# Earthquake Loss Estimation of Kampala City Core

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## Abstract

It is impossible to live in an earthquake disaster free environment but it is possible to reduce the impact of the disaster by proper risk management strategies. Earthquakes can create disasters of high magnitudes when they hit metropolitan areas of large population and infrastructure resulting into loss of properties, human injury and deaths. The Kampala City Core (KCCo) population and infrastructure growth is increasing at an alarming rate, expanding in a very improper manner, entertaining huge encroachments, lack of proper infrastructure facilities and unplanned urban development. Moreover, earthquake risk in the area makes the problem much more acute for the KCCo management.

The objectives of this study were to i) give an overview of the various past earthquake events and their losses in Uganda, ii) count the inventory, typology of existing buildings and assess the human population in KCCo, iii) assessment of vulnerability of the existing buildings and the risk measures to the earthquake, iv) estimate the effects of liquefaction in KCCo, and v) estimate the loss due to earthquake damage. Data on the long term historical earthquake events and their losses in Uganda was studied. The inventory, typology of the existing buildings and their occupants (people) in KCCo were counted. PROKON software and RADIUS 1999 model were used for vulnerability and loss estimation analyses respectively. Soil tests data from Soil Materials Laboratory in Kireka from the Ministry of Works, Housing and Communications was used for the determination of the liquefaction potential of KCCo.

Results show that from 1912 to 1994, various earthquake events of different magnitudes were experienced in the different regions of Uganda at different times. These events caused direct and indirect losses particularly human causalities and property loss, and social economic losses respectively. In Kampala, there was a gradual increase in the number of buildings from 1930s to 1970s, remained constant between 1970s to 1990s due to political instability in Uganda and sharply increased from 1990s to date. This increase in the number of buildings coincided with the exponential increase in human population in KCCo from 1930s to date increasing the vulnerability of KCCo to the earthquake which has led to human loss and destruction of buildings in KCCo. There was also a high liquefaction potential in the low laying areas of KCCo. The human injury and death count from the different earthquake scenarios indicated that the highest and the lowest human injury and deaths counts occurred during Large Scale Earthquake (LSE) and Disaster Preparedness Earthquake (DPE) respectively. The estimated losses due to the earthquake in the KCCo indicated a sharp and steady increase in the damage ratio with increasing Modified Mercalli Intensity (MMI).