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EXTENDED ABSTRACT

Derivation of Huff Curves for the Four Stations in Great Karun River in Khuzestan Province S

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1. Introduction

The first step in scientific water resources management is good understanding of the temporal precipitation pattern. One of the main tools in understanding the rainfall pattern is plotting the Huff curves. This is true especially in arid and semi-arid regions encountered with water shortages. These help decision makers in understanding temporal characteristics of rainfall, which in turn can help efficient management of water resources. Temporal distribution of rainfalls interested by many investigators in the field of hydrology such as Yen and chow (1980), Loukas and Quick (1994), Todisco (2014), Huff (1967 & 1990) and many others. Furthermore, illustration of Huff curves for different rain gauge stations performed by many researchers such as Azli and Rao (2010), Awadallah and Younan (2012), Yazdi et al. (2016), Shokri-koochak et el. (2011), and many others. In a recently published work by Ewea et al. (2016) the Huff curves were plotted for the city of Makkah Al-Mukkaramah in Saudi Arabia. Based on our best knowledge, there is no comprehensive scientific work carried out on illustration of Huff curves in Great Karun River basin, located in south west of Iran. Therefore, the main objective of this study is illustration of Huff curves and analysis of storm pattern during the rainfall occurrence in the four selected stations, including the Dez dam, Abdul-Khan, Gotvand and Ahwaz. These selected stations are located in Karun River basin, Khuzestan province, Iran.

2. Methodology

The study area is Karun River basin located in Khuzestan province, Iran. The four stations selected for analysis in this research. Figure 1 shows the geographical location of the selected stations. The total number of storms analyzed here, is equal to 1273. These storms classified in to the five different classes based on duration of rainfalls. As no sufficient storms recorded in summer season in the selected sites, therefore, analysis performed for three other seasons (i.e. spring, autumn, and winter).

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Fig. 1 Location of the selected stations in Karoon River basin.

3. Results and discussion

Fig. 2 shows the plotted Huff curves in different seasons and in distinct duration of storms in the station Abdolkhan. The first panel in Fig. 2 shows the Huff curves for the storms, which their durations are between 0-2 hours. The second, third and fourth panels in Fig. 2 represent the storms for durations of 2-6 (hr), 6-12 (hr), and 12-24 (hr), respectively. In Fig. 2 each column belonged to the storms of a distinct season. According to the 50% probability Huff curves, the design hyetographs plotted for each class of storms in the mentioned station, which is shown in Fig. 3. For each of the stations, the Huff curves as well as design hyetographs were plotted in this paper. As mentioned before, the Figs. 2 and 3 show the Huff curves and design hyetograph, respectively in the station Abdolkhan. Similar figures were plotted in this research (not shown here).

4. Conclusions

Temporal pattern of storms was analyzed in the present study for the four selected stations in Great Karun River basin, in the southwest of Iran. In this study, the recorded storms in each of the chosen stations divided into the five classes according to their storms duration. Furthermore, Huff curves plotted for each of the three seasons of the year. Summer had no enough recorded rainfall event at this part of Iran. Design hyetographs for each of the stations were illustrated using the recorded rainfalls, accordingly. It can be concluded that as the duration of storms increases the peak of the rainfall intensity moves from the second quartile to the third one. Furthermore, as the duration of storms increases, the percent of rainfall received in each of the four quartiles tend to be the same. This is especially true for events occurred in winter and spring seasons. Also, using all events recorded for a certain station, in a single class, it can be concluded that, the design hyetographs extracted from the 50% Huff curve were less and more symmetric for the chosen stations. Furthermore, design hyetographs of the selected stations in the case of short duration storms showed to be skewed. Moreover, the types of storms for most of them detected to be the second quartile type. In contrast, long time duration storms are generally found to be the third quartile, having skewed to right. In general, it can be concluded that the illustrated curves would be helpful in scientific management of fresh water in the great Karun River basin. Water crisis would be arising soon if no enough attention were paid to the scientific management of water in this fragile ecosystem at this part of Iran.

