

Hydrological Analysis of AL-Samawah Desert Using GIS

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Abstract

The research aims to conduct the hydrological analysis of AL-Samawah desert using GIS and digital satellite images from DEM, as the AL-Samawah desert is the largest area in Al-Muthanna Governorate, Because of the urgent need for other sources of potable water and agriculture. The available resources are inadequate. The importance of research in the study of water basins available in the desert of AL-Samawah and using GIS technology because it is easy and inexpensive scientific methods compared studies used and the basins in the apparent AL-Samawah is one of the main sources for the collection of ground water and rain water and therefore can from ground water for drinking purposes or agriculture to encourage people to exploit them optimally.

Keywords: Hydrological analysis; Digital height; Water basins; GIS

Introduction

Water resources are of the most important components of building societies, since most cities are established near water basins in the most of the world, water resources are among the most important things in human life in dry areas such as the desert of Samawah because they are free of rivers. Rain fall is limited as is the lake of ground water, where rain fall is limited during the winter. The desert of Samawah accounts for 75% of the area of Al-Muthanna Governorate most of which is desert and is not populated due to the lack of water available for agriculture and other human activities. In Samawah desert there a number of valleys that receive rain water, rain water to increase ground water supplies for drinking and agriculture [1]. Where there is a clear demand for surface water and after most scientific research proved in accuracy of topographic maps in the study of water basins, GIS and digital satellite images DEM have been used in hydrological studies to study water basins for accurate measurements and engineering analysis, Aquatic ponds are cost-effective when compared to traditional means of mapping. The study revealed that there are a number of water basins that can be used to collect rain water to increase ground water reserves and use these water these water for agriculture, drinking and rehabilitating settlements for nomads [2].

Study Area

The study area is located in Al-Muthanna province, west of Samawah city center called the western Samawah desert. It is a study desert region with a coordinates of 45 degrees east, 30.25 degrees north, and has limited human activity can be used for the purpose of setting up solar powered stations as an open area and not exploited in the present time as shown in Figure 1 [3].

Search Tools

The following tools were used for the purpose of completing research:

- Satellite images of digital altitudes from the site of the US geological survey of 2016 and the accuracy of 30 meters for the study area.
- ARC map program for data analysis and mapping of the study area.

The Importance of Studying

The study of the geomorphology of drainage basins is an important study because discharge ponds are important, geomorphologic

phenomena in dry areas where the characteristics of drainage basins and related hydrological variables are studies. Therefore it was necessary to develop a data base of the basins of AL-Samawah desert using geographic information system, where this area did not have sufficient hydrological study [4].

Working Methods

The method of working on the analysis of digital elevation images

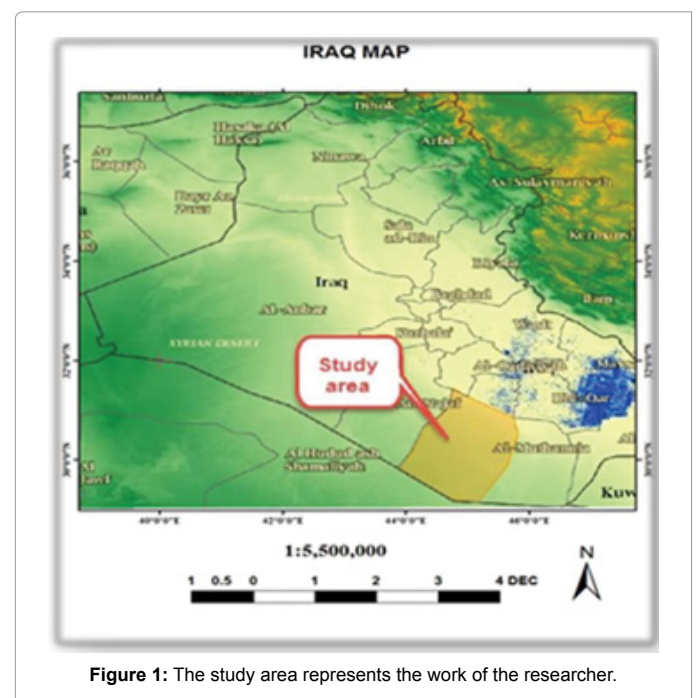


Figure 1: The study area represents the work of the researcher.

