PalArch's Journal of Archaeology of Egypt / Egyptology

GEOMORPHOLOGICAL CHARACTERISTICS OF AL-RAHALIYA AREA OF ANBAR PROVINCE

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Mohammed Talib Salem Al-Anzi, Assist. Porof Mohammed Musa Hamay, Geomorphological Characteristics of Al-Rahaliya Area of Anbar Province -- Palarch's Journal of Archaeology of Egypt/Egyptology 19(1), 1549-1566. ISSN 1567-214x.

Key Word: Geomorphometric, Ground Shapes, River Basins, Nomads.

SUMMARY:

The study is about the ground forms and morphological characteristics of al-Rahaliya district, located in the southeast of Ramadi district of Anbar province, which occupies an area of (2858/^{km2}). The study of the nature characteristics of the study area was based on geomorphological forms (ground forms), morphological characteristics (river basin network characteristics), specific to the study area, and through the study the use of modern techniques to identify the topography of the area, geomorphometry, and the work of a geographical database of river basins, through digital height data (DEM) with accuracy (30*30) meters, as identified: River basins, their formal, surveying and topography characteristics, valleys, river ranks, and topographic characteristics of the study area's own equal elevation lines, through the use of arc map 10.4.1, where (5) main basins of the study area were identified , and (7) river levels, and the height of the study area ranged from (29- 233) meters above sea level.

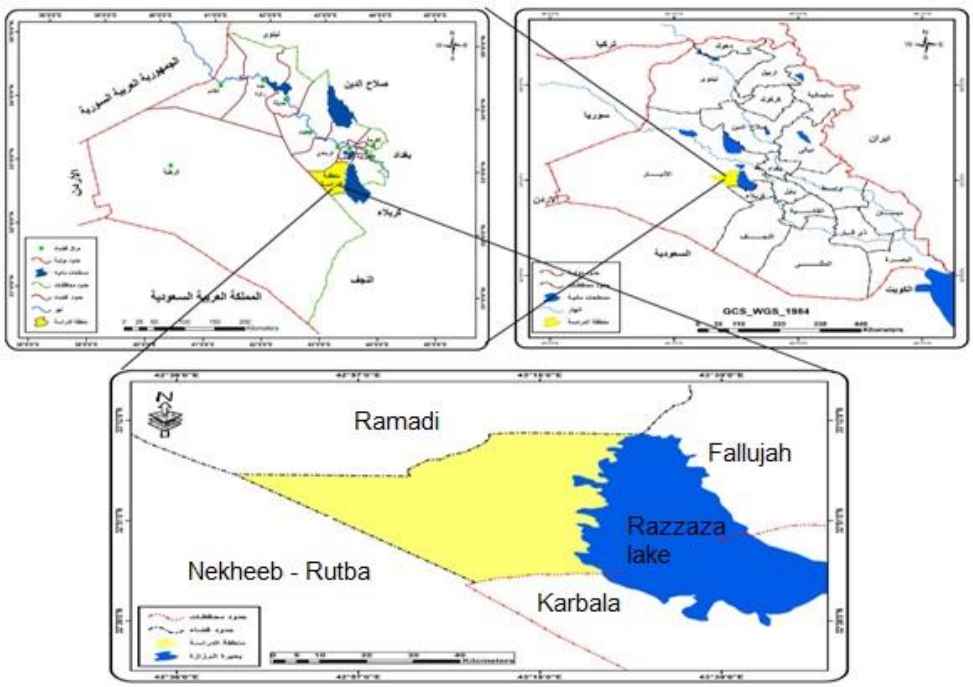
INTRODUCTION:

Applied geomorphology studies terrain by analyzing the factors and processes responsible for it, and classifies it into basic and secondary units, varying in form, area, regression, size, and various other characteristics similar to morpho-meters, and morphemic, as water basins are considered one of the terrestrial forms of great importance by geomorphologists, and hydrologists because they are considered With an important resource for humans, the study of water basins is important in terms of its nature and geological qualities, as well as the extension, area, capacity and storage of basins belonging to the region, is also the cornerstone of water assessment for any region of the world, as the study of water basins takes up a great deal of space in applied geomorphological studies,

Because they are the main cause of floods, the geomorphological and morphological elements were identified in this study, and expressed in geomorphometric elements, through the use of modern techniques, arc GIS 10.4.1, and the application of mathematical equations to the basins of the study area.

Research problem: Do the characteristics of the nature prevailing in the study area have an impact on the formation of geomorphological phenomena, and the work of a morphological system specific to the study area. .
Research hypothesis: Nature's characteristics play a critical role in determining geomorphological phenomena and determining the morphometric system of aquariums in the study area.
Research goals: The research aims primarily to identify the geomorphological phenomena found in the study area, through the remote sensing system and field study, as well as to identify the basins of the area and its spatial, formal, topographic and river levels characteristics for each basin of the study area.
Research Limits: The study area is located between two latitudes 00°46°32 to 5°00°33 north and the two lines of length of 42,45°C(43°30°000°C). To the east, this site of the study area was the reason for the prevailing dry desert climatic conditions. The study area is bordered to the north by Ramadi district, while to the south it is bordered to the south by Ain al-Tamar in Karbala province, and to the east by Lake Razzaza, where the north-western half of the lake is administratively dependent to the area of Al-Rahali, while on the west side is bordered by the al-Nakhib area of al-Rutbah district, map (1).

