AARSE 2016

# AARSE2016 CONFERENCE PROGRAMME AND BOOK OF ABSTRACTS

validate the flood extent maps developed from these conventional methods. The study was conducted to develop flood inundation maps under different flood scenarios to enable quantification of socio-economic infrastructure (schools, health facilities, household's settlements and roads) and other amenities at risk in a scenario without dykes. GIS flood simulator developed by USGS and SERVIR Eastern and Southern Africa was used to generate the flood maps for the lower Nzoia basin based on flood frequency analysis for a 22 years historical stream-flow data. Flood frequency analysis was done by fitting the annual maximum series into different distribution methods using Easy Fit Professional v5.5. The GIS flood tool makes use of the Digital Elevation Model, flow direction, flow accumulation and rating curves to generate flood maps. Flood extent maps representing 1 in 10, 30, and 50 years return periods were developed respectively. The flood maps assisted in carrying out an economic analysis on the cost implication of rehabilitating the dykes vis a vis the cost of avoided damages. Inundation maps corresponding to peak stream flow for the years 2003 and 2008 were also developed and compared with the flood extent captured from Landsat image of 2003 and Earth Observation 1 image of 2008 for the same period. The two outputs showed that the flood extents are comparable to an acceptable accuracy. The socio-economic infrastructures were overlaid with the different flood extents maps leading to the quantification of the same under each flood return period. The analysis showed that, household settlements were the most affected in all of the flood scenarios which can be attributed to the high population with the Budalangi floodplain.

**Key words**: GIS flood tools, remote sensing, Flood frequency, earth observation, HEC-RAS

## The Formation of the Characteristics of Floods in the Rivers in the Context of Global Climate Change

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**Abstract**
The impact of global climate change is available throughout the world. Studies have shown that from 1929 to 2014 the average annual air temperature increased by 1,03$^0$C and precipitation decreased by 10% in Armenia comparing with the average standard period 1961-1990 (adopted by the Intergovernmental Expert Group on Climate Change department). Moreover, the frequency and intensity of the dangerous phenomena have increased. Armenia has vulnerable mountain ecosystems, dry climate conditions and active exogenous processes of desertification and recurring natural disasters. Floods occurring frequently and causing great material losses, destruction and human victims, mudflows and landslides are very common in Armenia. However, unlike other natural disasters, floods are somehow predictable.In river basins extreme flows and their damages are considered water disasters. The extreme flows during the year are observed absolute maximum runoff, which are mainly due to climatic factors, in particular, intensive snow melting and heavy rains. The dynamics of changes of the rivers' extreme runoff and air temperatures have been studied, compared and assessed from 1960 till 2012 (case study is the relatively large rivers of Sevan Lake basin). In the studied river-basins are viewed air temperature increase and decrease of absolute maximum extreme runoff of the rivers. Therefore, it turns out that winter temperatures have contributed to a gradual melting of snow accumulated in the river basin causing reduction of absolute maximum runoff in spring. As a result, the risk of occurrence of floods have dramatically reduced.