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was adopted using the (ARC) map program to study the hydrological analysis of AL-Samawah desert and the following results were obtained.

Flow Direction

Where the direction from which water is drawn from a cell to neighbouring cells is determined, which is the line that water travels through the terrain. Most of the flow direction was from west to east in AL-Samawah desert as shown in Figure 2 [5].

Stream Order

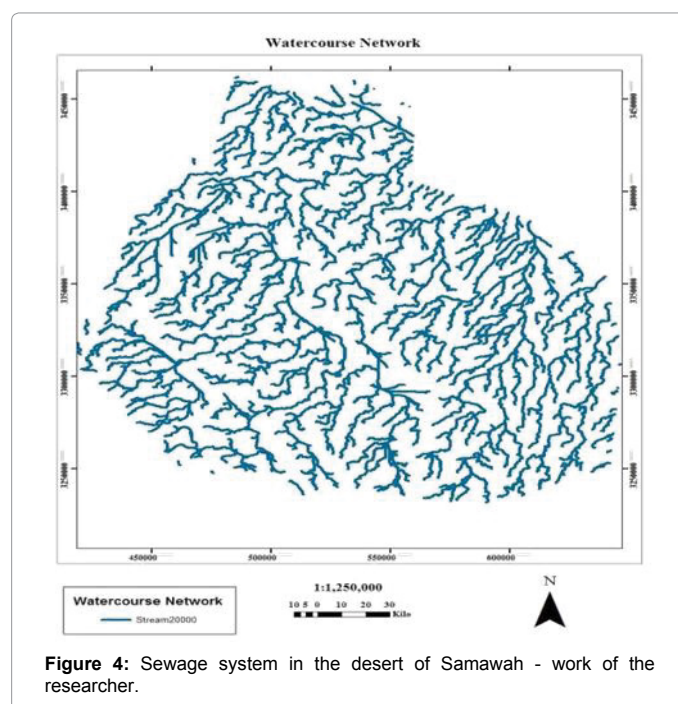
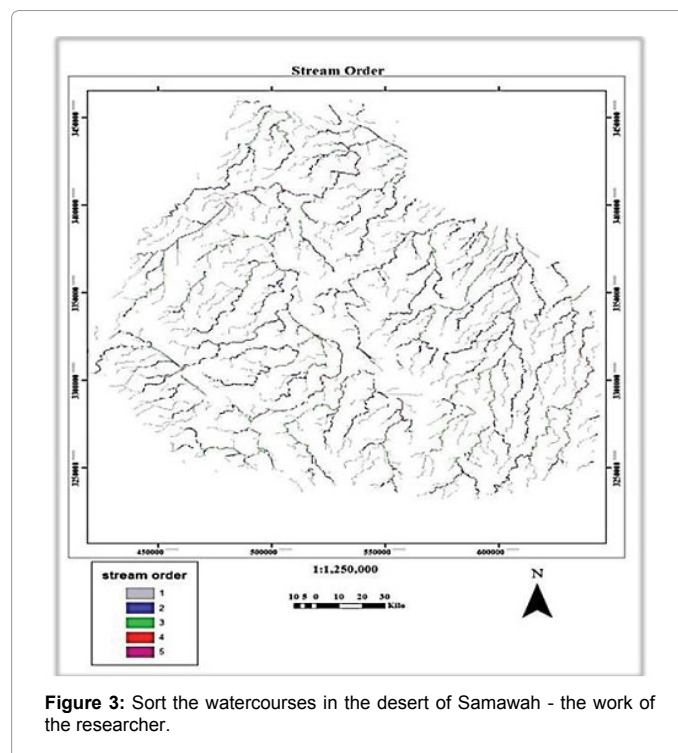
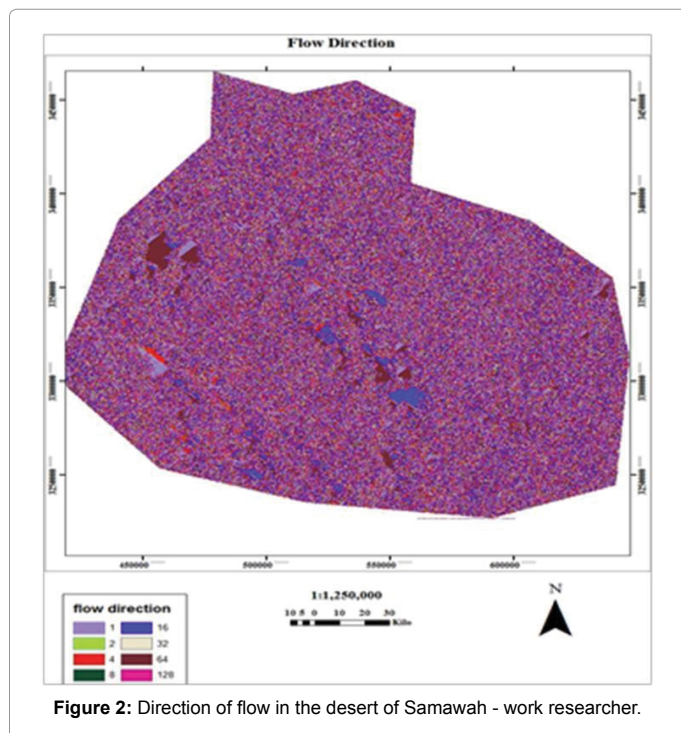
The water courses are distributed in the basins in hierarchical manner, they start with a small and many chambers that represent the first level and converge with each other to form the second rank, which is less numerous and larger than the first rank as shown in Figure 3. These grades are important in identifying the hydrological properties of dams and reservoirs. The stiller methods were used to derive water course levels and were five levels [6].