Map (1) Geographical location of the study area for Iraq and the in-country portfolio



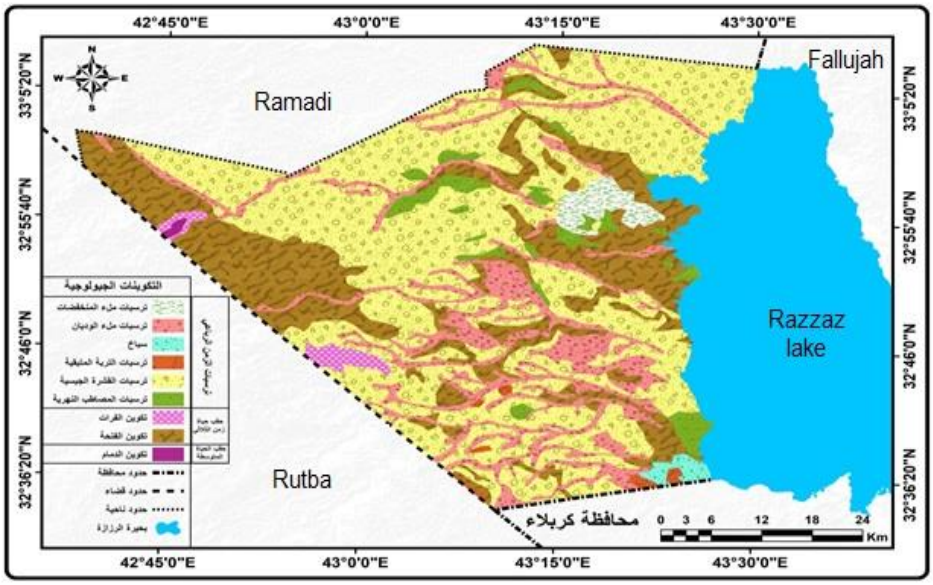
Source / The researcher worked on iraq's administrative map of military space, on a scale of 1:1 million 000,000 using ARC MAP 10.8

First- Geology of The Study Area: -

The geology of the study area is directly related to the tectonic structure of western Sahara, represented by the structural and structural situation, and this is illustrated by a map (2) and table (1), that one of the most important geological formations in the study area is:

1- The composition of the aperture. this configuration appears in different areas of the region, which occupies an area (689 /^{km2}) or 24.1% of the total area of the study area, where the thickness of this formation ranges (7-16 m).
2- Euphrates formation. This formation appears in the western part, and the northwest of the study area in terms of al-Naqib of the Al-Rutbah district, the area of this formation (34/km2) i.e. an estimated percentage (1.2%) of the total area of the study area.
3- The formation of dammam: this formation is revealed in the western part of the study area, and this formation surrounds part of the formation of the Euphrates.
4. Sediments fill the valleys. These deposits appear in different parts of the study area, and are largely present in the southern part of the study area, the area of these deposits (489/^{km2}) or 17.1% of the total area of the study area.
5. Low filling deposits. These deposits are located in the north-eastern part of the study area, which is close to the west coast part of Lake Razaza, and has an area of 53/$^{2\ km2}$, or 1.8% of the total area of the study area.
6. Plumbing deposits. The detectors of these deposits appear in the south-eastern part of the study area and are very close to the southwest coast of Lake Razaza, with an area of 20/km2, or 0.7% of the total area of the study area.

Map No. 2 Geological Formations of the Study Area



Source: Republic of Iraq, Ministry of Industry and Minerals, General Establishment of Geological Survey and Mineral Investigation, Geological Map, 2000, Scale 1:250,000, arc map 10.4.1 outputs.

7. Gypsum deposits (gypsum) . these deposits spread throughout the study area, and these deposits are considered to be among the largest deposits in the study area, occupying an area (1445/^{km2}) or 50.6% of the total area of the study area.

8- Remaining soil deposits. These deposits are spread in the southern part of the study area, occupying an area (16/$^{2\ km2}$) or 0.6% of the total area of the study area.

9- Deposits of river terraces. these deposits appear in different parts of the study area and occupy the deposits of river terraces an area (108/km2) or 3.8% of the total area of the study area.

