ABSTRACT

Varying climatic conditions with increased uncertainty mainly in rainfall and temperature are salient features in marginal areas globally, adversely affecting farming activities particularly in Africa. Kenya experiences variations of annual rainfall with considerable uncertainty. These variations ranging from below 500mm to above 2000mm annually, cause droughts and floods respectively, affecting farming activities and yields. This study focused on Machakos sub County, a semi arid area, East of Central Kenya highlands. Information on the effects of rainfall variability on farming activities in Machakos, have concentrated on small holder maize cultivation and covered broad areas of the Eastern region and Machakos County, leaving out other crops and livestock. They mainly cover the period between 1930 - 1990. After this period, very scanty information exists. The main objective of the study was to investigate the influence of rainfall variability on farming activities in Machakos sub County, focusing on Maize, Coffee and Cattle farming. The specific objectives were to; establish the historical rainfall variability at monthly, seasonal and annual basis in Machakos sub County between 1990 - 2014; determine the human factors that influence rainfall variability in Machakos sub County and to assess the relationship between rainfall variability and Coffee, Maize and Cattle Yields in Machakos sub County. A cross sectional research design was used. A sample of 384 from 35,605 households was drawn using the Webster (1995) formulae and stratified into units based on the twelve locations. Primary data was collected through; household questionnaires, interviews, observation and photographs. Publications from Meteorological Department Nairobi and sub county Agricultural offices provided secondary data. Using SPSS, quantitative data was analyzed using descriptive statistics such as Means, Standard deviation and percentages. Inferential statistics using Pearson's Correlation coefficient was used to determine relationships between variables. Coefficient of variability, Relative variability and Precipitation Concentration index measured Rainfall Variability. Qualitative data was analyzed through themes and patterns, conclusion and generalization. The study established that monthly, seasonal and annual rainfall distribution in Machakos sub County was highly variable, erratic and unpredictable over the 25 years with a CV of 24% and a PCI of 10. Human activities influencing rainfall variability such as overgrazing and deforestation were evidenced by high land carrying capacity, use of firewood and charcoal as the main source of fuel and timber extraction. Correlation between annual rainfall totals and maize yields (r = 0.632) and coffee yields (r = 0.695) were statistically significant at 0.05 significance level. Maize and coffee yields increased with high rainfall. Cattle production showed a positive relationship with the rainfall trends. There is high temporal rainfall variability (CV of 24% and PCI of 10) in the sub County. Deforestation, overgrazing and over cropping are evident. Rainfall variability has a strong relationship with Maize, Coffee and cattle farming and yields. Disseminating information on rainfall forecasts, rainwater harvesting for irrigation, proper cattle stocking, a forestation and reforestation programs were highly recommended.