ENVIRONMENTAL AND WATER EFFECTS OF GEOMORPHOLOGICAL PROCESSES IN THE NETWORK AREA WITHIN THE NAJAF GOVERNORATE USING MODERN GEOGRAPHICAL TECHNIQUES

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Abstract. This research dealt with determining the size and nature of the environmental effects of the geomorphological manifestations that occur in a suitable environment, especially within a geological structure in the sites of faults and faults, as the study of spatial relationships between geomorphological units, rock formation, structural nature and climate. As well as the processes of thawing and water erosion lead to changes in the nature and balance of the processes that exercise their influence on the surface of the earth, which makes the resulting geomorphic forms vary greatly. Its geographical distribution, the slope in it, especially the Najaf desert, contributed to the formation of deep, fast-flowing river valleys, while rain water gathered in the concave hollows, which may represent geological weakness areas. To material and human damage, and then can be concentrated spatially and temporally, as this rapid change can cause different problems for the region or the local community, and the rain collected in the stomachs of the valleys is accompanied by rapid water flows based on the slope of the region and the amount of water, which works to cause torrential torrents. Also, the effect of these torrents is to increase water erosion, as well as the difference in temperature The general environment of the study area works on sliding and moving the rock masses of different sizes for the rocks in the study area and the level of some lands in the area decreased, but these phenomena did not occur only due to the influence of heat and water factors, but there are other factors that control the degree of risks and construction, as the study area was divided into A number of levels of environmental impacts and identification of each type of risk, and those risks were measured depending on the type of each one according to the weight of each layer and according to the layers needed by each type of risk.

Keywords. Environmental, Network Area, sites.

1. Introduction

The spatial models in geography are of two types, as the first type is fixed, while the second type is kinetic, and the second is the one that the geographer uses to model the temporal changes that occur for the phenomenon, as this type uses modern Techniques and these techniques are (remote sensing, model Digital Elevation (DEM), and satellite visuals for spectral surveys, which are characterized by high accuracy.In addition to this modern technology, digital software such as Arc Gis is also used.

1.1. First: The Research Problem

-Do geomorphological processes have an impact on the environment of the study area .

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-What is the extent of influence of all the aquatic environment, soil and water to the geomorphological processes in the study area?

1.2. Secondly: The Research Hypothesis

-Natural factors affect the formation of geomorphological features (morph tectonics, morph climatic, morph dynamic, torrents) in the study area .

-The environment of the study area is affected by geomorphological processes such as weathering, erosion and others.

1.3. Third - Research Objectives

The research aims primarily at an analytical study to give a clear picture of the study area, and to build a model for geomorphological manifestations and their environmental effects and to build an information base to achieve three agency goals:

-Possibility of evaluation: the benefit of evaluation is the evaluation of the geographical phenomenon.

-The possibility of estimation: it is the estimation of geographical phenomena and their elements and identification of their environmental impact.

-Predictability: It is used in future predictions that occur on the geographical phenomenon over time, as dynamic models were taken in order to build a simulation model of geomorphological phenomena.

1.4. Fourth - The Importance of Research

Determining the natural factors affecting the geomorphological processes that have an impact in the environment of the study area through the application of modern technologies, including remote sensing and geographic information systems in order to analyze, interpret and build an information base for geomorphological manifestations.

1.5. Fifthly: Research Methodology

The study relied mainly on the descriptive, historical and deductive approach through the analysis of topographic maps and satellite visuals, the analysis of climatic data, knowledge of spatial variation between climatic elements, and the use of GIS software to assess the environmental effects of the geomorphological features in the study area.

1.6. Sixth: The Limits of Research

The study area is represented in the southwestern part of Iraq, that is, in the southwestern part of the southern desert, which is located astronomically between latitudes (32.00 -30.00°) in the north and longitudes (34.00 o'clock-44.00°) east and geographically to the west of the city. Al-Najaf Al-Ashraf with a distance of (170 km) and administratively located in Al-Shabaka district in Al-Najaf Governorate, the area of the study area is (22347.95) km2.[1] It is bordered on the north by the city center of Najaf, on the south by the Kingdom of Saudi Arabia, on the east by Muthanna Governorate, and on the west by Anbar Province, as shown in the fig(1).