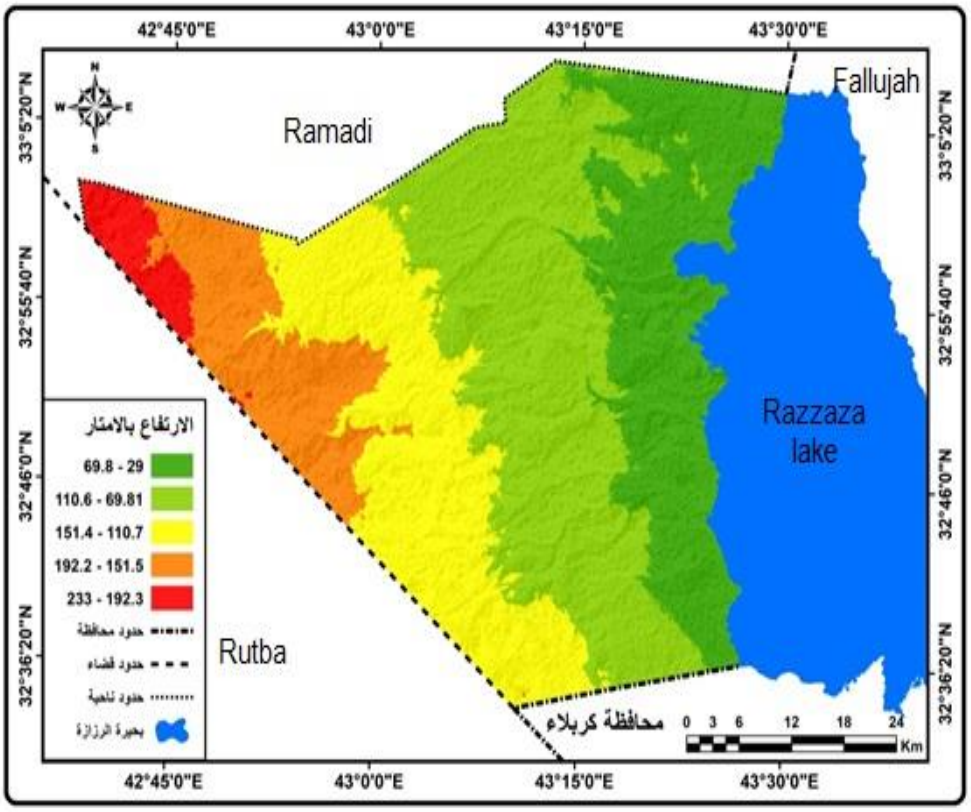
Table 1 Geological Formations of the Study Area Area /Km and Ratio (%)

Geological formations	Area/km	%
Aperture configuration	**689**	**24.1%**
Dammam Formation	**4**	**0.1%**
Euphrates formation	**34**	**1.2%**
Sediment filling the valleys	**489**	**17.1%**
Low filling deposits	**53**	**1.8%**
Plumber	**20**	**0.7%**
Sediments of the prefrontal cortex	**1445**	**50.6%**
Remaining soil deposits	**16**	**0.6%**
Sediments of river terraces	**108**	**3.8%**
Total	**2858 km**	**100%**

Source/ Based on map #2

II**. Topography of the study area: -** The study area is located within the stable pavement, the bulk of its surface is distinguished from a light ripple to a ripple, while the rest of it is flat flat to a fragmented section, i.e. it is relatively flat and free of Complex topographical manifestations such as mountains, and the height of the study area ranges from (29-233) meters above sea level, (map 2), in the study area there is a large group of valleys where running is seasonal. The main surface of the area was found to be located within the lower valleys, which are characterized by various topographic phenomena, occupying the entire area of (2858/^{km2}), consisting of limestone rocks, sand, mud, dry valleys, parallel meteorite, runoff seasonality, few depths and palaces, medium density, few branches and some water descending towards razor, grain, and furs·

Map no. (3) Equal Height Categories for The Study Area



SOURCE/DEM radar image analysis at 30 m using Arc Map 10.8

The Climate of The Study Area:

Climate is an important element in geomorphological studies because it has an important and extreme impact in determining the amount of water falling and feeding running and groundwater (Table 2), that the basins of the study area depend mainly on the climate of the region as a climate Hot desert, dry in summer, and cold with heavy rain in winter. The data for the study area were taken and based on the Ain Al-Tamar station located 25 km south of the study area, where the rates of solar brightness vary and reached the highest rate received from the station in June amounted to (12.5) hours, and the lowest rate recorded in December and reached (6, 5) An hour, as for temperatures, the highest rate in July was 35.5 m^{o}, when the lowest temperature rate was recorded in January at (10 ^{mo}), as these ratios resulted in a decrease in evaporation values in the study area.

Table 2 Monthly Rates of Actual Solar Radiation (Hour), Temperature (M^{o}), Rain (Mm), Relative Humidity (%), Wind Speed (M/Tha), Evaporation (Mm), Date Eye Station for Duration (1990.2020).

