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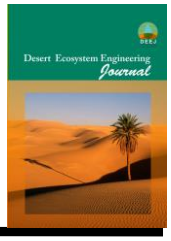

Improving Management of Urban Storm Water Qualitatively and Quantitatively in Bandar Abbas Using Best Management Practices (BMPs)

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Extended Abstract

Introduction: The development of urbanization and the increase of impervious surfaces, especially in arid and semi-arid regions with little atmospheric precipitation and a large volume of produced runoff, increases the risk of flooding, which is one of the most dangerous natural disasters. The main purpose of this research is to investigate and compare the performance of methods to improve the optimal management of runoff quantity and quality in Bandar Abbas city. Therefore, by simulating the operation of the surface runoff drainage system, it has been tried to identify the areas susceptible to flooding and to investigate the best operational solutions to reduce the flood volume and control the pollution load.

Materials and Methods: In order to analyze the hydrological information, using the digital elevation model (DEM) of the region, the slope and the direction of the slope were calculated and the border of the sub-basins of the study area was determined. Then, using the urban land use map, the area of impervious surfaces was calculated. In this study, SCS, Hazen-Williams, and Dynamic Wave methods were used to calculate infiltration, loss, and trending, respectively. Also, qualitative sampling was done at the place of flow measurement simultaneously with precipitation events. At the same time as rainfall events, qualitative sampling was done at the place of flow measurement. The samples taken in the laboratory were qualitatively analyzed and the parameters of BOD, COD, NO3 and PO4 were measured. In order to provide the required quantitative data, the total runoff flow was measured in five rainfall events. After preparing the rainfall data related to the synoptic station, the aforementioned data along with other measurements made in the study area were entered into the SWMM model and the simulated discharge values were obtained. Then the values simulated by the model were compared with the measured real values. For this purpose, using the EPA-SWMM software, three management solutions of bioretention cells, green roof, and swale, were evaluated. Also, in order to analyze the sensitivity of the model, three parameters of channel slope, channel roughness coefficient and percentage of

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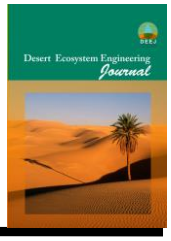

impermeability were checked on the results of the model and it was found that the percentage of impermeability creates the highest sensitivity in peak runoff. In this research, in order to better control the volume of floods and pollutants, three management practices of bioretention cells, green roof, and swale, were investigated in a part of the catchment area of Bandar Abbas city. For this purpose, the EPA-SWMM model was used. The obtained results of the validation showed that this model has the required accuracy for simulating urban runoff and this model can be used for urban runoff management plans and the design of the urban runoff drainage network in the study area.

Results and discussion: The results of the validation of the model in the 2, 5 and 10-year return period also showed that the peak discharge of the hydrograph of the basin outlet is close to the peak discharge obtained from the reasoning method in the different return periods. Considering that a 10-year return period is often used to design the surface water collection network, the results showed that in this return period, the green roof management solution has the best performance because it decreased 18.8% peak discharge in quantitative analysis. Also, the results showed that in all solutions, the percentage of peak runoff reduction increases with the increase of the return period. Another result of this research is that according to the qualitative results, the green roof management solution can significantly reduce BOD, COD and PO4 parameters. Therefore, the green roof management solution was chosen as the best solution to reduce the peak and load of pollution in the study area.

Based on previous researches, the per capita increase of green space in Bandar Abbas city can be realized by using the green roof system. The results of this research related to the reduction of flood volume and pollution load using the best management solutions are consistent with other studies conducted in this field. Therefore, by using the best management solutions, it is possible to promote urban development with the least negative effects of urban runoff on the downstream areas and to minimize the decrease in the quality of surface water resources.

Keywords: Best Management Practices, Bioretention Cell, Green Roof, Swale, Urban Flood.