

Geological and Topographical Characteristics of Wadi Mudud Basin

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Abstract: *The research included the study of the geological characteristics of the Wadi Mudud Basin, represented by the geological structure that includes folds, faults, and joints, and the study of rock formations in the region, as well as the terrain characteristics. The research concluded that the study area is characterized by the presence of two falcons and one fold, as well as the presence of many rock formations represented by the formation of Dammam, the Euphrates, gypsum crust deposits, slope deposits, valley deposits, depression deposits, and he also concluded that the study area extends between two terrain regions, namely the plateau Western and sedimentary plain.*

Keywords: Wadi Mudud, sedimentary plain, Euphrates, geology

Introduction

The geological and topographical characteristics affect the determination of the geomorphological characteristics and the formation of the geological and topographical features in the study area. They also affect the nature of the surface and groundwater resources, their quantitative and qualitative characteristics, and the volume of water revenue. Therefore, the research will study the geological and topographical characteristics of the Mudud Valley Basin.

Research problem

The research problem is summarized in the following question

the geomorphological characteristics geological and topographical factors have an impact on determining Do of the Wadi Mudud basin ?

Research hypothesis

To verify the research problem, the hypothesis was as follows

The role of geological and topographical factors varies in determining the geomorphological characteristics) (of the Wadi Mudud basin

Aim of Study

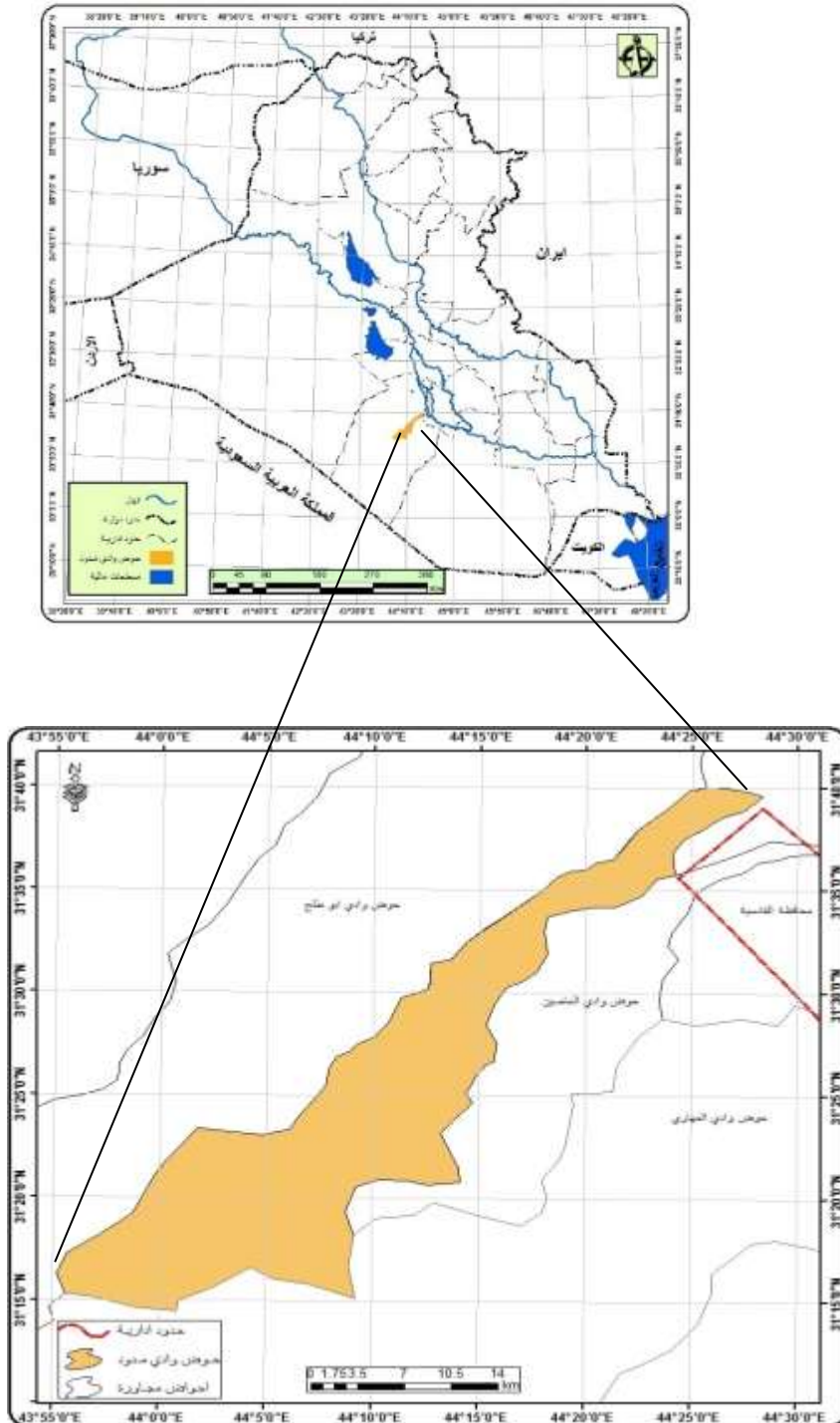
The research aims to study the geological and topographical characteristics of the Mudud Valley Basin in order to know its role in determining the geomorphological characteristics in the study area, as well as its impact on the characteristics of surface water resources and the volume of water revenue.