Months / Item	January	February	March	Nissan	Mace	June	July	Father	September	October	November	December
Solar brightness	**6.9**	**7.4**	**8.6**	**9.1**	**10.6**	**12.5**	**12.4**	**12.1**	**10.2**	**8.4**	**7.5**	**6.5**
the heat	**10**	**11.5**	**15.5**	**22.30**	**28.1**	**33.22**	**35.5**	**33.6**	**29.50**	**24.20**	**16.49**	**11**
winds	**1.90**	**2.35**	**2.65**	**2.77**	**2.46**	**2.60**	**2.90**	**2.20**	**1.50**	**1.57**	**1.60**	**1.70**
Rain	**18.15**	**11.2**	**8.9**	**14.50**	**1.0**	**0.11**	**0**	**0**	**0**	**4.5**	**9.8**	**15.9**
Evaporation	**71**	**108.2**	**191**	**303.2**	**302**	**448**	**567**	**484**	**320**	**252**	**124**	**61**
Relative humidity	**72.7**	**60.20**	**54.9**	**48**	**41.3**	**36.2**	**29.1**	**31.90**	**37.40**	**44.55**	**58.90**	**67.80**

SOURCE/Republic of Iraq, Ministry of Transport, General Authority for Air Forecasting and Seismic Monitoring, Climate Section, Unpublished Data 2020.

The region's strong winds, which were strong in the summer months, recorded the highest rate in July at 2.90 m/tha, while the lowest rate was 1.50 m/tha in September, with the highest rainfall in January at 18.15 mm, while in the summer months the rains were permanently non-existent, especially in July, September, compared to the amount of evaporation that evaporated. The highest rates in July (567mm), the lowest in December reached (61mm), and the relative humidity is reduced to the highest rate in January and reached (72.7%), and the lowest (29.1%) in July, the study area is characterized by a relative low humidity due to its occurrence within the desert climate.

Fourthly, The Geomorphological Forms of The Study Area: -

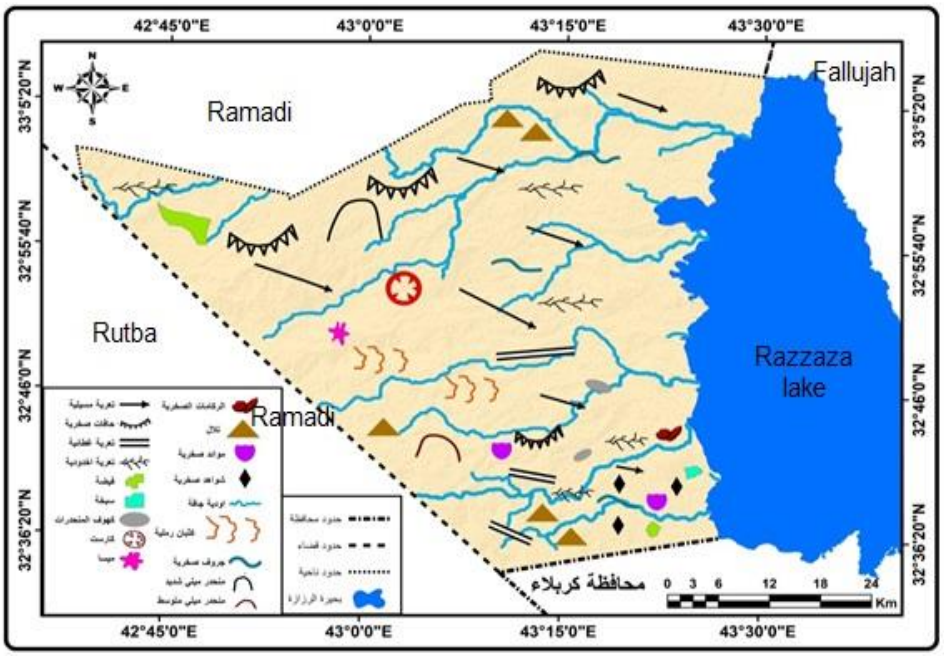
1. Hills: - They are different-shaped heights that are similar to mountains in terms of molar and roughness but are smaller up to (200/m) high, and the height of the hills varies from region to region depending on the activity of geomorphological processes, but the degree of Its slope ranges from (3-5) to a degree of low slope, which is considered a geomorphological form form form formed by external factors[1], the hills are located in the study area in the southern and southwestern parts and also the northern parts, map (4) Image (1)

Figure 1 Shows the Hills in The Study Area

Source/ Field Study dated 7 February 2022

2- Rock tables: - Rock tables are one of the manifestations of the earth's surface, controlling the origin of this phenomenon rock structures and the environment of their layers, but their external form is determined by the erosion of water and wind, and this phenomenon arises on layers that are horizontally inclined and have weak rocks and are rapidly affecting the earth movements, this phenomenon is present in the study area in the south-eastern and south-western parts, a map (4) showing the distribution of this phenomenon.

Map No. (4) Geomorphological Phenomena of the Study Area



Source/ Iraq Topographic Map on the scale of 1:100,000 for 1990 issued by the General Authority for Space /Digital Height Model (DEM) with distinctive accuracy (30×30), and the outputs of Arc Map 10.4.1. / Field study

3. Mesa (houses): - One of the forms of land that is of flat land, found in the presence of a soft rock layer topped with a solid rock layer, and its presence in dry and dry areas and its slopes are very steep, these forms were formed as a result of several processes, including weathering and water erosion during the

plasticsin era[2], these forms are present in the area of study in the western part (khari) T4) Picture (2) ...