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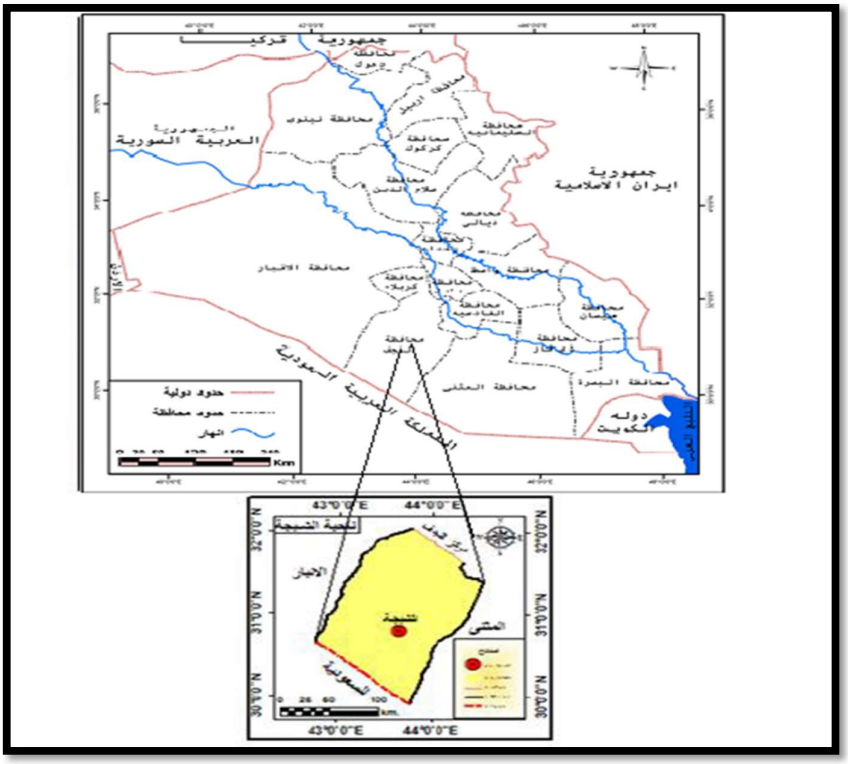

Figure 1. location of the network area of Iraq.

Source: the researcher, depending on the General Authority for Survey, the Department of Map Production, the administrative map of Iraq at a scale of 1,000,000.1 and within the program ((10.4Arc Gis)).

2. The first axis: the natural characteristics of Najaf Governorate.

Geologically, the Shabakah side is located on the eastern edge of the western plateau and within the stable pavement area represented by the Salman area, which is very close to the boundary separating the two stable and unstable platforms, which is located on the eastern side. The sedimentary section, which dates back to the third geological time, represented by the Lower Miocene era, and that this formation appears on the surface of the earth in the western parts of it, as the geological evidence taken from modern satellite images and geological surveys of the subsurface structure indicate that the ancient Euphrates River in ancient times extending between the middle Pleistocene era Even the Old Stone Age did not take its current course, but rather it took a course starting from the current Hit, passing through the Razzaza depression, passing through the western and southern edge of the Karbala plateau - Najaf.

-formations of the Euphrates are represented by types of limestone and white chalk, which contains fossils. The thickness of this formation reaches (31 m) and settles from the bottom on the Dammam formation dating back to the Eocene era[2].

-Formations dating back to the middle Miocene era of the third geological time These formations consist of shallow marine sediments that contain fine grains of limestone, gypsum and mineral materials. These formations extend in one order and settle above the Euphrates formation, which are represented by the Al-Jaribi and Al-Fath formations[3].

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-Formations dating back to the upper Miocene era of the third geological time and include formations consisting of clay stone with thin layers of gypsum. Its northern and northeastern edge[4].

