



Cartographic Analysis of the Geomorphological Hazards of the Eastern Part of Sheikh Saad Sub-District by Using GIS

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ABSTRACT

Geographical information systems are the latest applied computer technologies that contribute to supporting contemporary geographical studies through the possibility of working on preparing a database of geographical phenomena and modeling them in a digital form by providing automated methods and a set of systems and programs for managing and processing data with spatial and non-spatial reference, which is one of the important functions in geographic information systems. And the base on which it depends to reach the optimal decisions to reveal the spatial relationships and correlations between geographical phenomena and with high efficiency, to become the contemporary method in the method of processing and spatial analysis of geographical information instead of the old traditional methods of geographical analysis, and the system also allowed the geographical area to enter into the era of modern technologies to evaluate phenomena. Geographical forecasting.

The research materials and methods are determined by adopting topographical and geological maps, land-sat satellite visuals, and DEM data to form the search database, and based on the GIS program (Arc Map 9.3) and the (Global Mapper 11) program and the extensions of the (Arc Map 9.3) program, which are (Spatial Analysis) And the three-dimensional analysis (3D analysis), and the outputs are the final process through which the results of the research emerge.

These outputs show the type of information that will be processed and presented in the form of three-dimensional maps and shapes, studying the most important causes of geomorphological risks for the study area, and developing solutions and treatments through the conclusions and recommendations of the research.

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INTRODUCTION

Given the great importance occupied by rivers, this requires tracking the natural changes that occur in river basins, river channels and the lands adjacent to them, and observing the change in the relationship between the elements of the geomorphological environment (shape, factor, process, surface materials) and the degree of interaction between them during short or long periods, which requires Analyzing historical data and evidence to determine the causes and extent of change and to limit the human role in its occurrence.

The soil of the shoulders of rivers and their extensions from the soils of the banks, the tongues and the rivers are of the soils of the first category from the agricultural point of view, due to the availability of agricultural potentials in them and their suitability for the growth of most crops. Sheikh Saad and Ali Al-Gharbi, which sparked the researcher's scientific curiosity to study it and clarify its merits.

RESEARCH PROBLEMS AND HYPOTHESES

The research problem centers on the question of whether there is a defect or ambiguity in the nature of the reasons and the geographical factors that led to the

geomorphological risks in the Sheikh Saad area.

Then the banks of the Tigris River were salinized in the study area, the researchers assume that there are natural and human geographical factors and processes that contributed to these risks in the study area.

Research Goal and Importance

The research aims to shed light on an important phenomenon affecting people's lives and the shape of the earth, as well as revealing the factors that led to the occurrence of this phenomenon, and determining the scope of this phenomenon and the possibility of its expansion or disappearance.

Search Limits

The spatial boundaries of the research are represented in the astronomically confined area between two latitudes $28^{\circ} 32' -$ and $.34 32$ (North and between longitudes $16 46$ and $42 46$) East, and this location places it geographically to include the course of the Tigris River between the city center of Sheikh Saad district, the end of the southern administrative borders of Wasit Governorate from the north

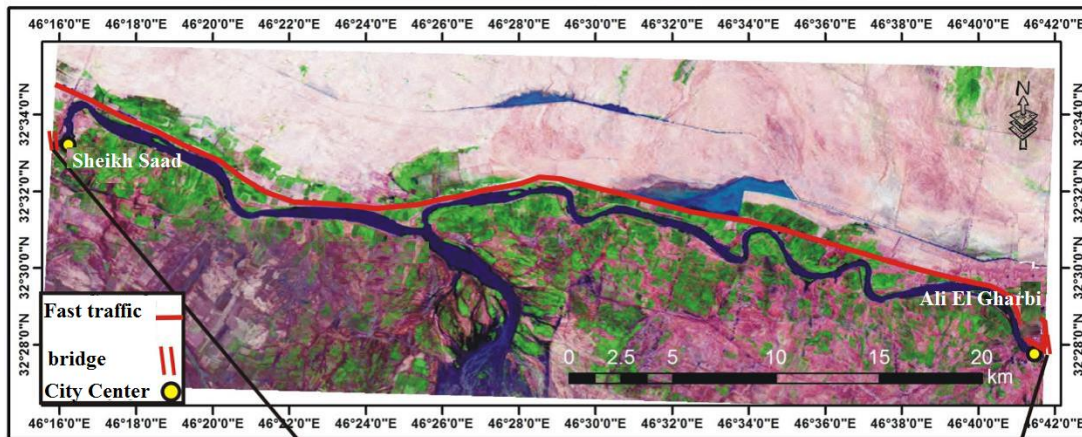
And the center of the city of Ali Al-Gharbi District, the beginning of the northern administrative borders of Maysan