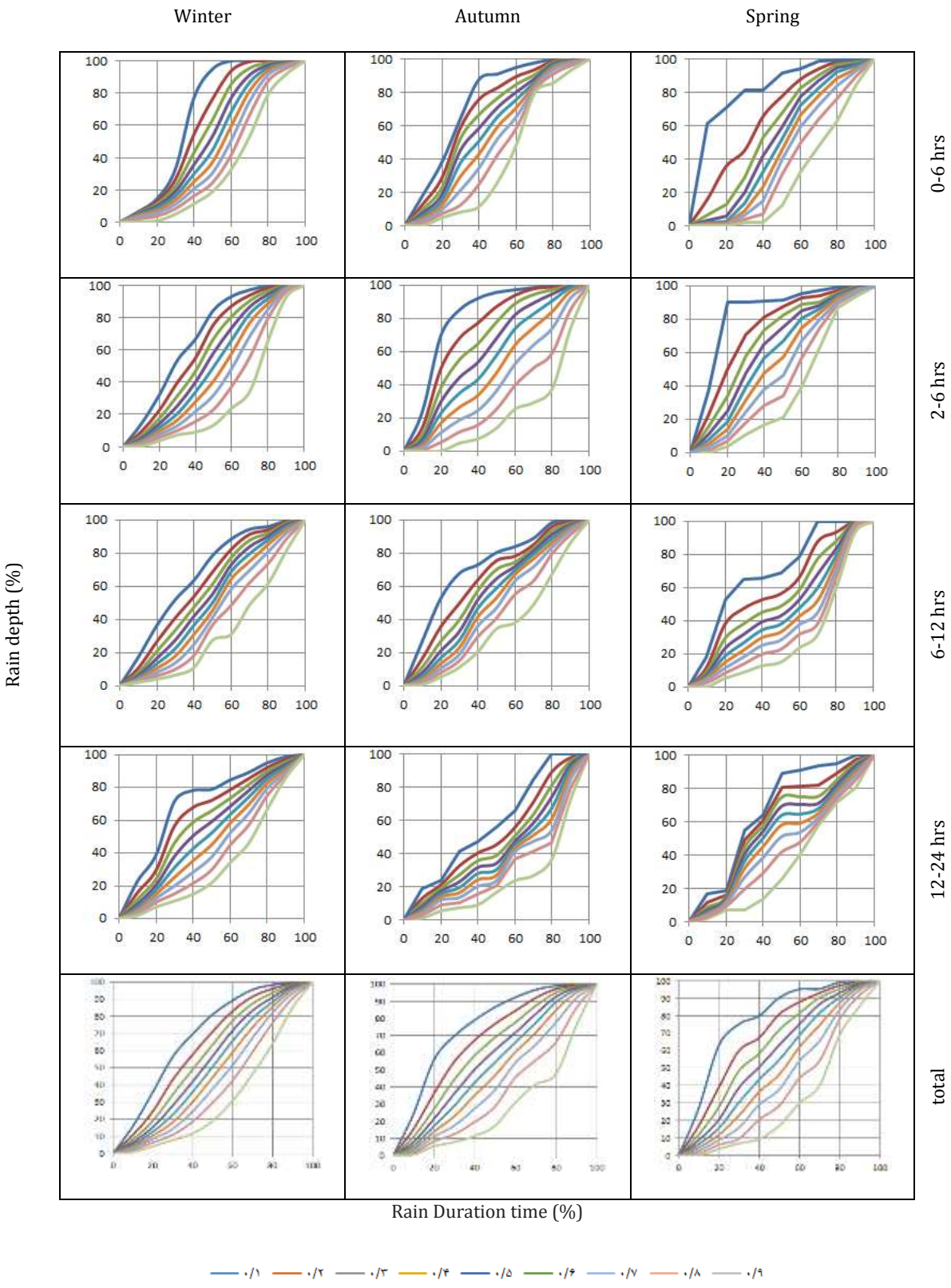

Fig. 2. The set of Huff curves in the station Abdolkhan for different seasons and durations