Tectonic movements and climatic changes are the most important changes in the interpretation of many of the current geomorphological phenomena. In addition, the climates of the geological past are the most ancient, reaching their climax with regard to their role in the formation of topography that has now been revealed from the bottom of the newer rock covers. Pleistocene climatic changes apply to most of the ranges. The climatic conditions on the surface of the earth, including the study area, and climatic conditions cause changes in the nature and balance of the processes that are practically practiced on the surface of the earth, which makes the resulting geomorphic forms vary greatly. Of the geomorphological phenomena and their different geographical distribution, the steep slope in it, especially the Najaf Badia, contributed to the formation of deep, fast-flowing valleys, while rain water gathered in the concave hollows that may represent areas of weakness in the formation of the surface.

In order to determine the morphotectonic manifestations and their geomorphological effects for the study area, more than three morphological layers were installed in order to derive a detailed map of the most important morphotectonic processes. The study[5]by using the GIS program (10.4 Arc Gis). Using one of the information systems tools, the layers resulting from the map of morphotectonic features were determined[6].

-Layer of geological formations: This layer contains geological formations, two formations of triple time and quadrupole time deposits, and this layer was transformed from (polygon-raster) and then weight was given to each layer of sediment.

-Layer of regression: The regression was derived through the digital elevation model (DEM), and the study area was classified into five types of regression, which are (flat land, low slope, medium slope, severe slope, and very severe slope), and then reclassified through the tool (Reclass) was divided into three categories, and flat lands gave less weight (1) than moderately sloping lands (2) and steep lands (3) .

-Linear structure: After conducting the analysis, the total linear structures amounted to (114) lines in the study area, and they were reclassified through the tool (Reclass) into three categories, and they were distributed into weights in terms of low-density areas (1) and medium-density areas (2) and high density areas (3) Table[1].

Table 1. Layers of geomorphological processes.

Type of geomorphological processes	class variable	Layer weight	Layers
Triple time deposits	1	30	geological
Quaternary time deposits	2		
little incline	1	35	degree of incline
mean gradient	2		
steep slope			
Low linear density	1	35	linear structures
Medium linear density	2		
high linear density	3		

Source: researcher based on (10.4Arc Gis) program.

Data Processing and Analysis of Results:

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The method of quantitative analysis relied on the method of weighing each layer, through the use of one of the tools of the GIS program, specifically the use of the tool (spatial Analyst tool). Division The geological layer was given a weight of (30), the regression layer (35) and the linear structures layer (35), as the total weights 1.

-Reached (100), provided that the weights do not exceed (100). We know that there are three types of environmental manifestations in the study area, which are as follows:

-High impact areas: It is clear from the map that this area included an area of (697, 3777 km^2) and 17% of the area of the study area.

-Medium impact areas: They are areas that included an area larger than the high-risk area, with an area of (734,7528 km^2) and a rate of (6,33%) of the area of the study area .

-Areas of limited impact: This area included an area larger than the medium-risk area, with an area of (42, 11014 km^2), and at a rate of (4.49 %) of the area of the study area, Table (2).

Table 2. The degree of influence of Morphotectonic processes.

The ratio %	Impact area/km^2	Effect range
17	3777.390	high impact areas
33.6	7528.733	Medium Impact Areas
49,4	11041.40	Limited Impact Areas
100	22247.88	Total

Source: The researcher based on the outputs of the program (10.4Arc Gis).

The governorate is also part of the sedimentary plain and western plateau regions, according to its geological formation. Despite the lack of soil in it, the surface forms differ markedly between the regions of the plain and the western plateau. The land of the governorate in general descends from the southwest, where its highest altitude is (420 m) above sea level towards the northeast, as it decreases to (10 m) above sea level, at the depression of Bahr al-Najaf, and then rises again clearly if it is located at a height of (54 m), and this elevation is characterized by a clear cliff extending from the city of Abu Sakhir towards the northeast, then the land begins to gradually decline towards the northeast until it reaches a height of (20 m) above sea level at the lands of Hawr Ibn Najm, and the surface of the governorate can be divided into two parts:

-The sedimentary plain region, which represents (5%) of the area of the governorate and forms the northeastern part of it, which is characterized by its flatness and gradual decline from north to south and at an altitude of (26 m) above sea level in the north at Al-Haidariya area (13 m) above sea level at The south is in the direction of Qadisiyah [7]. There are some mounds in the region that are slightly above its surface level on the side of the Euphrates, and they are barren mounds that are seen in some areas overlooking its right and left banks [8].