Governorate, from the south, Note the map (1)

available climatic data for the period (1994-2014) and hydrological data for the same period were applied.

Time limits: Through the field study in the fifth and sixth month of 2021, the

Map (1) The site of the study area from Iraq



Source: From the researchers' work based on the General Authority for Survey, Map Production Department, the digital unit, the administrative map of Iraq at a scale of 1/100,000 for a year 2019 .

Some of the physical geographic characteristics of the study area

FIRST: GEOLOGY:

Geomorphology is interested in studying the geological formation from several aspects, the most important of which is its use in extracting scientific explanations for the types of terrain and geomorphological forms in the region. And what this formation has on the quality of soil, surface and ground water and the direction of their flow.

The study area is located within the sedimentary plain, which is completely covered by the sediments of the Quaternary period, which is an ancient wind, silt, river and marine sediments. What is not clear, due to repeated erosion and sedimentation processes and the lack or absence of fossils?

Geological formations have been confined

On river sediments, it can be dealt with in two main topics as follows:-

1- Pleistocene alluvial deposits:

These deposits are represented in the first era of the Quaternary period (Pleistocene), which began before (8.1) million years ago, and the upper limit of these deposits is (15) p below the surface of the earth and its thickness reaches (174) m. It consists of deposits of sand, silt and clay. They

overlap with each other in the layers, and the sand is more dominant than others, and the thickness of the layers ranges from centimeters to some meters, 3 and accordingly it can be said that these sediments do not appear in the study area except in the regions.

2- Holocene sediments:

These deposits are represented in the second era of the Quaternary time (Holocene), which began 10 thousand years ago

It lays several types of sediments, the most important of which is the sediments of the floodplain that occupy the entire study area. It was deposited by the waters of the Tigris River, whose thickness is (10-15) m, and consists mostly of sand, silt and clay.¹

The folds in the basin spread in a north-east-southwest direction and sometimes from north to south. These folds are characterized by their convergence and asymmetry at both ends and there are many cracks, which often take directions similar to the directions of the folds with a large spread of breaks and cracks on the surfaces of rocks.²

¹ - Khattab and Nuri al-Barazi, Geography of Iraq, Baghdad Press, 1979, p. 83.

² - Sameh Jazmati and Sami Makdisi, Geographical Information Systems, Arab Orient House, Lebanon, 2005, p. 151.

These deformations occurred as a result of the torsion that affected the region, and these deformations represented by cracks, joints and fissures are a weakening factor for the rocks and activate the chemical or mechanical weathering process.

Analysis of the most important geomorphological risks First - spatial analysis of the distribution and shapes of sand dunes in the study area and includes.³

Preparing the sand dunes and identifying their locations and the extension of the sand dune belts prevalent in Iraq and the study area and studying the shapes of the sand dunes scattered in the study area as well as the spatial analysis of the distribution of the sand dunes prevalent in them, and the areas of their presence at the level of the study for determining their spread areas, and making measurements from satellite images to know Its height, spatial extension and directionality were also used in determining the areas affected by this phenomenon.⁴

Factors affecting the formation of sand dunes.

- 1- The wind.
- 2- Availability of sand sources.
- 3- Topographical characteristics.