The boundaries of the study area

The study area is located within the western plateau in the northeastern part of Najaf Governorate and Mahari -is bordered to the north and northwest by the Abu Talh Valley Basin, to the south by the Wadi Al

Qadisiyah Governorate and the Wadi -Basin, and to the east and southeast by the administrative borders of Al Aasin Basin-Al .

Astronomically, the study area extends between two latitudes $^{\circ} 31 40 10 - ^{\circ} 31 14 27$ north and between two longitudes. Map 1 To the east, the total area of the study area is 514 km^2 $^{\circ} 44 28 27 - ^{\circ} 43 54 54$.



Map 1 of the location of the study area

Ministry of Water Resources, General Authority for Survey, Map Production -Source: Depending on 1 , Digital Elevation Maps -Department, Administrative Map of Iraq, 2010 2DEM and Arq Gis10.5 program

As for the natural aspect, the study area is located within two parts of the main sections of the surface of Iraq, the sedimentary plain in the northeastern part and the western plateau in the southwestern part

First: geological features

:Structure and geological composition -1

Structural refers to the impact of ground movements on the surface of the earth during different geological times. As for lithology, it means the structural shapes and aspects prevailing in the region resulting from the influence of structural movements such as folds, faults, and joints¹.

African plate, which is considered one of the large tectonic plates, whose borders were-Iraq is part of the Arab formed during a series of geological movements that it was exposed to, and which are still continuing in our This includes²() time, and these movements were reflected in the formative and structural framework of Iraq the study area through its location between two main geotectonic units: the Nubian Arab Shield unit in the⁽³⁾ unit in the north and northeast of Iraq southwest and the Alpine Geosynclinal Basin .

The study area forms part of the western plateau in Iraq, which was affected by the movements that the Arabian plate was exposed to, and this effect was less than what it is in Iraq, due to the distance of the region from the which showed ,center of the earth movement, in addition to the hardness of the rocks of the study area resistance to the earth movements

The study area is located according to the division of Buday 1973 Iraq in the within the prophetic divisions of stable dock within the range of Salman

Most of the rocks of this pavement date back to the Quaternary and Tertiary periods, as well as some formations west to east. The dating back to the Permian period (the second time), which are of a general direction from study area, while a single fold appears in the central parts of the area and in a direction from northwest to southeast (Map 2) .

2. Rock formations in the study area :

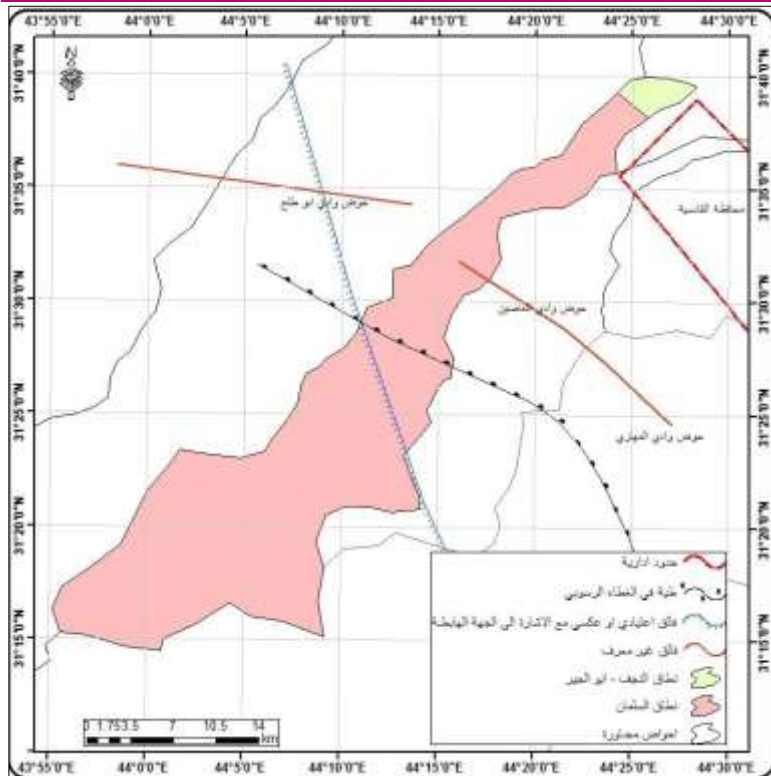
according to their geological age from The rock formations and sediments in the study area will be studied the oldest to the youngest, starting from the Pliocene era until the Pleistocene era, in addition to the sediments dating back to the Quaternary time within the Holocene era