-The western plateau region, which constitutes (95%) of the area of the governorate, and extends from the southwest towards the northeast from the elevation line (420 m) to a small line and sand dunes, and intersperses some low areas such as the Bahr al-Najaf depression and the network depression.

It is clear from the above that the surface of the governorate is low, gradual in height, that is, it is open to the arrival of external climatic influences such as wind, air masses, rain, dust and dust storms, and the surface also facilitated the transmission of climatic influences from the Mediterranean Sea and the Arabian Gulf, and the presence of valleys extending over the plateau

region helped in Ease of wind flow with its extension and slope towards the alluvial plain region. It appears indirectly on the climate of the province.

As for the climatic characteristics, despite the presence of a number of differences in the local climatic elements between the two main parts of the governorate, the study of the elements related to the phenomenon in question will be adopted. The climatic averages of the Najaf station, due to the availability of its data. The general annual rate of the amount of solar radiation in the study area is (2,769 calories / 520 calories / cm^2), and this rate varies monthly in the month of June, due to the clearness of the sky, the lack of relative humidity and the large angle of solar radiation, which results in the length of the theoretical and actual duration of solar brightness of (14 o, 11 Then the amount of solar radiation begins to decrease in line with the angle of solar radiation and the length of the day, as it reaches its lowest in the month of December, reaching (7,255 calories / cm2), because the angle of solar radiation reaches the lowest possible and the duration of theoretical and actual brightness is within its minimum limits. It reached (10 hours and 6.6 hours), respectively, and this is due to the large number of clouds and high rates of relative humidity [9], Table (3).

Table 3. Climate characteristics in Najaf Governorate.

rain	relative humidity	winds	high temperature	low temperature	theoretical brightness	Actual brightness	Months
19.8	70	1.8	16.5	5.5	6.7	10.14	January
12	58.1	2.1	19.5	7.6	7.4	10.2	February
13.4	50.2	2.5	24.7	11.6	7.7	11.3	March
14.2	43	2.5	31	17.7	8.6	12.1	April
6.4	34	2.6	37.6	23	9.6	13.4	May
0	28.6	3.5	42	26.7	11.7	13.15	June
0	26.4	3.5	44.2	28.8	11.3	13.6	July
0	28	2.8	44	27.1	11.1	13.2	Father
0.2	34	2.1	40.7	24.5	10.4	11.2	September
4	43	1.8	33.6	19.3	8.5	11.2	October
16	60	1.5	24.5	11.9	7.1	10.9	November
15.4	69	1.6	18.2	7	6.5	9.6	Decembe r
101.4	45.35	2.3	31.39	17.64	8.85	11.88	average or total

Source: Republic of Iraq, Ministry of Transport and Communications, General Authority for Meteorology and Seismic Monitoring, Climate Department, 2019.

The variability of climatic elements from temperature, wind, relative humidity and precipitation can be traced through Table (3).

3. The Second Axis: Geomorphological Processes and Their Morpho-Climatic Classification According to Their Environmental Impact in The Study Area

The environmental effects of morph climatic processes resulting from climatic changes during the Quaternary era play a major role in the formation of most of the depressions and lakes in Iraq, through water erosion in the periods between rain and water erosion during rainy periods, especially since the nature of the sediments and rocks that make up this sea may have helped in erosion processes in the region . In addition to this, the role of water erosion affecting some types of rocks under appropriate conditions [10], especially since the location of the sea is towards northwest and southeast, and it is noted that changes in the water level inside the sea affect all sedimentary and life processes, and this in turn affects the nature of sediments Which can be used as a guide to identify the ancient changes in the water level in the sea, and these changes in the nature of the sediments are very important evidence, for example, that sand with good sorting usually represents previous coastal sediments. It is possible to determine the Morph climatic factors and their geomorphological effects for the study area. More than four layers have been installed in order to derive a map of the natural manifestations, especially the climatic elements from them. In order to determine the sites most affected by the environmental features in the study area, through the use of the GIS program (10.4) .