Sand dunes in the study area: The sand dunes in the study area are in several forms:⁵

- Cress centie dunes or Barchans
- magnitude dunes
- cross dunes
- shrub - coppice Dune
- Dome dunes
- Sandy hills or mounds

The most important factors affecting the distribution of sand dunes in the study area

1- The regularity and dominance of northwesterly winds, accompanied sometimes by southeasterly winds Which descended as a clear retaliation in the nature of the extension of the sand dunes in the northern study area West - southeast.

2- The nature of the geological formation of the study area and the presence of the first formations on the sand from the Miocene era to the Pliocene era. These formations are a permanent source of nutrition for the sand in the study area through weathering and transportation and

³ - Talal Mariwish Gari Al-Lami, Al-Jabbab River Basin in Iraq (its definition, shape and characteristics) Master's Thesis (AS), College of Arts, University of Baghdad, 1992, pp. 241-242.

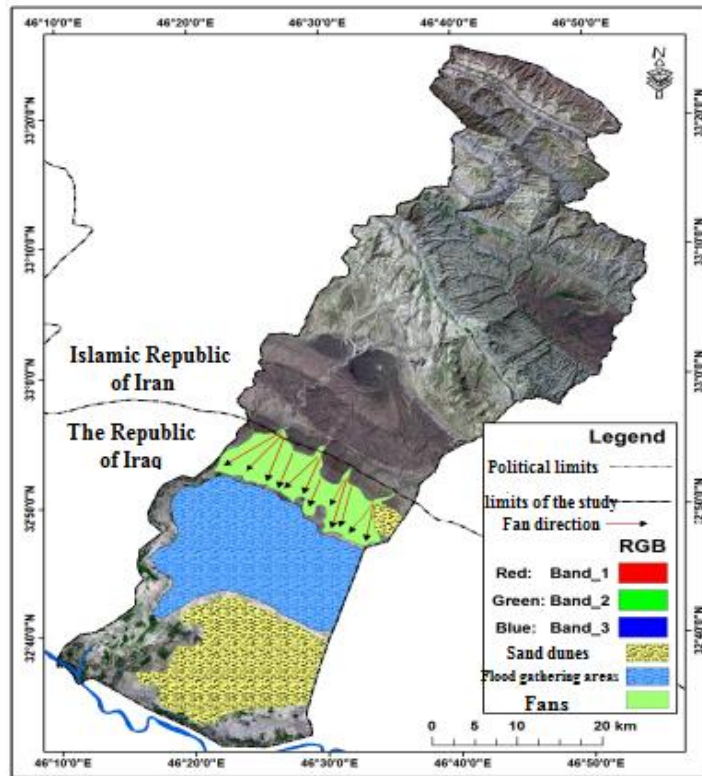
⁴ - Abd al-Hadi Hamad Muhammad al-Jubouri, Problems of calculating regression, slope and body in GIS software for a molar region of Bashiqa, diploma thesis of the Department of Geography, College of Education, University of Mosul, 2016, p.

⁵ - Adnan Baqir Al-Nafas and Mahdi Ali Al-Sahaf, Geomorphology, Dar Al-Kutub for Printing and Publishing, University of Baghdad, 1989, p. 240-241.

then their accumulation through the presence of obstacles and beams.

The flatness of the surface, the lack of scrutiny and the large area of the studied area help On the wind speed on the ease of movement and many factors of wind erosion as the relative gradient of the surface from east to west helped to increase sculpture in high areas and its deposition in low areas.

4- The presence of obstacles such as plants that stand in the way of the wind movement, which leads to the depletion of its load from this sand and its deposition around the plants that grow continuously, and their size increases. We conclude that there are factors that may affect the geographical distribution of sand dunes in the study area, which led to their presence in the current places. Therefore, the study area is a suitable place for the formation and spread of sand dunes, see map (2).



Map (2) Distribution of sand dunes in the study area.

Source: The researchers worked on the 14m visible Landsat visual for 2010.

SECOND: EARTHQUAKES:

Several seismic tremors occur in the study area, and in relation to the area of seismic

impact it is influenced by many factors such as earthquake energy, focal depth and rock nature as well as the effect of the

factor of attenuation of seismic waves in rocks and others, see Map (3).