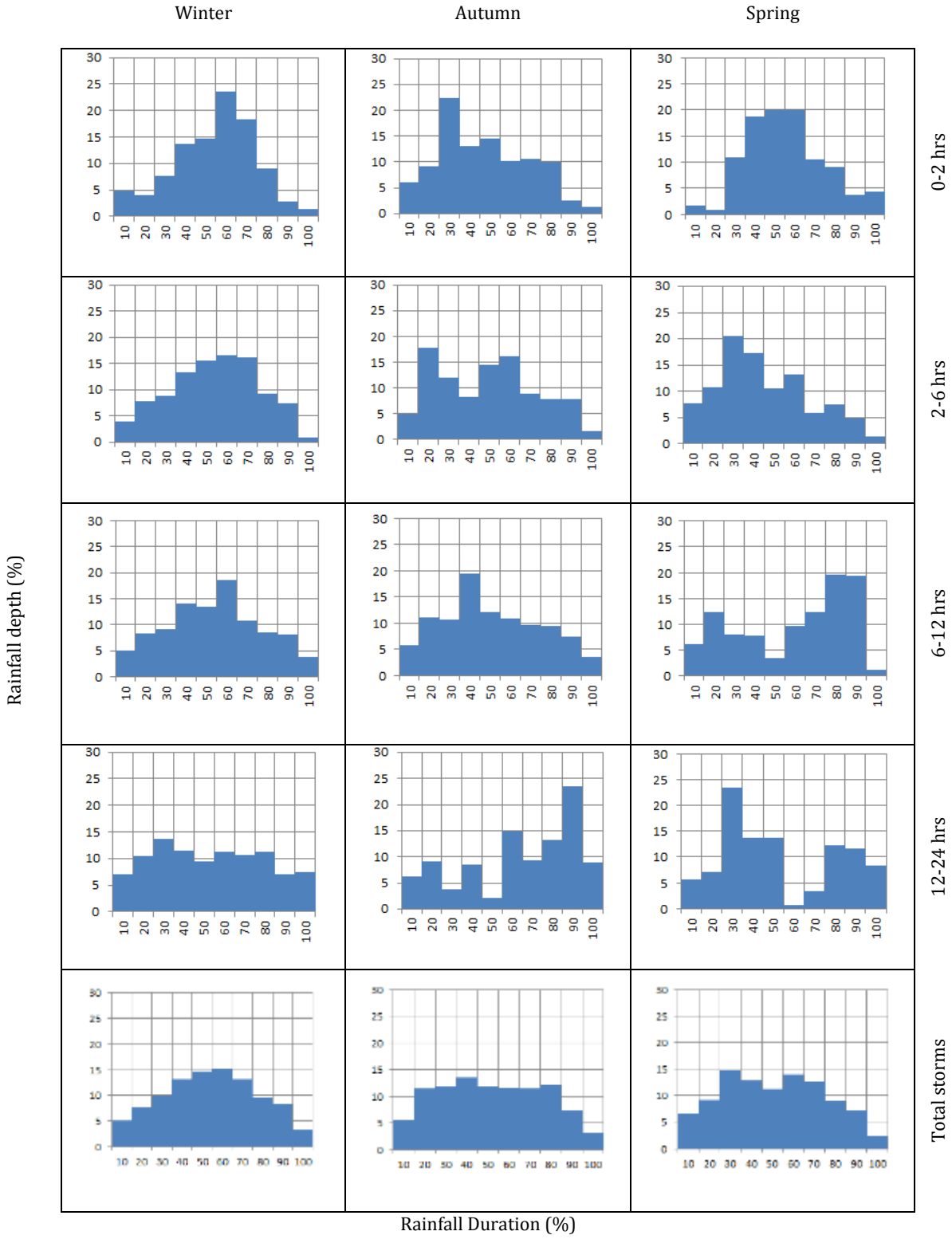

Fig. 3. Rainfall hyetographs plotted by 50% probability in different seasons (columns) and different durations (panels) in the station Abdolkhan.

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