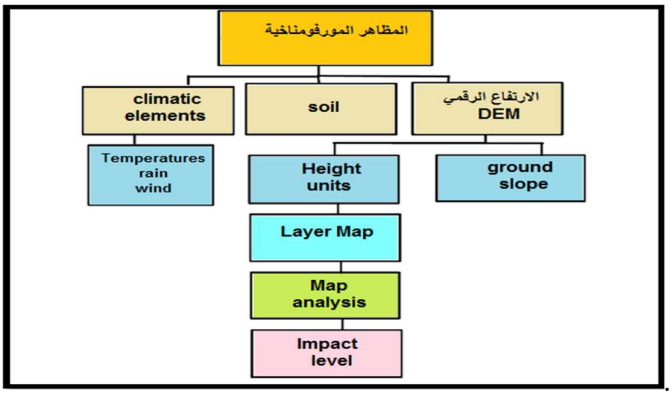

Figure 2. Layers of Morpho-climatic processes.

Source: Based on 10.4Arc Gis software.

We can divide the layers that were identified through the map of morphometric features into the following main parts:

-Regression layer: which is detailed within the spatial Analyst tool .

-Height units: where the elevation map was derived through the digital elevation model (DEM) and then reclassified through the tool (Aectoolbox) and then worked for it (spatial Analyst tool) and it was classified into three categories and weight was given to the land level Low elevation (1), to medium elevation lands (2), and to high elevation lands[3].

- Soil: The soil in the study area included two main types, according to Björnck classification of soil, which is (gypsum soil and stone soil) and then reclassified through the (Reclass) tool. The level of gypsum soil (1) and stone soil were also weighed (2).

-Climatic factors: and they have an impact on the forefront of environmental factors The map of climatic elements was derived based on three main elements (temperatures, rains, winds [11] and then merging these elements from one map in order to know the most influential elements

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and then re- It was classified through the tool (Reclass) and it was classified into three categories, the weight of the temperature was (1), rain (2), wind (3), table(4).

Table 4. Variables of morphological and climatic processes.

Varieties of variables	Variable item weight	Layer weight	layers
little incline	1	25	regression
mean gradient	2		
steep slope	3		
low altitude lands	1	25	height unit
medium altitude land	2		
high altitude land	3		
gypsum soil	1	20	the soil
stony soil	2		
	1		
Temperatures	1	20	climatic elements
rain	2		
wind	3		

Source: Based on software (10.4Arc Gis).

Data processing and analysis of results: The analysis relied on the method of weighting for each layer, through the use of one of the tools of the GIS program and the identification of the tool (Analyst tool Spatial) and through this tool giving a weight to each layer and it is according to the effect of this layer on the occurrence of geomorphological manifestations, the regression layer was given a weight (25) and the height unit layer (25), the soil layer (20) and the climatic elements layer (30), as the total weights amounted to (100), and for accuracy, it should not exceed (100) as shown in Table (4), and through the map (3) It turns out that there are three types of manifestations in the study area, which are as follows :

-High-impact areas with geomorphological features: It is clear from the above map that this area covered an area of (250,70488 km2), with a rate of (7.31%) of the area of the study area .

-Medium areas affected by geomorphological manifestations: As shown in the map, this area is the largest in terms of area, as it covered an area of (251, 8869 km^2), with a percentage of (7.39%) of the area of the study area.

-Areas less affected by geomorphological manifestations: As shown in the map, this area covered an area of (674, 6394 km^2), with a rate of (6,28%) of the area of the study area.

