The main focus of this study was to examine both the long and short-term modification of Nairobi City's microclimate resulting from its changing urban environment. The specific objectives were to: (a) determine the temporal changes in environmental factors affecting climate; (b) determine the long short-term changes in the microclimate as a result of changes in (a) above; (c) establish how specific land use types modify some climatic variables within the urban canopy layer (UCL); (d) model the influence of topography and land use on wind flow pattern. To achieve the above objectives both secondary and primary data were used. A combination of cartographic, numerical and statistical techniques was employed to analyze the data.

The results of the study established that the city of Nairobi has experienced phenomenal growth in population, built environment, manufacturing industries, number of motor vehicles and consumption of energy. It was also established that as these aspects of the Nairobi urban environment change so does its microclimate.

Using the linear regression model, it was established that rates of annual temperature change over the study period of 34 years (1966-1999) were found to have higher coefficients of determination (r^2) for minimum temperature than for maximum temperature. The Mann-Kendall rank statistics established that the warming trends with significant U (t_i) values of greater than 2 were observed at the urban stations than at sub-urban stations. Seasonally, the hot dry season represented by the month of January and the warm wet month of November were found to have both significant warming trends for minimum temperature and cooling trends for maximum temperature, an indication of the existence of both the urban heat island and cool island respectively. The cool dry month of July and the hot wet month of July and the hot wet month of April were found to have insignificant and lower $U(t_i)$ values for both maximum and minimum temperatures. The daily temperature differences between urban and sub-urban stations were found to be greater for minimum temperature during the dry month of January. The highest daily difference in minimum temperature of 3§C was experienced between urban MABE station and sub-urban JKIA station during the dry month of January; an indication of the intensification of the urban heat island in the hot dry period. Cooling/Warming temperature rates were found to be highest during the dry hot period and lowest during the dry cool period. The highest cooling rates were recorded at the suburban station while the lowest at the urban station.

Significant trends in annual seasonal specific humidity at 0600 and 1200 GMT were found to exist at the urban stations, having $U(t_i)$ values greater than 2, while no trends were established at the suburban stations. The t-test values for the diurnal differences in specific humidity between the urban stations were found to be significant at 95% confidence level. Regression analysis of annual and seasonal rainfall amount using the suburban/urban ratios established that both increasing and decreasing trends were found to exist in Nairobi City. In the wet month of April, the trends of all the ratios between suburban stations and urban MABE station had negative slope values with higher r^2 values, an indication of the urban influence on long-term rainfall amount. On the daily differences in rainfall days, amount and intensity, among the urban and suburban weather stations, topography was found to influence the number of rainfall days, while urbanization exerted an influence on rainfall amount and intensity.

A simulation of the wind flow pattern over Nairobi area under the influence of topography and various land use categories established that easterly wind flow was predominant during the months of January, April and November. In July southerly and Southwesterly winds were found to be predominant. Surface wind flow was found to stagnate as it flows over the built-up areas, the central business district (CBD) and the relatively steep slopes to the west of Nairobi. Wind channeling was also found to exist along river valleys to the northwest and southeast of Nairobi.

The findings of this identified some implications concerning climate and urban planning for Nairobi City. Specifically planners should put in place policies and strategies that enhance the creation of an urban environment that is climatically safer, healthier, less polluted and physiologically comfortable. To realize this, the study recommended that continuous and systematic monitoring of urban land use change that impact negatively on the microclimate of Nairobi City should be undertaken. There is need to continuously make observations and measurements of the relevant climatic variables by improving on and increasing the number of existing weather station network, and using both auto-traverse and satellite-based techniques to regularly monitor changes in the microclimate of the city. Research in computer simulation models applicable to Nairobi City should be undertaken to understand to understand both the wind flow and energy balance dynamics that prevail within its urban boundary layer