

Effectiveness of Retention Ponds for Sustainable Urban Flood Mitigation across Range of Storm Depths in Northern Tehran, Iran

Ebrahim Ahmadisharaf, M.ASCE; Nasrin Alamdari, A.M.ASCE; Masoud Tajrishy; and Sahar Ghanbari

Abstract

Although there has been a growing interest in the application of stormwater best management practices, many developing countries still rely solely on traditional practices, such as channels, for urban flood management. The city of Tehran in Iran is an example. In this study, the effectiveness of hypothetical retention ponds for flood mitigation and the removal of total suspended solids (TSS) was evaluated in five design storm depths in the Darakeh catchment in northern Tehran. The key case study findings were the following: (1) a large pond is more efficient than a series of small ponds for both flood mitigation and TSS removal; (2) channel enlargement is the most cost-effective alternative in all the five storms if only flood mitigation is desired (traditional flood management approach); however, if TSS removal is considered as well (more sustainable approach), the retention pond is the most cost-effective alternative for all the storms; and (3) retention ponds more effectively reduce both peak flow and TSS in smaller storm depths.

Authors:

Ebrahim Ahmadisharaf, M.ASCE

Senior Research Associate, Dept. of Civil and Environmental Engineering, Resilient Infrastructure and Disaster Response (RIDER) Center, Florida A&M Univ.-Florida State Univ. College of Engineering, Tallahassee, FL 32310 (corresponding author). ORCID: <https://orcid.org/0000-0002-9452-7975>.

Email: eahmadisharaf@eng.famu.fsu.edu; eascesharif@gmail.com

Nasrin Alamdari, A.M.ASCE

Assistant Professor, Dept. of Civil and Environmental Engineering, Resilient Infrastructure and Disaster Response (RIDER) Center, Florida A&M Univ.-Florida State Univ. College of Engineering, Tallahassee, FL 32310.

Masoud Tajrishy

Professor, Dept. of Civil Engineering, Sharif Univ. of Technology, Tehran 1136511155, Iran.

ORCID: <https://orcid.org/0000-0001-9252-8213>

Sahar Ghanbari

Water and Wastewater Engineer, Deputy of Supervision on Operation and Maintenance, National Water and Wastewater Engineering Company, Nofel Loshato St., Tehran 1134935557, Iran.