4. The Third Axis: The Layers of The Map of Morph Dynamic Processes in The Study Area

To determine the impact of Morph dynamic processes and their geomorphological effects for the study area, six layers have been installed in order to extract a map of Morph dynamic features, and the layers can be determined (regression, water density, wind erosion, groove erosion, vegetation cover, climatic elements), that the prevailing geomorphological processes in the region leave their clear effects On the surface forms of this region, and each process develops its own forms, because each terrain appearance in the region has its own characteristics that depend mainly on the nature of the geomorphological process. The surface and ground waters, in addition to the fact that the variation in the composition and structure of the rocks in the region is a basic and important fact in the difference in surface erosion, but this is not the only reason in this field,

because the geomorphic and apparent processes in particular operate to different degrees, even if it is within narrow limits. The effectiveness of geomorphic processes in the region is the occurrence of differences in some effective facts such as temperature and humidity The height, quantity and type of vegetation cover, therefore, surface relief forms are related to the different speed of geomorphological processes, and the complex geomorphological development of the region is more common than simple, and that the top of the surface features can be interpreted as the result of a single geomorphic process, or as a result of a single geomorphic evolution cycle. In fact, we find that most of the terrain details in the region such as valleys, cliffs, and isolated island hills have resulted in this in order to reach the most influential areas in the study area [12]. Note figure(3) .

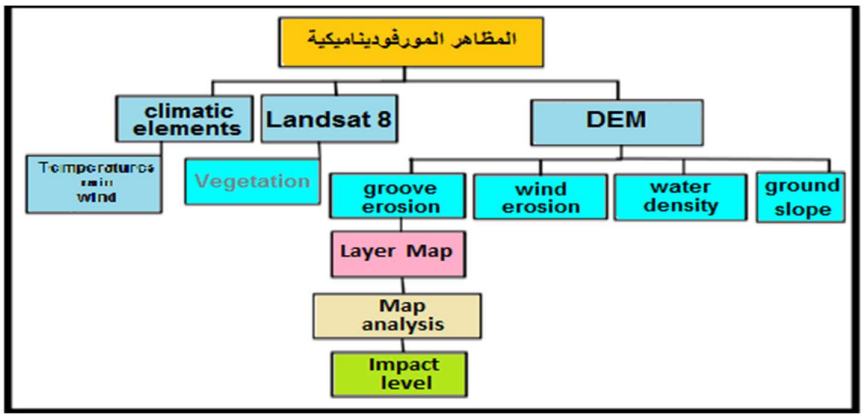

Figure 3. Layers of dynamical processes.

Source: Based on software (10.4Arc Gis).

Tectonic movements and Pleistocene climatic changes are the most important changes in the interpretation of many of the current geomorphological phenomena. Most of the climatic ranges on the surface of the earth, including the study area, and climatic conditions cause changes in the nature and balance of the processes that are practically practiced on the surface of the earth, which makes the resulting geomorphic forms vary greatly. The formation of many geomorphological phenomena and the difference in their geographical distribution, the steep slope in it, especially in the Najaf desert, has contributed to the formation of deep, fast-flowing river valleys, while rainwater accumulated in the concave hollows that may represent geological [13], weaknesses.

The layers of the morph dynamic map are as follows:

-Layer Regression: The surface of the Earth may have a very slight curvature, whether this curvature is concave or convex.

-Layer of water density: where the water density map was derived by reclassifying it through the tool (Reclass), the groove erosion map, and the plant to normalize the water network by matching these layers through the tool (Arctoolbox). With water (1), medium-density areas (2), and high-density areas (3), Table (5).

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Table 5. Variables of Morph dynamic manifestation.

Variable varieties	Variable class weight	Class weight	Layers
A little slope.	1		
Average slope	2	15	Regression
Extreme decline	3		
Low density	1		
Medium density	2	15	Water density
High density	3		
A few wind erosions.	1		
Medium wind erosion	2	15	Wind erosion
Severe wind erosion	3		
A few groove erosions.	1		
Medium groove erosion	2	20	Groove erosion
Severe groove erosion	3		
Yearbook plants and grasses	1		
Perennials	2	15	Vegetation
Barren areas	3		
Temperatures	1		
Rain	2	20	Climatic elements
Winds	3		

Source: Based on software (10.4Arc Gis).

