Management and Disposal of Urban Runoff Using Geographic Information System and River Tools Techniques  
(Case Study: District 1 of Ahwaz City)

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1.INTRODUCTION
Regarding the classification among lowlands, Ahwaz is considered as one of the metropolises of Iran due to being topographically characterized by low slopes. In this city, unsystematic construction and immediate rainfalls and showers have been identified as the main sources of floods in the streets of Ahwaz. Motivated by these factors, this descriptive-analytical study, which is based on a causal approach, seeks to investigate, identify and manage surface water and urban flooding in the District 1 of Ahwaz using Geographic Information System (GIS) and river tools techniques. It also sets out to make maps of slopes, their directions and areas that are susceptible to floods during the precipitation. In this region, given the low slope of the land, the gravity drainage was impossible due to the high cost of pumping water to Karun River. However, using GIS analysis, the best natural way for draining runoff was determined, and the map of surface water disposal network of the area was presented.

2.THEORETICAL FRAMEWORK
In a non-urban area, given the permeability of lands, usually a large portion of the rainfall infiltrates into the ground, adding to the supply of groundwater. However, in an urban area, runoff is the result of a complex geometrical structure. Urban development is followed by the increased level of isolation, and as a result of development of these surfaces, permeable areas absorbing rainwater are disappeared. When these lands are

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constructed and exposed to impermeable communication network, about 70 percent of land permeability is reduced. It can increases annual runoff up to 0%. Consequently, most rainfalls are directly converted to runoff, which can disrupt the existing urban drainage system and damage urban properties.

3. METHODOLOGY

The present study has a descriptive-analytical approach and is based on the causality method. The data were collected from the existing documents and maps and then analyzed by Geographic Information System (GIS) and River tools techniques. To do so, first the area was marked on topographic maps with a scale of 1/2000 and then the elevation map of the area was designed in GIS environment. Finally, the proposed maps were made based on the layers.

4. DISCUSSION

To design and manage a system of surface water collection and disposal, or a sewage system, some information about the slopes, their directions and current status of streams is needed. The slope of an area has a large effect on the hydrological reaction of the basin. Consequently, the volume of surface runoff and flows is directly related to the slope changes. Areas susceptible to floods, which are a combination of slopes and its direction maps, are characterized with flat and smooth surfaces with a slope close to zero. Drainage network of basin indicates how runoff is drained, thus making its identification highly important in hydrological processes. The flooded areas could be discharged by the drainage network and any of these points can be led to the nearest drainage so that it is connected to the main channel and directed outside the area. Not only is it difficult to propose a runoff disposal network due to the low slope of the area, but also the gravity drainage of the area to Karun River is impossible. However, GIS analysis can help determine the best route for the channel or pipeline of the drainage system.

5. CONCLUSION & SUGGESTIONS

Besides stating prevailing environmental functions, geography and particularly urban planning act in such a way that prevents a conflict of human functions and the environment. The art of an urban planning expert is to predict the reaction of the environment to human functions, and propose a comprehensive view to resolve issues accordingly. Ahvaz is located on a low-slope plain, and water disposal through pumps and natural channels is almost impossible due to the high costs and low slope of the area. As a result, each year this area is subject to floods and heavy damages. Given the importance of this issue, Geographic Information System (GIS) and River tools can be used to design a hierarchical or tree drainage system to collect run-off in the streets and alleys of the city center, direct it to the drainage channels and finally transfer it to Karun River. Therefore, first the optimal routes of channels need to be determined by these tools in Ahwaz and its urban textures and then pipes should be laid accordingly. Also, it is
recommended to determine water drainage channels before urban texture is fully developed.

**Keywords:** Runoff Disposal Network, Geographic Information System, River tools techniques, Ahwaz city.

**References**


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