



Investigating the effective factors influencing surface runoff generation in urban catchments – A review

Abdul Razaq Rezaei^{a,*}, Zubaidah Binti Ismail^{b,*}, Mohammad Hossein Niksokhan^c,
Abu Hanipah Ramli^d, Lariyah Mohd Sidek^e, Muhammad Amin Dayarian^f

^aWater Resources Engineering, Civil Engineering, Institute for Advanced Studies (IAS), University of Malaya, 50603 Kuala Lumpur, Malaysia, Tel. 60379675284, Fax. 60379675318, email: abdulrazaqrezaei@gmail.com (A.R. Rezaei)

^bCivil Engineering Department, University of Malaya, 50603 Kuala Lumpur, Malaysia, Tel. 60379675284, Fax 60379675318, email: zu_ismail@um.edu.my (Z.B. Ismail)

^cSchool of Environment, College of Engineering, University of Tehran, Iran, email: niksokhan@ut.ac.ir (M.H. Niksokhan)

^dDepartment of Irrigation & Drainage (DID), 50626 Kuala Lumpur, Malaysia, email: jdabhar@gmail.com (A.H. Ramli)

^eCivil Engineering Department, University Tenaga Malaysia, 43000 Kajang, Selangor, Malaysia. email: Lariyah@uniten.edu.my (L.M. Sidek)

^fSchool of Environment, College of Engineering, University of Tehran, Iran, email: m.a.dayarian@ut.ac.ir (M.A. Dayarian)

Received 15 September 2018; Accepted 2 May 2019

ABSTRACT

The natural water cycle in an urban catchment normally results from climate, physical characteristics and natural surface coverage. The hydrological process in urban catchments can drastically change due to urbanization, human activities, modified physiography and climate change. Urbanization typically results in a larger runoff volume, higher peak discharge, faster time of concentration as well as lower infiltration. It also has a significant impact on the precipitation intensity and patterns. Antecedent soil moisture, steep slopes and roughness will lead to uncertain rainfall-runoff behavior as well. Climate change will usually alter temperature, precipitation intensity and duration along with the runoff timing and magnitude. Various number of studies have proved that urbanization and climate change would have stronger effect on urban rainfall-runoff behavior than other factors. We have reviewed and investigated various and the most effective factors influencing urban runoff generation in this paper. Particularly, the anthropogenic, geomorphologic and meteorological impacts on urban surface runoff have been the focus of this review paper. The study gaps and suggestions for further research have also been discussed at the end. Finally, the best measures to be taken into consideration to mitigate urban excess runoff have been suggested in the final section.

Keywords: Climate change; Hydrological process; Stormwater runoff; Urban catchment; Urbanization

*Corresponding author.