4. Rims and rock cliffs: - The cliffs and rock cliffs are one of the most important geomorphological manifestations that are clear and striking to the isotopes, and these rims and cliffs are of a steep slope of up to (40 °). The origin of these rims and rock cliffs is linked to the system of horizontal rock layers, which were formed as a result of vertical and lateral erosion of running water as well as aerodynamic erosion, as well as limestone rocks, dolomites and solid limestone rocks.[3] The rims and rocky cliffs are shown in the study area in the northwest and southern parts of the study area, as shown in map 4.

Figure No. 2 Shows the Phenomenon of MESA In the Study Area

Source/ Field Study on 7 February 2022

5- Liquefied nudity: - Liquefied erosion occurs when rain falls and the severity of erosion varies depending on the severity of the slope or leveling of the surfaces, it shifts from a plate runoff to a concentrated runoff leaving behind narrow short waterways [0,4] and the presence of liquefied erosion is concentrated over the hills or on any height, but in the study area this erosion is found in different areas, especially in the northern and central parts of the picture (3).

6- Cover erosion: - This erosion is considered one of the geomorphological forms resulting from the collection of rainwater that falls on the semi-flat lands, i.e. low slope, which reaches the degree of slope of (1-20 °), the land is regular slope The sedimentation form is similarly thick, leaving the fallen water when it gathers towards the sloping lands and the speed of the water is slow to wash away the disassembled and suspended rocks, and in the end it leaves distances free of soil scattered or dissolved stone materials. This type of erosion is found in the study area in the southern parts of the region as it is a low-slope area.

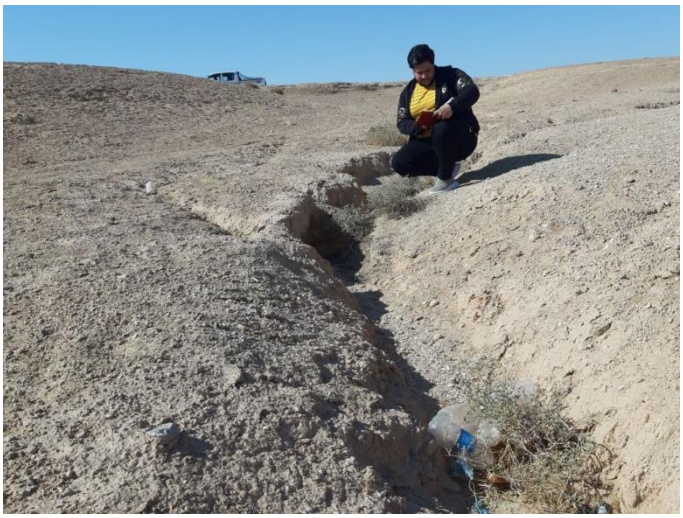
Figure No. 3 Showing the Impact of Liquefied Erosion in The Area

SOURCE/ Field Study dated 8 February 2022

7- Groove erosion: - Grooves are geomorphological manifestations that form mainly during the rainy seasons, especially if these rains are strong and intermittent, but in the absence of rain and the prevalence of drought phenomenon, these grooves disappear gradually[5], this phenomenon spreads in several areas of the study area, it is found in the southern, central and northern parts, (map 4), picture (4).

8. Karst: - A geomorphological depression that takes the circular or oval shape and has sharp walls, due to the collapse of rocks as a result of the melting process, this phenomenon arises due to the occurrence of the chemical weathering process, and this phenomenon is present in the balloons containing limestone rocks penetrated by dividers and cracks, and it is found only a little in dry areas, as this phenomenon increases and develops from itself as the intensity of rain[6] increases. In the study area, the karst phenomenon is found in the central parts of it (map 3) picture (5).

Figure No. (4) Impact of groove erosion in the study area Image No. (5) The phenomenon of karst in the study area



Source / Field Study dated February 7, 2022 Source / Directorate of Municipality of Al-Rahaliya District on March 2, 2022

9. Cliff caves: - The formation of large-fish limestone rocks is one of the most common formations of the phenomenon of caverns, and the main reason for the formation of these caves is the process of melting to which this formation is exposed, and occurs particularly in areas with vertical and intermittent dividers, because these areas are more vulnerable to the process of melting, which results in the beginning of the phenomenon of condensation[7], in the study area this phenomenon is located in the south-eastern part of the region, i.e. close to the west coast. To Lake Razaza.

10. A severe slope: - This type includes very steep slopes, and this phenomenon occurs as a result of the convergence of contour lines with each other because of the small horizontal area between them, and the degree of slope of this type of slope is between (25-45 º) i.e. 47% -87%), and this phenomenon is located in the northern part of the study area, (map 4**).**

11. Mooring: - The mooring is located in the study area in the far southeast of the region and is very close to the south-west coast of Lake Razaza (map 4), and the moor is considered one of the geomorphological forms of dry land, and is a sediment of modern quadruple time, and consists as a result of evaporation of the lake water, as well as the movement of groundwater upwards due to the poetic property and exposing it to high temperature, this leads to evaporation of water and thus the salts are swallowed in the form of surface layers, Its area in the study area (20/km2) is 0.7% of the total area area.