Third: Analysis of water liquefactions of the study area

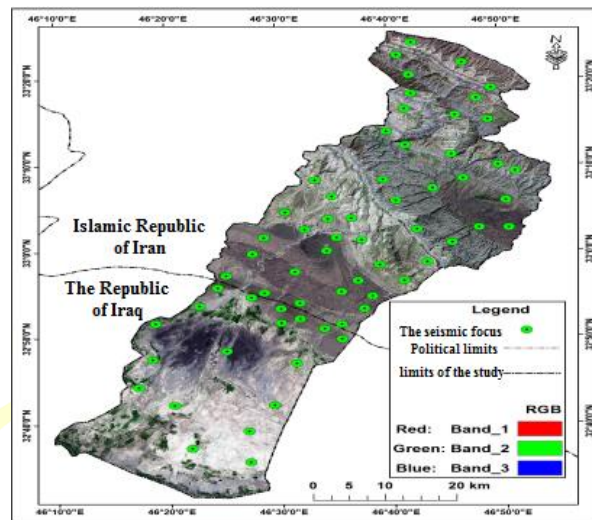
It is the group of sewers and valleys Who is coming from the eastern highlands that penetrate the Iraqi border, which is the basis of life for many of the population, although its relative importance is minimal in the amount of water it supplies and we will deal with the most important sources of water in the region⁶:

1. Al-Jabab River: The Jubb river runs within Iraq about 45 km, the river begins to run from the foothills of the Zakros Mountains on the Iraqi-Iranian border to enter the sedimentary plain area of Iraq to its mouth in the Tigris River, the river basin is characterized by a general decline from the northwest to the southeast and the sources of river feeding are located outside the Iraqi border, either inside Iraq and the Hungarian is fed seasonal valleys, especially when heavy rains fall from the eastern reaches of the Zakroos Mountains⁷, see map (4).

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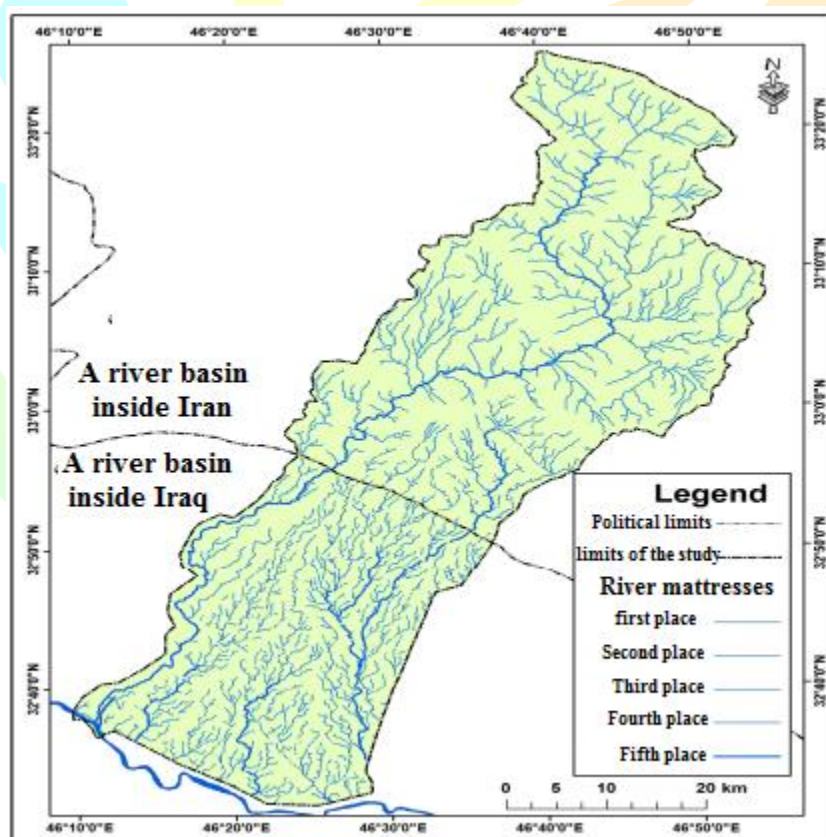
⁶ -Buda .T. The Regional Geology of Iraq Stratigraphy and Paleogeography vol. ISTATE ORGANIZATION MINERAL .BAGHDAD 1980.P10.

