Study on the Relationship between Rainfall Characteristics and Urban-runoff Quality in an Arid Area (Case study: MaghsudBeyk watershed, Tehran)

Reza Ghazavi*
Associate Professor of Range and Watershed Management, University of Kashan, Iran.

Extended Abstract

Introduction

According to many experts opinion, the water crisis is one of the most important challenges of the coming years on the planet. Iran is located in a dry and semi-arid region and its rainfall is lower than the average of the world, consequently, the problem of water scarcity is more severe and it is imperative that measures be taken to prevent future problems. The containment and maximum use of fresh water sources have long been regarded as one of the manifestations of human civilization and Iran in the management of water resources have been prominent and lightweight in the history of large civilizations. In the management of water resources, reuse of the containment water was prominent in the history of large civilizations such as Iran. In urban areas, the potential of the runoff production is very high due to type of land use and high impenetrable levels. In some case, an uncomfortable rainfall should produces a significant amount of runoff, which often has significant financial and human damages for urban areas. Urban runoffs collection and reuse of surface runoff is a sustainable and economic development that also should reduce the damage caused by urban flooding. Runoff collecting as a suitable water supply source, especially for urban green space development has attracted the attention of the urban managers. But the presence of non-point polluting sources in urban areas is a major challenge in collecting and re-use of runoff. In this research, the relationship between urban runoff quality and rainfall and flood characteristics was investigated in a sub-basins of Tehran province.

Materials and Methods

In this study, rainfall, discharge and water quality measured at Maghsud Beyk’s hydrometric station located at the outlet of the Darband were used. The study area has a Mediterranean condition, as most rainfall occurred in the cold season. Discharge of the studied basin is variable and maximum discharge was observed in the spring and at the least of the summer. In this study, 25 rainfall events and its related runoff were investigated. The relationship between runoff quality and rainfall characteristics were examined in annual, seasonal and single rainfall scales. Then, the relationship between precipitation and discharge characteristics with water quality factors was investigated using Pearson statistical methods and one-way analysis of variance analysis.

Discussion and Results

According to results, total dissolved solid (TDS) of runoff deceased with increasing of rainfall. A significant relationship was observed between rainfall intensity, EC and TDS of runoff (R² = 0.56, and 0.68 respectively), while an inverse relationship was observed between rainfall duration and runoff quality (R² = -0.543). The most seasonally change in groundwater was happened in the spring and winter.

Conclusions

Due to the lack of rainfall in the arid and semi-arid areas, rainfall is extremely low and high level of contamination and it contains a large amount of contaminants. Therefore, reuse of these runoffs or direct groundwater aquifers recharge by these runoff can have an adverse environmental

* Email: Ghazavi@kashanu.ac.ir
impact. On the other hand, instant measurements of the amount of pollutants at the time of the occurrence of rainfall and in the large extent is not possible. Therefore, studying the relationship between the rate and severity of rainfall with the amount of surface runoff pollution is an effective factor that can be effective in determining the threshold of suitable runoff. According to the results of this study, the process of changes in the quality of all qualitative elements follows the trend of the rainfall variations and with the increasing of the rainfall amount, the average of all studied elements of runoff decreased. This reduction can be the result of the discharge of contaminants at the beginning of precipitation and its decline in long-term rainfall.

**Keywords:** Urban Runoff, Rainfall Characteristics, Discharge, Urban Runoff Quality.
References


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