12. Flood: - The flood is low and shallow lands, and it is a flat semi-low, i.e. low slope, occupying the understated land that is full of sediment, the land of these floods is surrounded by high hills, and is located in the study area in the far northwest and the southern part of the region, and these depressions were formed by melting, and this It leads to gaps, over time these gaps widen, leading to water leakage into the territories, and the land falls into small depressions that

increase over time and with the impact of the speed of geomorphological processes[8].

Figure Number 6 Shows One of The Floods in The Study Area

Source / Directorate of The Municipality of Al-Rahaliya district on 2 March 2022

13- Dunes: - Blocks of sand that are moved by the wind and transported from one place to another and usually these dune in dry desert areas, formed as a result of stable obstacles to the direction of the sand-bearing winds and these obstacles may be with different forms of them, natural plants, or the artificial wall represented by sheep corridors, large pebbles, rock blocks, groves, or fences of installations, the longer these obstacles remain in place the dunes remain constant on those This[9] phenomenon is present in the study area in the western parts of the region.

14. Rock debris: - A simple geomorphological process that occurs slowly, it is difficult to notice this phenomenon, as it is usually found in the slopes of the slopes, i.e. under steep borders, which works to form deposits called talus deposits, where these forms of land prevail in the study area in the south-eastern part of the area, which is adjacent to the western coast of Lake Razza (7).).

15. Dry valleys: - The study area has a large network of dry valleys, which represent prominent forms of land helped by floods during previous rainy periods, which give an effect of the current water in the formation of the earth's surfaces, the more rain conditions increase in the drilling of valleys in the region, this study of valleys after river erosion as permanent rivers in earlier times especially during the era of plaistosin gives the result of As a result of climate change during the current era, the reversal of the climate from wet to dry, high temperatures, low rainfall and increased evaporation, these valleys became dry valleys[10], through field study in the region, one of the dry valleys was seen, the Valley of Thailb, which is located in the gloating part of the study area.

Figure No. (7) Showing the Impact of Rock Debris in The Area Image Number (8) One of The Dry Valleys in The Study Area

SOURCE/ Field Study dated 8 February 2022

Morphometric Analysis Basins Study Area: -

1- The spatial characteristics: - The area of the basin is of great importance because the large area was directly affected by the amount of water flow within the basins, the size of erosion, transportation and sedimentation, and the spatial characteristics are as follows:

- The length of the basins: - is one of the morphometer variables, which has a number of features specific to the drainage basin, and can be represented by a line that extends between two points, a point starting from the area of the division of water at the top of rivers or valleys, while the other point ends at the mouth of the river or valley. The lengths of the basins in the study area range from (11-76) to two basins (5,1) respectively (Table 3).

- The width of the basin: - The width of the basin is meant to be the straight transverse distance between two opposite points located on the perimeter of the basin, but it is difficult to rely on one dimension measurement of the width of the basin, for several reasons, including, a difference in the forms of aquariums, the zigzag of the boundaries of the basin perimeter, and as a result the width of the basin will be calculated through the use of the following equation [11] .

$$\text{average pelvic width} = \frac{\text{pelvic space/km2}}{\text{pelvis length/km}}$$

After applying the equation to the basins of the study area, it was found that the average width of the basins ranged from (3,461-20.184) km for the two basins (4,1), while the average width of other basins (2, 3, 5) (11,916) km (17,162) km (6,090) ranged respectively (table 3).

- **Ocean basins: -** The ocean of the basin means its water boundaries between the basin and other adjacent basins, and there is a relationship between the length of the ocean and the breadth of the area, the more the length of the ocean accompanied by an increase in area[12], the higher the value of the basin ocean in the study area in the basin (1) reached (260) km, while the lowest value was (55) km per basin (5), while the basins (2, 3, 4) recorded values of 55 km. (154) (158) (79) Km respectively as shown in table (3).

2. Formal characteristics: - There are several geometric forms of the valleys and they are multiple of them take the circular shape, the triangular shape, or the rectangle, as these forms affect the nature of the drainage, the round shapes differ from the rectangular shapes, by giving a significant indicator of flooding, because flood waves reach more quickly to round shapes than other forms.

- The ratio of rotation (ratio of ocean cohesion): - which indicates that the shape of the basin is approaching or moving away from the round shape, the high values that are close to the one means that the basin approaches the circular shape, but if the values are far from the one in this case the shape of the basin is far from the circular shape, and to obtain the ratio of rotation in the basins of the study area was relied upon the following mathematical equation[13].

$$\mathbf{Cf} = \frac{\mathbf{4 \times \pi \times A}}{\mathbf{P2}}$$

Cf= rotation coefficient, π = fixed value (3.14), A = basin area/km2, p = basin circumference.

