A Spatio-Temporal Study of Urbanization and Flooding in the Greater Accra Metropolitan Area (GAMA) of Ghana

Kagblor, Cephas

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ABSTRACT

Of much concern to global efforts to achieving socio-economic development and environmental quality ideals is the cost of natural disasters on such strives arising from man-made triggers. About 3.3 billion and 5 billion people of the world's population was projected to live in urban areas by 2008 and 2030, respectively, and with much of the contribution from developing countries especially in Asia and Africa as predicted by United Nations Population Fund. Urbanisation is touted to play a critical role in global economic growth and development, though; it is also a major source of environmental concern particularly in areas such as waste management, pollution control, access to water and energy resources as well as creation of risk conditions to various form of disasters especially urban flooding.

A critical issue of increasing trends of global urbanisation that requires urgent attention bothers on physical land use planning and on ensuring that safe conditions exit for habitation as proposed at the UN Conference on Human Settlement in Vancouver,1976 and by the United nations in Target 11 of the Millennium Development Goals. Unfortunately, most cities in developing countries where much of the contribution to urban population is expected to originate from are plagued with many socio-economic problems of which Accra is no exception. This makes it difficult for such countries to effectively manage their urban centres as most city authorities still grapple with challenges of waste management, drainage, water supply, transportation, slums and deprived communites. This state of affairs, coupled with encroachment on natural risk zones due to spatial urban growth and heavy rainstorms possibly due to climate change, create conditions of vulnerability to devastating damages from urban flooding. In most developing cities such as Accra, Lagos, Darker, rapid encroachment on waterways, poor garbage disposal practices., poor drainage systems and increasing impervious layer (building and pavement) create conditions favourable for urban floods especially in an era of climate change.

To achieve the objective of the study which included estimating changes in spatial cover of the built up area and delineation of flood risk zone, techniques of Satellite Remote Sensing(RS) and Geographical Information System (GIS) analysis were used to map spatio-temporal changes in the landuse cover and to identify flood risk zones in Accra and its environs. GIS and RS technique is a useful tool in prevention, preparedness and relief management of flood-related disasters and also help to provide and manage comprehensive and real-time synoptic and multi-temporal data over vast areas at regular intervals hence its application in the study.

The study revealed that the built-up area of Accra and Greater Accra Metropolitan Area (GAMA) grew from about 413.83km^2 in 1990 to 646.31km^2 and 646.38 km^2 in 2000and in 2005respectively indicating a change of 232.54 km^2 from1990 to 2005. The area covered by water bodies also increased from 34.9884 km^2 in 1990 to 61.181 km^2 in 2000 but later reduced to about 5.69 km^2 in 2005 suggesting massive encroachment particularly on wetlands for housing projects and agricultural activities. Flooding in Accra and its environs was attributed to various factors including encroachment on wetlands and waterways such in the Densu and Sakumono wetlands and massive built- up in flat and low- lying areas below 100m above sea level such as Alajo and Asylum Down. Other flood hazard factors identified were frequent rainstorms, dumping of waste into water bodies and inadequate or poor drainage systems.

The study, therefore proposed among others measures, setting up a spatial 'Drainage Fund' to ensure availability of funds to improve upon the poor drainage system and to support flood reduction programmes in GAMA and nationwide and promotional public education on flood-related issues. Additionally, the capacity of mandated institutions such as the Town and Country Planning Department, NADMO and Hydrological Services Department should be strengthened as well as encourage co-operation among all stakeholders in helping reduce and if possible, eliminate flood-related disasters in our cities.

SUPERVISORS

Mr. Kufogbe, K. Sosthenes

Dr. Kankam-Yeboah, Kwabena

Professor Agyei-Mensah, Samuel