Map 2 Structures of the study area

¹Nibras Foundation for -Attiyah, The Land of Najaf: History, Geological Heritage and Natural Resources, Al-Musa Jaafar Al - Printing and Publishing, Najaf, 1st edition, 2006, p. 41

²Kamel Hamza Fleifel, Variation in Morphometric Characteristics of the Valleys of the Western Plateau in Najaf Governorate and - Its Relationship to Human Activity, Ph.D. thesis, College of Arts, University of Kufa, 2012, p.14

³ Buday, T. and Jassim, Z. 1987. The Regional Geology of Iraq. Vol. 2. Tectonism and Magmatism Metamorphism directorate of Geolical Survey and Mineral Investigation, Baghdad, p 352.



Source: The General Establishment for Geological Survey and Mining, Iraq Structural Map, scale 1/1000000, Plate No. 2, second edition, 1996

The study of these geological formations contributes to the knowledge of the prevailing water flow system in region, and the following are the geological formations according to their sequence from the oldest to the the most recent Map 3 .

1- Formation of Middle Dammam :

age dates It is one of the most widespread formations within the study area with an area of 380.6 km² and its back to the Eocene era and extends from the source to the center of the basin as well as at the mouth. Which quarters of its rocks, and the unit of dolomite stone mixed-forms the basal part of the formation and about three ⁽¹⁾ meters, and it may reach 225 meters (120-with marl rocks, and its thickness ranges between (90 .

2- Formation of the Euphrates :

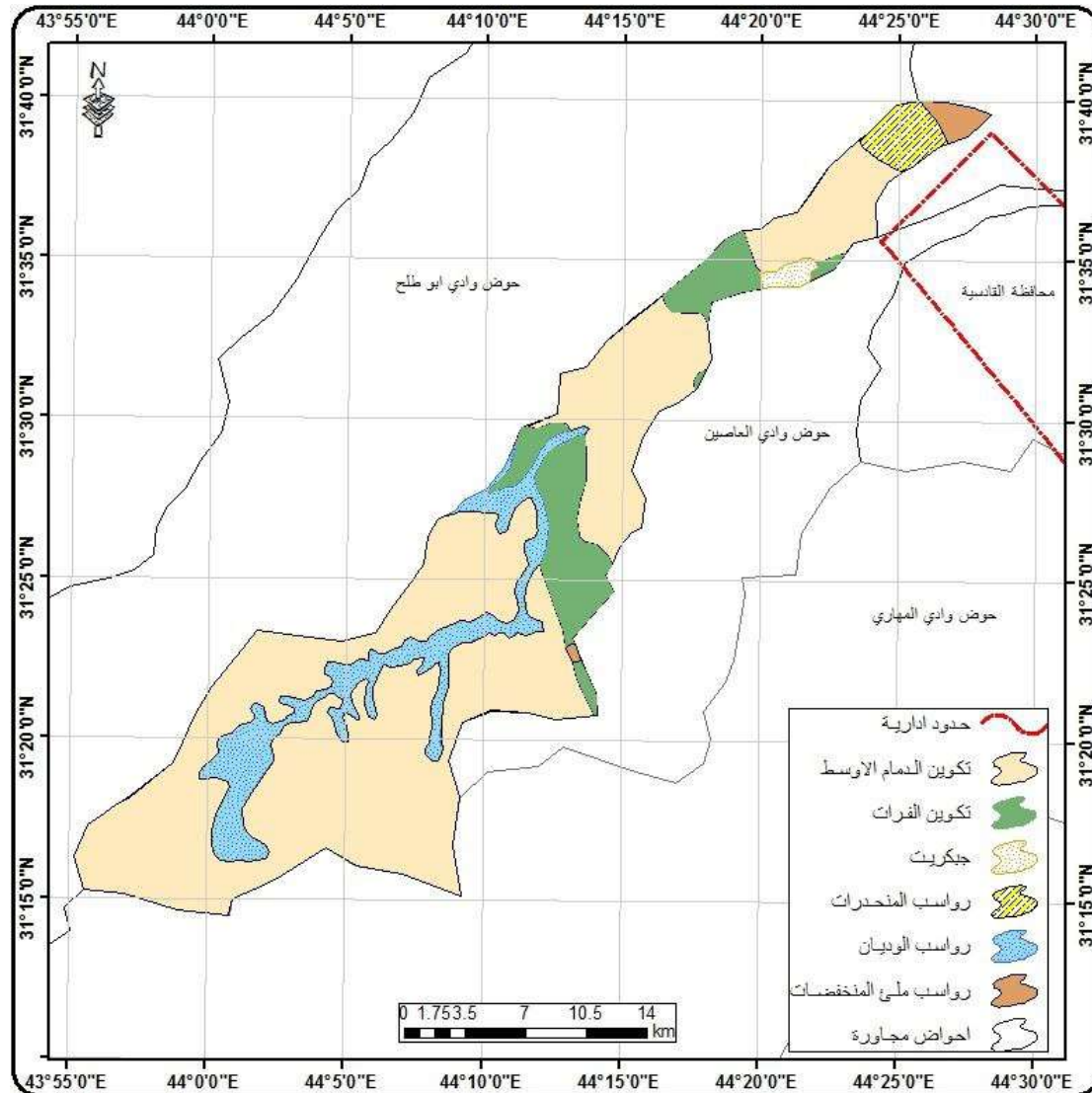
and is considered one of the oldest -the lower Miocene era -This formation dates back to the Tertiary period in separate parts of the study area in the central, northern, and northeastern geological formations. It appears ⁽²⁾ parts of the basin, with an area of 52.4 km². Its base consists of recrystallized calcareous rocks .