After the application of the equation, the values of the study area basins ranged from (0.15) to (0.37) for the third basin (Table **3), indicating that the basins are moving away from** the **circular shape, indicating that the water dividing lines are irregular in the aquariums and their zigzag.**

The elongation rate: - The longer the **elongation means that the basin approaches the rectangular shape or moves away from it,** the longer the **ratio between (0-1), the closer the ratio from zero, the closer the basin to the rectangular shape, but if the values are close to the one, then the effect indicates that the basins are moving away from this form, and the elongation rate is extracted through the following equation[14].**

$$\mathbf{Ef= (2\times\sqrt{(A)} / \pi)/L}$$

Ef = elongation coefficient, A = basin area/km2, π = fixed value (3.14), L = maximum length of basin/km.

After being applied to the basins of the study area, the elongation ratios ranged from (0.41-0.83), which varying values as the ratio of basin 4 was the closest to zero, which means that the basin approaches the rectangular shape, (Table 3), which indicates that the flow of water regularly so that it is successive from the nearest point downstream, and reached the farthest point of the basin, which leads to an increase in the rate of loss of

evaporation and leakage, due to the increased length of distance travelled by rivers.

- The ratio of ocean cohesion: - **It is another measure used to measure the approach or distance of the basins from the round shape, the farther away from the correct one, the further the basin will move away from the circular shape and be more elongated, and the result in this ratio is more than the correct one, as the ratio of ocean cohesion is extracted through the following equation[15].**

$$\text{circumference coherence ratio} = \sqrt{\frac{1}{\text{Coherence ratio of circumference (rotation)}}}$$

After applying the equation to the study area, the ratios of ocean cohesion ranged from (1.85-2.67) to 3,4 (table 3), while the remaining ratios were in the basins (1,2,5) high, indicating that they were **moving away from** the **circular shape, except for basin 3, which recorded the closest percentage of the correct one, which is closer to the round shape**.

- Basin shape factors: - **For the factors of the shape of the basin is important in the arrival of discharge waves to the peak of the main stream, the factor of the shape of the basin is proof of the knowledge of the shape of the basins and the extent to which they approach the triangular shape or move away from it, and when** the values of the factor of form **are high indicates** that the basin is **moving away from the triangular shape, but if the values are low means that the basin approaches the triangular shape, and the factors of form are extracted by relying on the following equation[16].**

$$\text{pelvic shape parameter} = \frac{\text{pelvic space/km2}}{\text{pelvic length square/km}}$$

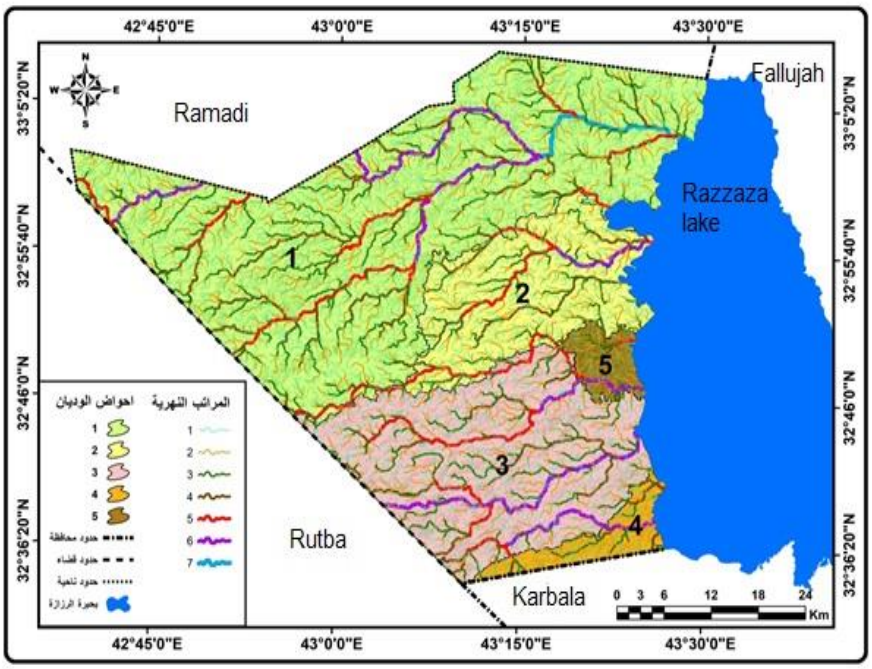
By applying the equation to the basins of the study area**,** the values of the basin shapes ranged from (0.13-0.55), (table **3), values were high in the basins (2,3, 5), indicating their** distance **from** the **triangular shape, while basins (1,4) occupied low ratios, indicating the strength and activity** of the basins.

Table No. (3) Spatial and Formal Characteristics Basins Study Area

Tub	Basin area/km2	Percentage (%)	Tub length/km	Average pelvic width/km	Pelvic circumference	The length of the main real stream /km	Ideal main course length/ km	Distance between the weight of the	Basin perimeter box (km2)	Rotation ratio	Elongation rate	Ocean cohesion ratio	Shape coefficient
1	**1534**	**54**	**76**	**20.184**	**260**	**83**	**67**	**44.52**	**67.600**	**0.28**	**0.58**	**2.13**	**0.26**
2	**429**	**15**	**26**	**11.916**	**154**	**44**	**34**	**17.40**	**23.716**	**0.22**	**0.64**	**2.35**	**0.33**
3	**738**	**26**	**43**	**17.162**	**158**	**44**	**34**	**23.14**	**24.664**	**0.37**	**0.71**	**1.85**	**0.39**
4	**90**	**3**	**26**	**3.461**	**79**	**22**	**18**	**14.54**	**6.241**	**0.15**	**0.41**	**2.67**	**0.13**
5	**67**	**2**	**11**	**6.090**	**55**	**12**	**9**	**3.77**	**3.025**	**0.27**	**0.83**	**2.13**	**0.55**

Source/ based on space visuals, Arc Map 10.4.1 outputs, and mathematical equations.

