

DECLARATION

This thesis is my original work and has not been presented

**A NUMERICAL STUDY OF THE IMPACTS OF SURFACE ALBEDO
CHANGES ON THE WEATHER OVER KENYA//**

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ABSTRACT.

The potential of human induced surface changes in altering the local natural environmental conditions have been noted in recent years. The overall objective of this study was to examine the impacts of changing the land surface reflectivity (albedo) on the meso-scale weather systems over Kenya using a numerical model.

Two groups of numerical experiments were performed in the study. The first experiment examined the ability of the model in simulating the meso-scale weather systems over Kenya. The last group of experiments were devoted to the impacts of changes in land surface albedo on the weather systems in the country. Four albedo change scenarios varying from 0.10 to 0.40 were used.

The results from the study indicated that changes of the surface albedo would have considerable impacts on the Kenyan weather. The most significant impact was observed during the afternoon hours. The specific humidity, precipitation, temperature and wind speed patterns changed significantly with changes in the surface albedo. The scenario of the albedo changes from 0.10 to 0.40 which corresponded to changes in natural vegetation from forest to desert conditions produced largest changes in the weather parameters. Relatively low changes were observed when the albedo scenario was changed from 0.12 to 0.20 which corresponded with changes in the

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surface vegetation from forest to grassland. An increase in albedo generally resulted in reduction of precipitation, humidity and temperature while increasing wind speed tendency was observed with increasing surface albedo.

The results from this numerical study has highlighted the drastic changes in the natural states of the regional environment which are associated with human induced albedo changes like those which are linked to deforestation, desertification, urbanization, industrialization and over utilization of the natural resources. Changes in the space-time distribution of the regional climate induced by albedo changes would therefore have adverse consequences on space-time distribution of natural resources, biodiversity and socio-economics. This study also provide informations which can be used to describe the complex feedback processes between ecosystems and the physical environment. This can be used to improve the skill of the parameterization schemes for use in the modelling of regional climate. The study will thus help to formulate policy guidelines on the mismanagement of the natural resources through land misuse (environmental degradation) activities in order to develop environment friendly national development planning objectives.