¹ Kamel Hamza Fleifel, Variation in the Morphometric Characteristics of the Valleys of the Western Plateau in Najaf Governorate source, p. 20 and Its Relationship to Human Activity, previous .

² -Saad Z. Hassim and Jereny C. off. Geology of Iraq 2006. P 177.

The upper part of this formation is characterized by complex stratigraphy and consists of chalky calcareous and sandy calcareous rocks, while its lower part consists of calcareous and chalky rocks, as calcareous rocks overlap with marl deposits and mudstones. The thickness of this formation ranges between 16-10⁽¹⁾ m .

Map 3 Geological formations in the study area



Source: The General Company for Geological Survey and Mining, Najaf PlateNH -38-2 Scale 1/250,000 -

3- Gypsum crust deposits :gypsum

Holocene era. These deposits appear at -the Pleistocene -These deposits were formed during the fourth time the northeastern end of the study area between the formation of the Euphrates and an area of 3.6 km². 2) AD

¹Razzazah and Sawa and their Relationship to -Zamili, Landforms in the Intermittent Edges between Lakes Al-Ayed Jassem Al - ,University of Baghdad, 2007 -Human Activity, Ph.D. thesis, College of Arts .p.13

(1) It is believed that this gypsum crust dates back to the ice age and that its origin is the formation of the hole

crystallized -The texture rock formation of the gypsum crust differs, as it may appear in a white, fibrous, or well m, or it (205-a thickness ranging between (0.5 granular form, or it may appear in a brown spongy form with may appear in the form of a mixture of sand and gravel. Gypsum is either directly exposed on the surface or covered with sedimentation from the wind or mixed with sand, silt and clay with a few carbon and organic (2) materials of brown color .

4 :Slope deposits

the far north east of the study area near the estuary and at the edges of the hills and³ valley, with an area estimated at 12.6 km² .

These sediments consist of a mixture of sand, silt, clay, rock rubble or gravel, and sometimes secondary (4) gypsum. Materials transported in the form of deposits at the feet of the slopes .

5 :Valley deposits

These sediments date back to the Holocene era and spread at the bottom of the valley in the form of a strip extending from the southwest towards the northeast, with an area estimated at 59.8 km². The thickness of the coarse valley sediments gravel, rock fragments is estimated at 3 m, while the thickness of the fine sediments clay soil (5) m 1 .

