Hazard Zonation and Assessment of Urban Flood Damage Using Mathematical Models, HEC-RAS, HEC-FDA and Geographic Information Systems (GIS)

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Abstract

Management and assessment of expected annual damage to minimize damage and to control flood in the urban environment is necessary but it has special complexity due to the urban development. Nowadays there are many different methods to control flood, which are considered depending on the hydraulic conditions. Using longitudinal embankments, flow diversion, watershed management, etc. are among the methods considered by urban planners. The use of software engineering tools such as HEC-RAS and application of engineering tools such as GIS has attracted the attention of many researchers. This article pays attention to hydraulic studies of the ravine of Mehraneh-rood River, which is the major surface drainage in Tabriz, using a mathematical model. Flood hazard zonation in the city of Tabriz has been performed in northwestern Iran and its possible hazardous areas are determined based on land use, structures and buildings by the riverside. In the following section, the expected annual damages from the floods in this river are estimated using HEC-FDA analyzing software and in the end some methods are taken into consideration to control and mitigate the flood risk with regard to the river regime and the condition of the area, land use, etc.

Keywords: ***flood zonation, flood hazard mitigation, expected annual damage, HEC-RAS, HEC-FDA***

1. Introduction

Iran, according to its ecological condition and the weather, according to existing statistic, each year a considerable flood takes place in it. In this situation, cities and crowded centers, have the most amount of risk and touchable physical probability caused by flood happening. Among the other damages that its financial value can hardly be calculated we can point to environmental changes which happened by floods, like water pollution, erosion and … Flood damage, as a natural problem, can be minimized when before happening it, some basic and organized operation be done for preventing of aggravation of happening and controlling of it. Therefore, the first step for management of map is a danger of flood. Today, studies of flood investigated in two scales area and regional.

Generally, the ends of area studies are just management of flood in the level of area and pay attention to how floods that happened and managed in a high level

Nevertheless, in flood studies by high scale, in order to determine the amount of flooded, analyzing hydraulic values and spatial data's needed that is done by using numerical models (yang j, 2006). So against the area methods, which just emphasize on the extent and amount of flood, regional method, by using strong techniques not only fasten the process of drawing the amount of flooding, but make extracting of depth and speed parameters improved with acceptable precision (Noman, S. et al, 2001). Urban rivers have some main problems that one of