-Wind erosion: To determine the level of this factor, the (Chepil) equation [14] has been applied, in order to know the leve of wind erosion. Few (1), areas with moderate wind erosion (2), and areas with severe wind erosion (3), and as shown in Table(5).

-Groove erosion: The (Rergsma) equation (8) was applied, the grooves erosion ratio was extracted in the study area, as this equation depends on the study of the surface water drainage network after the grooves' lengths were measured based on the satellite visual (landsat). (9) With a coding accuracy of (15m), and then re-classified through the administration (Arctoolbox), and then classified into three categories, and weight was given to areas with little nudity (1), and then areas with medium erosion (2), And areas with severe erosion(3).

-Vegetation cover: The vegetation cover map was derived based on the satellite visual (Landsat8) with a coding accuracy of (15m), and then reclassified through the tool (Arctoolbox), and classified into three categories, and weight was given to areas with annual plants. and grasses (1), and areas with perennial plants (2), and barren areas (3), as the barren areas in which the activity of erosion and weathering processes increases.

-Climate elements: they have been clarified in the map of morpho-climatic processes.

Data processing and analysis of results: The analysis relied on the method of weighting for each layer, through the use of one of the tools of the GIS program, specifically the use of the (spatial Analyst Tool), and through this tool giving a weight to each layer, but giving the weight according to the effect of this layer on the occurrence of geomorphological manifestations, The gradient degree layer was given a weight (15), the water density layer (15), the wind erosion layer (15), the groove erosion layer (20), the vegetation cover (15) and the climatic elements (20), so the total weights (100), provided that the weights do not exceed(100).

It was found that there are three types of geomorphological manifestations, which are as follows:
-High-impact areas with geomorphological features: it is clear from the map that this area covered an area of (679,7836 km2) and a rate of (1,53%) of the area of the study area.
-Medium-impact regions with geomorphological features: This region is the largest in terms of area, as it covered an area of (255, 8870 km2), with a rate of (7,93%) of the area of the study area .
-Low-impact areas with geomorphological features: As shown in the map, this area covered an area of (789,563 km2) and a percentage of (2.52%) of the area of the study area. Note the map (4).
It should be noted here that the impact of water erosion in the region was also a major reason for the formation and emergence of many morphological forms, as it comes in second place after the tectonic factor, as it may reach (16) m above sea level, while the Euphrates reaches 32 m, above sea level. Sea level at the city of Najaf, and from observing these differences in the level of the bottom of the Euphrates River Valley and the Najaf Sea, and it can be concluded that water erosion was a major reason for the formation of the depression. Through water erosion in the periods between the rain and water erosion during the rainy periods, especially since the nature of the sediments and rocks that make up this may have helped in the erosion processes in the region. In addition to this, the role of water erosion affecting thin rocks under appropriate conditions, especially since the location of the sea is towards the northwest, southeast, that is, parallel to the Euphrates River in the region, as it is the remnants of the old dry basin of the Euphrates River .

5. The Effect of Torrential Rain

The identification of the torrents and their geomorphological effects in the study area, nine layers were installed in order to derive a map of the manifestations of the torrents, and these layers are represented in (geology, slope, height unit, space visual, water gathering areas, flow direction and vegetation cover, climatic elements), and that In order to reach the most affected sites in the study area, through the use of the GIS program (10.4Arc Gis), where it becomes clear to us the layers (the geological layer, the regression layer, the height unit layer, the soil layer, and finally the satellite visual layer), and as shown in the figure (4).
By defining the flood impact map, the satellite visual layer was transformed through the tool (Arctoolbox), through the tool (Conversion) and then choosing the tool (To Raster), and it was classified into three, weight was given to the areas of low height (1), medium-altitude areas (2), and high-altitude areas (3).

Table 6. Layers of torrential impact.