⁷ -walai Sabri Loyalty, Sandy Dunes in Muthanna Governorate - Applied Jiomoriya Study, Master's Message Introduction to Faculty of Arts, University of Baghdad, 2011, p. 74.



Map (3) Geographical distribution of seismic hotbeds in the study area

Source: General Geological Survey and Mining Company, Seismic Focus Map of Iraq Scale 1:000,000,000, 2018. Baghdad, Iraq.



Map (4) River network of the study area.

Source: The researchers worked on (d e m) digital height data with a distinctive accuracy of 30 m.

The number of river mattresses for the al-Jabab colleges was 5 river levels. The area of the Jabab River basin is the largest area on the Iranian side of the Iraqi side, originating from the drainage basins in Iran from a very severely cut and damaged area.

2. al-Maleh Valley: It originates from Iranian territory towards Iraq and enters a limited area within, the mountain area is a small fan component connected to the Shihabi River fan.

3. The old Shihabi Valley: it is part of the Shihabi River other than the Shihabi River in the area, Shihabi fan ends the old stream in the low-lying area of the torrent pool area in the part of Eastern study area.

4. Groundwater: Groundwater is of great importance to the life and cultivation of the population in dry and dry areas where surface water sources are not available, and climate, topography and rock quality factors control the size, quality and distribution of groundwater from region to region⁸.

The most important problems caused by water deposits

One of the most important forms resulting from the sediments of river streams,

⁸ -Hassan. A.h. Badra Jassan Hydrogeological Study Ministry of Irrigation1977p12

especially the Border Rivers, is the alluvial fans, which are a sedimentary ground problem of rocky materials of a variety of sizes deposited due to the poor viability of running water to carry them and take a problem closer to the form of a semi-circle. One of the most important problems of the earth's aquatic land is the alluvial fans, which are the most important and widespread geomorphological manifestations in the study area and have formed a wide range along the sides of the hill heights at the border, Another notable phenomenon is the phenomenon of lava surfaces and sand dunes: it is a phenomenon resulting from aerodynamic erosion, as the wind transports light sediments leaving gravel and glammed prominent on the surface in the exotic areas of the border, the Shihabi area, where gravel and glammed appear on the surface of the earth⁹, see figure (1).

By Using modern technologies using space visuals and DEM digital height data using ARC 9.3 MAP. To analyze the ground appearance data the ground appearance of the study area the rate of slope trend, see fig (2) and (3).

⁹ -Hossein Baderipour, Islamic Republic of Iran, Forage Resource Profiles, Geological Part, Iran, 2005, P.5.



