



Is Climate Change Responsible to Recent Urban Flooding in Developing Cities in Africa? A Case study of Addis Ababa City, Ethiopia

Semu Moges (1), Liqa Raschid-Sally (2), and Mekonnen Gebremichael (3)

(1) Addis Ababa Institute of technology, Addis Ababa University, Addis Ababa, Ethiopia (semu.moges.2000@gmail.com), (2) International Water Management Institute, Colombo, Sri Lanka, (3) Department of Civil and Environmental Engineering, University of Connecticut, Storrs, USA

Cities in Africa show extraordinary expansion of the built environment and imperviousness of the surface condition. Addis Ababa is a case in point, where over the period of 1984 to 2002, the city asphalted area has increased from 4.72 sq.km (1984) to 27.7 sq.km (2002). Similarly the paved area has expanded five fold from the original 11.1 sq.km, whilst the built environment expanded from 60.1 to 212.7 sq.km.

Using hydrological modeling, we demonstrated due to the surface condition change, runoff generation potential has shown significant increase from 28% (in 1984) to 45% (in 2002), showing over 60% change in the runoff volume. The changing condition of the surface is increasing unabatedly, worsening the flooding condition. Similarly, climate change study shows likely increase of precipitation in and around Addis Ababa by about 13 to 17% and comparative increase in flooding. Unlike many cities in Europe, cities in developing countries are confronted with impact emanating from climate change as well as surface condition change. The impact of flooding caused due to the expansion of built environment is found to be more significant in the short term than the climate change, however, the climate change may dominate the long term future of flooding pattern as cities mature towards 2050. Therefore, it is important to view the impacts expansion of built environment and climate change in tandem in future time horizon since the dominance of the impact is different in different temporal scale.

In the case of Addis Ababa, we strongly present the following four suggestions: i) the city administration re-establish the abandoned flood and drainage department of the city as the main flood regulatory and management body working in tandem with Addis Ababa Roads Authority, Water Supply and Sanitation Authority and Urban Planning Authority; ii) The old design guidelines for planning and design of urban drainage system is not working any more (assumed stationarity condition), we suggest the planning and design criteria of urban drainage systems be immediately revised and incorporated to reflect the new reality of hydrological non-stationarity; iii) for Addis Ababa City to be Resilient, we suggest implementation of 'Best Management Practice' that incorporates arresting runoff from the source for beneficial use, application of runoff treatment practices (open space, infiltration galleries, retention ponds, etc) and flood flow control drainage system based on new design criteria, and iv) instituting improved weather forecasting and early warning system.