Variable varieties	Variable class weight	Class weight	Layers
Triangular time deposits	1	13	Geology
Four-time deposits	2		
A little slope.	1	11	Regression
Average slope	2		
Extreme decline	3		
Low-altitude land	1	8	Height units
Medium-altitude land	2		

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High-altitude land	3		
Gypsum soil	1	8	Soil
Stone soil	2		
Low-altitude areas	1		
Medium-altitude land	2	8	Space Visual
High-altitude areas	3		
A little water pool.	1	15	Water pool areas
Average water pool	2		
The direction of the flow from the south to the northeast of the region	1	15	The direction of the flow
Yearbook plants and grasses	1		
Perennials	2		Vegetation
Barren areas	3		
Temperatures	1		
Rain	2	15	Climatic elements
Winds	3		

Source: the researcher based on the program (10.4Arc Gis)

As for the water collection areas: this map was derived based on the satellite visual (landsat), then the choice of the spatial Analyst Too, and then the choice of the tool (Hydrology). Where water accumulation is low (1), areas where water accumulation is medium (2), and areas with high water accumulation (3).

While the direction of flow is, and this map was derived based on the satellite visualization (Landsat8), then the choice of the tool (Arctoolbox), then the choice of the tool (spatial Analyst Tool), and then the choice of the tool (Hydrology). The direction of flow is from the south of the study area to the northeast of the study area towards the Najaf Sea. The weight of this layer has been given(1).

Data processing and analysis of results: The analysis relied on the weighting method for each layer, through the use of one of the tools of the GIS program, specifically the tool (spatial Analyst Too). The geological weight layer (12), the gradient layer (11), the height unit layer (8), the soil layer (8), the space-visible layer (8), the watershed layer (15), the direction of flow layer (15), and the Vegetation cover (8), and the layer of climatic elements (15), as the total weights reached (100), provided that the weights do not exceed (100), and through map (5), it becomes clear that there are three types of influence in the study area, which are as follows:

-Areas highly affected by geomorphological features: this area included an area of (64,7791 km^2), with a percentage of (35%) of the area of the study area.

-Medium areas affected by geomorphological features: as shown in the map, as this area covered an area of (89,3414 km2), and at a rate of (2.15%) of the area of the study area.

-Areas less affected by geomorphological features: As shown in the map, this area covered an area of (42,11114 km 2), or (8,94%), of the area of the study area as.

It is noted that changes in the water level within the ground layers affect all sedimentary and life processes, and this in turn affects the nature of the environmental manifestations that can be used as a guide to identify the ancient changes in the water level in the sea, and these changes in the nature of the sediments themselves are very important evidence For example, sand with good sorting usually represents coastal sediments or near the coast, and the presence of sand that

contains quartz grains gives an indication of dryness and a decrease in the lake level, and the presence of fine sediments of azimuthal and clay represent deposits of a lake with relatively large depths. The study of the type and nature of fine sand particles is one of the best sources of information about the ancient environment, which is reflected in changes in geomorphological processes. In addition, rocky and sedimentary formations are an essential tool that can be inferred from the fluctuations that occurred in the level of geomorphological activity.

Conclusions

1. The geomorphological processes prevalent in the region leave their clear effects on the shapes of the earth's surface for these The region, and each process develops its own shapes, because every topographical appearance in the region. Its special features depend mainly on the nature of the geomorphological process.
2. The geomorphic processes and the apparent ones, especially, operate to different degrees, even if it is within narrow limits, and the effectiveness of the geomorphic processes in the region is the occurrence of differences in some effective elements such as temperature, humidity, altitude, quantity and type of vegetation cover, so the surface terrain forms are linked to different speed.
3. The primary responsibility for geomorphological work in the study site is to do both the running water transported through valleys and canyons, and rock disintegration processes, which determines the true nature of the effective geomorphological processes in the area.
4. It takes the shape of the network side, a basin with a large area of dry land filled with rocky crumbs that wash the water in its folds.
5. The water drainage network consisting of valleys that drains into the Najaf Sea is only evidence that it was formed in climatic conditions that were more prevalent than at that time.
6. One of the most affected aspects of the study area is the phenomenon of torrential rains that form during the monsoon season.

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