Historical and Future Flood Trend in the Congo River Basin

Gode Bola[1, 3], Raphael M. Tshimanga[1], Mark A. Trigg[4], Jeff Neal[2], Laurence Hawker[2], Lukanda Mwamba[3], Paul Bates[2,] Sridhar[4], V. Sridhar[5]

[1] *Congo Basin Water Resources Research Center (CRREBaC) and Department of Natural Resources Management, University of Kinshasa, DR Congo*

[2]*School of Geographical Sciences, University of Bristol, United Kingdom*

[3]*General Commission of Atomic Energy, Regional Center for Nuclear Study, Kinshasa, DR Congo*

[4]*School of Civil Engineering, University of Leeds, United Kingdom*

[5]*Department of Biological Systems Engineering, Virginia Polytechnic Institute and State University.*

Abstract

Ongoing increases in the temperature, rates of evaporation and increasing rainfall will significantly affect flow volumes of rivers. However, what if the significant changes have already been happening during the last decades? and the impact of climate change have exacerbated this variability. Therefore, this research is focused on the analysis of current and future changes of high flow events at near-natural catchments in the Congo Basin (CB). Historical and future daily maximum flows for six gauging stations are used, and three flood indicators are drawn from daily annual maximum series. Trends were evaluated using a Mann Khendall, Pettit and Levene test at 5 % significance level. Log-Pearson III assesses future Annual Exceedance Probability and Flood timing was assessed using Directional Statistic. Our analysis detects significant trends at gauging stations; in most cases these trends are downward. Most changes in ANMAXF and POT are detected for gauging in the North and South of the basin. Further, monthly relative flood frequency reveals larger changes on gauging stations located in the South compared to monotonic trend in the gauging station located in the North. Projection results indicate that the flooding could increase under RCP4.5 and RCP8.5 as well as the timing of flood during the 21st century (2020–2099). The spatial and temporal characteristics of flooding under two RCPs are similar in most studied gauging stations. Given the influence of climate system on flooding, this study highlights the importance of improving monitoring, modelling across the Congo Basin in order to prevent the impacts of floods due to climate changes.

Key words: Congo Basin, Flood Trend, Climate change, Mann Khendall, Pettitt