Shape (4) phenomenon of lava surfaces

Source: Wasit Geological Survey Office of Geological Survey 15/6/2021

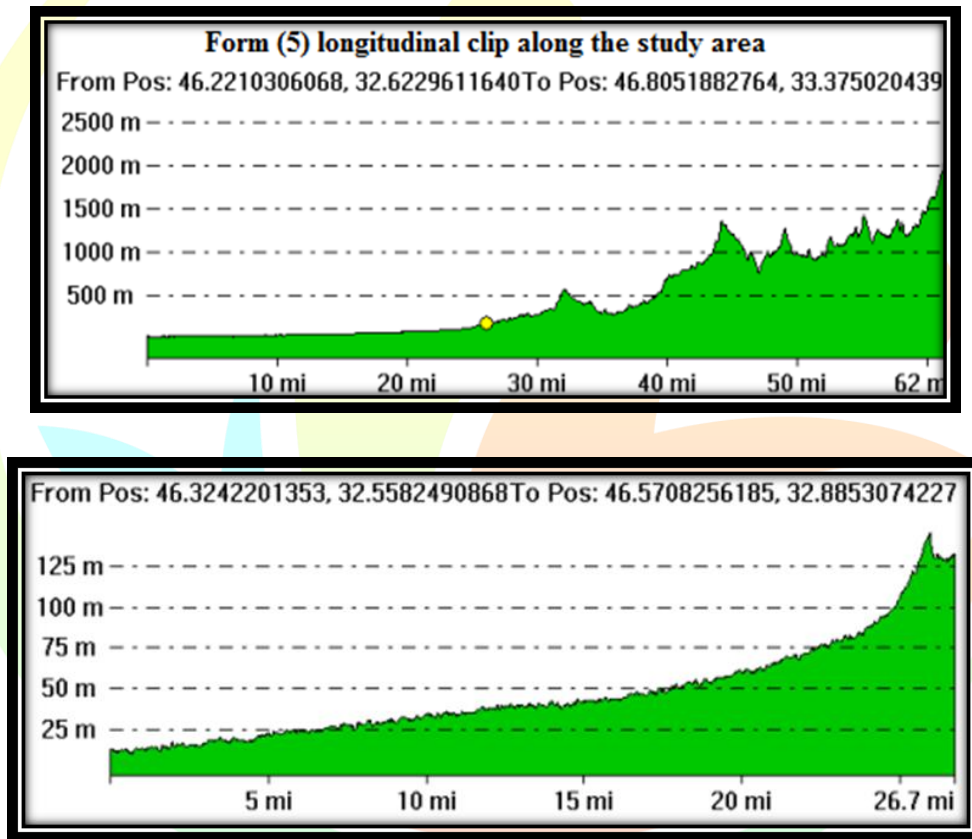


Fig (2) longitudinal section along the study area

Source: Researchers based on (d e m) digital height data.

CONCLUSIONS:

The adoption of GIS technology gives importance to the spatial analysis of the phenomenon

Geomorphological risks and risk identification.

2- When analyzing the stratified sequence of the study area, it was found to be part of

the class sequence that appears in all parts of the Earth's surface.

3- Sand dunes are a common phenomenon in the study area and have a large impact on agricultural areas and villages through the dust rising from the dunes and crawling on the nearby territory.

4- The diversity of forms resulting from the sand dunes in the study area.

5- Climate phenomena play a role in controlling the movement of sand dunes in the study area. The frequency of earthquakes in the study area and to a varying degree, and the water flows in the study area emerged through the meteorization of the Shihabi River on the area and the frequency of the phenomenon of floods on the study area¹⁰.

6- Alluvial fans and helicopter buckets in the study area are water liquefactions, rock dredging, sand and gravel from inside Iran to Iraq.

7- Diversity in the height of the study area between the drainage basins of river streams in Iraq and Iran, where basins in Iran are characterized by the fact that they take place in rugged areas and mooring lands either in Iraq characterized by the land characterized by the simplicity or gradual decline of the surface of the earth.

8- In most of the study area, reliance on well water, which is characterized by the fact that most of them are unfit for human use.

9- The sovereignty of the phenomenon of overgrazing in the study area¹¹.

RECOMMENDATIONS:

1- Establish research centers to study and identify geomorphological risk areas in order to develop studies to reduce their impact.

2- Installing sand dunes in the study area to reduce their risks to the area.

3- Construction of dams and dirt payments to reduce floods from the Iranian highlands. 4- The establishment of earthquake registration centers in the study area.

4- Adopting modern techniques to monitor environmental changes in the region and predict geomorphological hazards.

5- The establishment of climatic plants in the study area to monitor climatic phenomena. Use of floodwaters in the rainy season and use in groundwater feeding and use in agriculture.

¹⁰ -Tibor Boday, and Saad Z Jassim, The Regional Gaology of Iraq Volumel Baghdad. 1987.p18.

¹¹ -Philip Lake, Physical Geography, Thtrdediton Cambridge at the Universusty, Press, 1955, P. (367)

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