Chapter 9

Hydraulic Modeling of Oued El Jawaher Using HEC–RAS Model for Flood Protection

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ABSTRACT

Flooding has a wide range of impacts on societies and natural environments. In this sense, the city of Fez suffers from these problems reflected by the overflow of Oued El Jawaher during the rainy periods. This situation led the authors to compare between the current situation and the situation developed by the thresholds of Oued El Jawaher. HEC-RAS hydraulic model consists of 31 cross-sections, which will be used in the course of this study. The simulations will concern the current state and the developed state for flows of different frequencies. The result of the simulations confirms that the capacity of the proposed hydraulic structures is insufficient to transit and should be considered. To conclude, the development of the channel by thresholds, which serves for the creation of water plan, magnifies the risk of an overflow of the banks of the canal by the water line along with the longitudinal profile.
INTRODUCTION

Flooding can be defined as “a phenomenon of temporary submersion, natural or artificial, of a land space” (Helga-Jane & Richard, 2004). The latter produces very different impact on societies and natural environments. The city of Fez experienced from the middle of the 20th century (September 1950 and October 1989) excessively violent floods which caused very important damages (ABHS, 2010). The overflowing waters of El Jawaher River during rainy periods are one of the main sources of flood risk for the city of Fez, which continues to grow due to human activity.

The aim of the present research paper is to develop a hydraulic model that will simulate the flow in El Jawaher River for floods of different return periods, and make a comparison of the current state and the state of development by thresholds intended to remedy the overflow threatening the local population at the level of the city.

PRESENTATION OF THE STUDY AREA

El Jawaher River is located between the parallels 33 ° 30 and 34 ° 08 N and between the meridians 4 ° 54 and 5 ° 09 W. The city of Fez is located in the northwestern part relatively watered compared to the rest of Morocco, the climate type of this region will be defined according to the data provided by the resorts in the region. The region of the city of Fez has several weather stations enough distributed and distant from each other. Only the data of the station Fès-Saïs is selected, for the preparation of this overview, by their proximity to the study area.

The zone is a subsidence filled by deposits of Neogene age whose southern fringe comes to stumble against the Jurassic Limestones and dolomites of the middle-atlas and the northern fringe against the Pre-Rifain groundwater.

The city of Fez is characterized by a semi-arid climate; the annual rainfall regime is characterized by the existence of two distinct seasons: a wet season that runs from October to May and a dry season that extends from June to September, cold in winter and hot in summer. From the series measured by the station Fez Sais, the average annual rainfall is 494 mm, and the calculated average temperature is of the order of 17.5 ° C (ABHS, 2015).

The hydrographic network is very important, most rivers which constitute this network are supported by eternal sources. It converges towards the valley of the Wadi Fez which is thus the main collector which carries the water of the two sides which frame the city of Fez, towards the Sebou River.
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