

Analysis of Rainfall Variability in Rwanda for Small-scale farmers Coping Strategies to Climate Variability

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Abstract

In this study we analysed rainfall data to assess rainfall variability in Rwanda for small scale farmer's strategies to climate variability and to determine the annual and seasonal trends of both rainfall and dry spells in Rwanda using 15 stations. The stations divide roughly into two groups. Some started from the 1930s, while others, including Kigali, started in the 1970s. Three stations, Rulindo, Rwaza and Save, had even earlier records, but no data was available from 1920 to 1929, so these early records were not used. The statistical methods used include time series. InStat + Version 3.37 and R programming were used to determine the annual and seasonal rainfall totals, annual and seasonal number of rain days, ploughing and planting date, maximum spell length, crop water requirement and end of the season. GIS Software was used for data visualisation in the maps. The observation of rainfall and number of rain days totals show that there is no visible trend. The results shows that we did not find a conclusive evidence of climate change in the rainfall data analysis and this should be investigated further by making a statistically significant difference between the different types of years. The maximum dry spell was found in March 1985 with dry spell length of 21 days in Butare. It was observed that the trend of dry spells increases seasonally in the results of the analysis. The evidence from this study shows that long dry spell length will lead to poorer yields of the crops due to stressed plants which experience dry spell in their growing season. From the results, seasonal dry spell has clear impact in crop production and good yield is obtained by accurate timing of ploughing and planting period in order to plant the seeds on time which gives opportunity to use available water for each rainy season. The application of irrigation will help in maintaining crop water requirements for farmers in various areas and if irrigated areas are expanded, the total crop yields will increase.

We suggest that further study could be carried out to find out the effect of dry spell in water requirement for crop factor according to the growth stages: initial stage, crop development stage, mid-season stage and late season stage). We also suggest further study to investigate the extent to which the pattern of rainfall is the same in El Ni~no, La Ni~na and normal years.

Keywords: *Rainfall Variability, Small Scale Farmers, Coping Strategies*