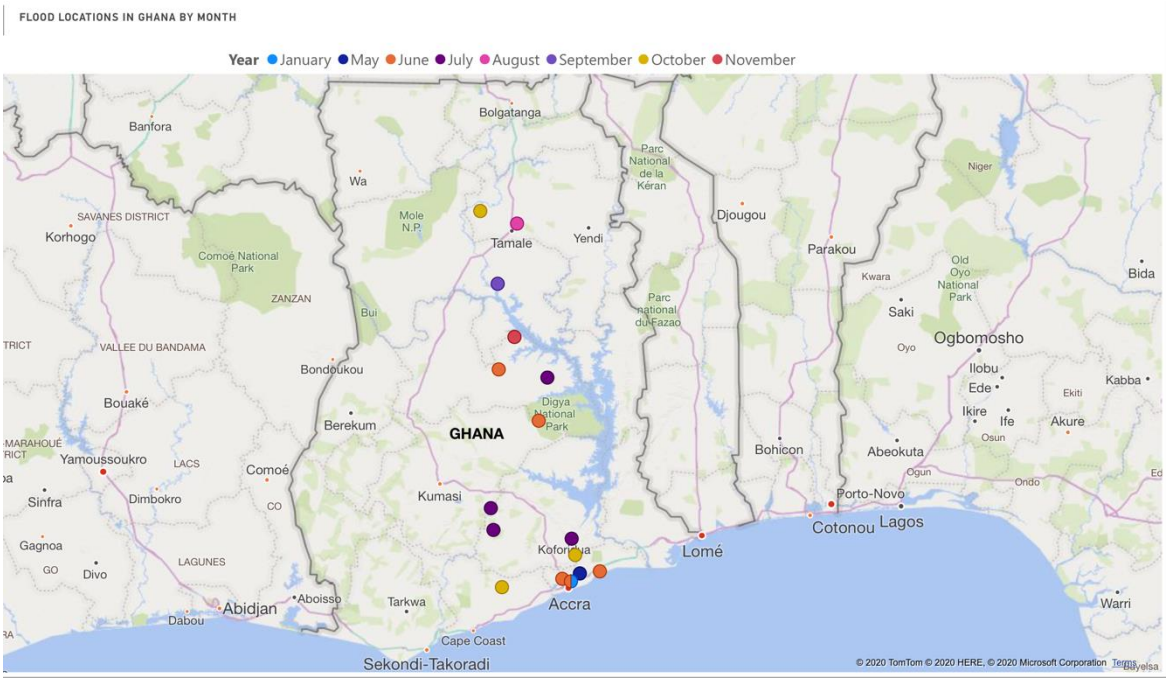

Average Rainfall Volume of Top 3 Rainfall Districts in Upper West Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Lawra
Sissala West
Sissala East
District


Average Rainfall Volume of Bottom 3 Rainfall Districts in Upper West Region from 2010 - 2016
Year 2010 2011 2012 2013 2014 2015 2016
Average Rainfall (in mm)
Wa West
Jirapa
Nadowli
District



7. What locations have had flood occurrences in Ghana?





Results

From the graphs above, Greater Accra has the highest record of floods but from our earlier inference the least amount of rainfall is recorded there. Western Region also had the highest amounts of rainfall but there is no record of flood from our data.

We can assume from this that the floods in Ghana are not directly caused by rainfall volume hence the floods in Greater Accra especially can be caused by other factors such as lack of infrastructure and poor building planning.

Conclusions

From the above analysis, it is evident that a lot of work would have to be done to combat flood in Ghana regardless of the amount of rainfall volume per year or month. Farmers can also use the analysis on the rainfall by months and regions to know when and where to build their farms based on the amount of rainfall needed for their crops.