Water Course Network

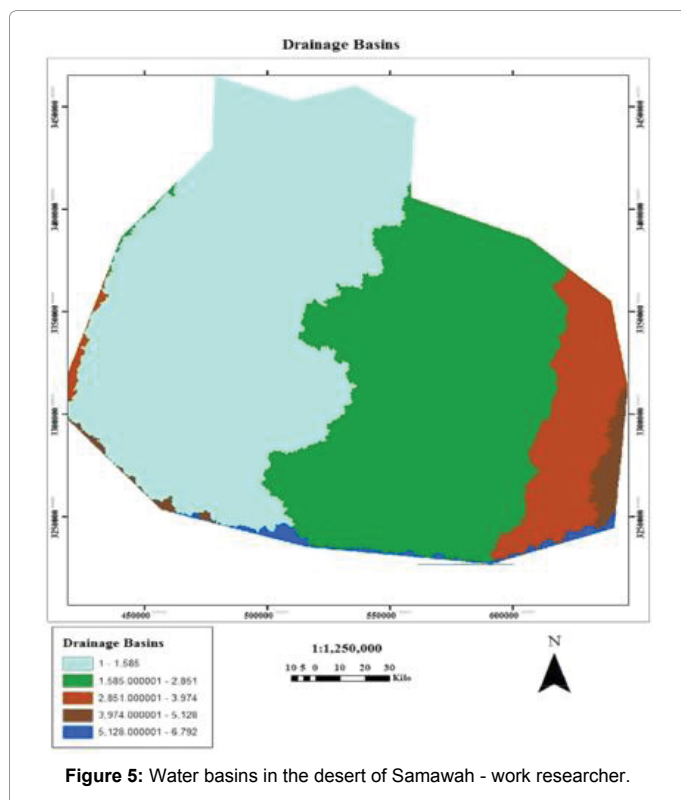
The water network is one of the most important ground forms which have a direct and indirect impact on the other land forms within the region and also affect the different uses of the land. Figure 4 shows the water course network within the study area and it is going from west to east [7].

Drainage Basins

Through the use of the GIS program and the hydrological analysis



tool, the areas of feeding basins were identified in the AL-Samawah desert, based on the digital elevation model, and AL-Samawah desert was divided into four basins as shown in Figure 5 [8].



Conclusion and Recommendation

- The digital elevation model is an important source for obtaining

information on terrain and hydrological drainage network identification.

- The structure of AL-Samawah can be divided into two plateaus, hills and a group of valleys, which are important sources of ground water collection [9].
- The terrain in the desert of AL-Samawah is high on the western side and low on the eastern side and there are places for the gathering of sand dunes.
- Digital elevation models should be used in hydrological and geomorphologic analysis, providing a lot of effort, time and cost.

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