Map No. (5) Aquariums of The Study Area



Source/ Dem with distinctive accuracy (30×30) and Arc Map 10.4.1 outputs.

3- Topographic characteristics: - Topographic characteristics are important in the study of water basins, and knowledge of their geomorphological and morphological characteristics, because these characteristics are important for identifying weathering and water and wind erosion processes, and the topographic characteristics include:

- The rate of molaring: - The rate of molaring is important in knowing the nature of the topography of the water basins, and the extent to which it affects the flow and its relation to nudity and sedimentation, which works to form geomorphological manifestations represented by poor lands, and the rate of molaring is extracted through the following equation[17].

$$\text{Terrain ratio} = \frac{\text{The difference between the highest and lowest point in the pelvis/m}}{\text{pelvis length/km}}$$

By applying the equation to the basins of the study area, the values ranged from (2.26-4.45) m/km (table 4), which are low, indicating a low slope between the height difference from the source to the estuary where the valleys take place.

Relative terrain: - Represents the relationship between the relative terrain and the ocean of the basin, and is another measure of the knowledge of the basin's damage, extracted according to the following equation[18].

$$\text{Relative topography} = \frac{\text{basin topography/m}}{\text{pelvic circumference/mx100}}$$

After extracting the relative terrain values of the study area basins ranged from (0.076-0.089) to the convergence of ratios in other basins, which ranged from (0.078, 0.078, 0.082) to the first basin, the second and the third (table 4), these ratios are weak because they are represented by gradual increases due to the lack of rainfall.

- Hypsometry coefficient: - The hepsumtri factor is one of the important means that reflects the morphological phase of the basins to which it has reached, and calculates the factor through the relationship between relative height and relative area, as the relative height represents (the ratio between the lines and the basin ocean to the total area of the basin), as the relative height of the lines and the output of the hepsumtri According to the following equation[19].

$$\text{Hypsometric coefficient} = \frac{\text{Relative height}}{\text{Relative space}}$$

When applying the equation to the basins of the study area, the values of the coefficient ranged from (0.13-0.73) and these ratios are considered low, as a result of the small area of the basins, which indicates that the basins are going through the youth phase, and the beginning of the development of the geomorphological phase.

Table No. (4) Topography Characteristics Basins Study Area

Tub	Highest height (m)	Lowest height (m)	Difference (m)	Length of basin (km)	Pelvic circumference (km)	Molar ratio (m/km)	Relative terrain	Hebsomtree Laboratories
1	**233**	**29**	**204**	**76**	**260**	**2.68**	**0.078**	**0.13**
2	**146**	**25**	**121**	**36**	**154**	**3.36**	**0.078**	**0.28**
3	**160**	**29**	**131**	**43**	**158**	**3.04**	**0.082**	**0.17**
4	**87**	**28**	**59**	**26**	**79**	**2.26**	**0.074**	**0.65**
5	**77**	**28**	**49**	**11**	**55**	**4.45**	**0.089**	**0.73**

Source/ based on space visuals, Arc Map 10.4.1 outputs, and mathematical equations.

CONCLUSIONS:

1- By studying the topography of the study area, we find that it is located within the stable pavement, as part of the Arab plate, and that the surface of the area is from light wavy to wavy, and it is free of complex terrain such as mountains, i.e., semi-flat, and its height ranges from (29.233 m) above the surface level. the sea.

2- The existence of geological formations in the study area whose ages range from the third geological time to the sediments of the Quaternary age, and these times serve to expose the rock layers and increase their slope and cracking.

3 The climate of the study area has a great role in shaping geomorphological phenomena, now most of the forms in the study area, due to its presence due to the prevailing climate in the region, which works to activate geological factors and processes, and the emergence of land forms that differ according to their origin and type.

4- Correlation of the morphometric characteristics of the basins of the study area, with the natural characteristics of geology, topography and climate of the region, in determining the quantities of flow in them.

RECOMMENDATIONS:

1- It must be encouraged in many morphometric and geomorphological studies in the study area, because these studies are of great importance in exploiting and increasing the existing water appropriately, and reducing its exposure to leakage and evaporation.

2 Awareness of people that the existing landforms in the study area may lead to the occurrence of geomorphological risks, and deal with them seriously, and avoid building houses and facilities near those forms represented by rockslides and landslides, in order to reduce material and human losses.

3- Working on employing modern techniques, in order to study and analyze the morphometric characteristics of the water basins, which have good results and are of little effort.

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