6 :Sediments filling depressions

Its formation dates back to the Holocene era and appears in desert depressions at the northernmost end of the study area (at the mouth) and at the middle of the basin at the southeastern end, with an area estimated at 5.7⁶ m (1.5-km², and its thickness ranges between (0.5 . These sediments were formed from the gathering of . rain and torrential waters in flat sites resembling scourges, in which water stagnated for a period that may be long or short (7) . These sediments consist of fine clay and sand deposits rich in aluminum oxides and alluvial materials carried by the valleys with wind sediments .accompanied by some salt deposits and evaporates

Second / Surface Characteristics :

the western plateau and the sedimentary The study area extends within two parts of the surface in Iraq, namely plain, with an area estimated at 514 km² Map 4

¹Rahima Region, southwest of Najaf, Master Thesis, College of -Razzaq, Magnetic Survey in the Al-Muhammad Ibrahim Abd al - .Science, University of Baghdad, 1980, p. 21

²Hill, Master Thesis, College of Science, University of Baghdad, 1988, p. Khatib, Geomorphological Study of Najaf-Azhar Ali Al - .21

³Anbar Governorate, Master Thesis, -Asadi Basin in Al-Halbousi, Study of the Geomorphology of Wadi Al-Fadel Jawad Khalaf Al - .College of Education, Ibn Rushd, University of Baghdad, 2005, p. 21

⁴previous source, p. 19 .Zamili-Ayed Jassim Al

⁵Razzaza secondary valleys and related landforms, a study in physical geography, -Ajili, West Al-Abdullah Sabbar Abboud Al - .PhD thesis, College of Arts, University of Baghdad, 2005, p. 26

⁶Zamili, previous source, p. 20-Ayed Jassim Al

⁷ ,Sabah Youssef Yaqoub and Anwar Mustafa Barwari, Report on Iraq Map of Quaternary Sediments - General Company for Geological Survey and Mining, Baghdad, 2002, p. 7 .

1 :The Western Plateau

It is part of the western plateau in Iraq, as it constitutes an area of 507 km² out of the total area of the western plateau, which amounts to km² 238,149 .

The surface of the plateau within the study area is characterized by a gradual decline from the southwest to the northeast (Map 4), as the general slope rate of the surface is 1m per 2km and the highest elevation in the , region is 230m above sea level in the far southwest, while the lowest elevation is 20m. above sea level in the far northeast, and the line of equal elevation 20 m above sea level is the boundary between the western plateau and the sedimentary plain.

2 :The sedimentary plain

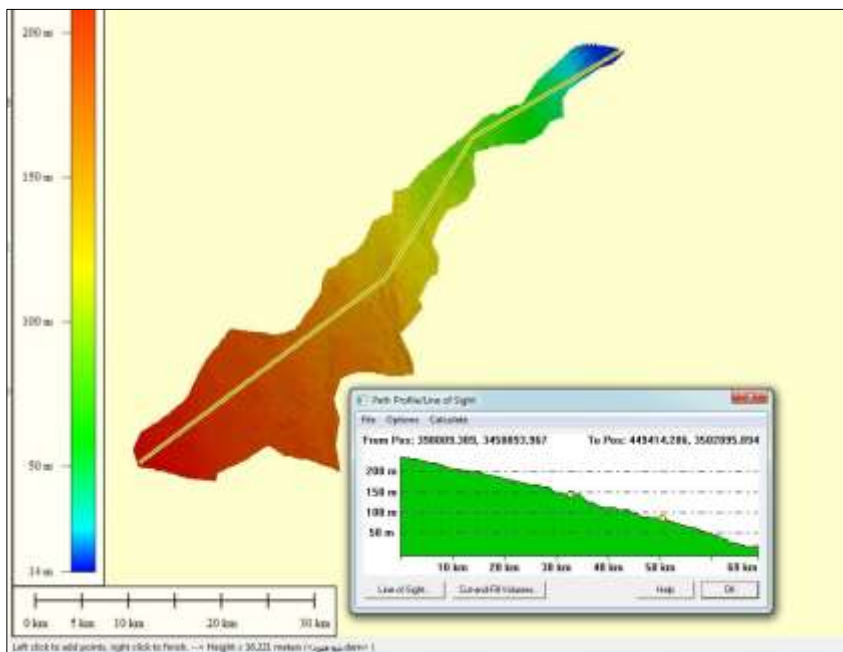
The sedimentary plain within the study area is characterized by its flatness and low slope, as the highest elevation is 20 m towards the southwestern part, while the lowest elevation is 15 m in the extreme northeast of the sedimentary plain within the study area is 7 km² at the mouth of the valley. The area Map 5

Longitudinal and transverse sections of the Mudud Valley Basin :

Two transverse sections and one longitudinal section were taken for the study area, as shown in Figures 1,2,3 and as follows :

Longitudinal Section: This section is taken from the extreme southwest to the extreme northeast, starting -A with a height of 230 m above sea level in the extreme southwest, then descending to 20 m above sea level, at a distance of 69 km from the starting point, with a slope of 1 m per each 2 km Fig. 1 .

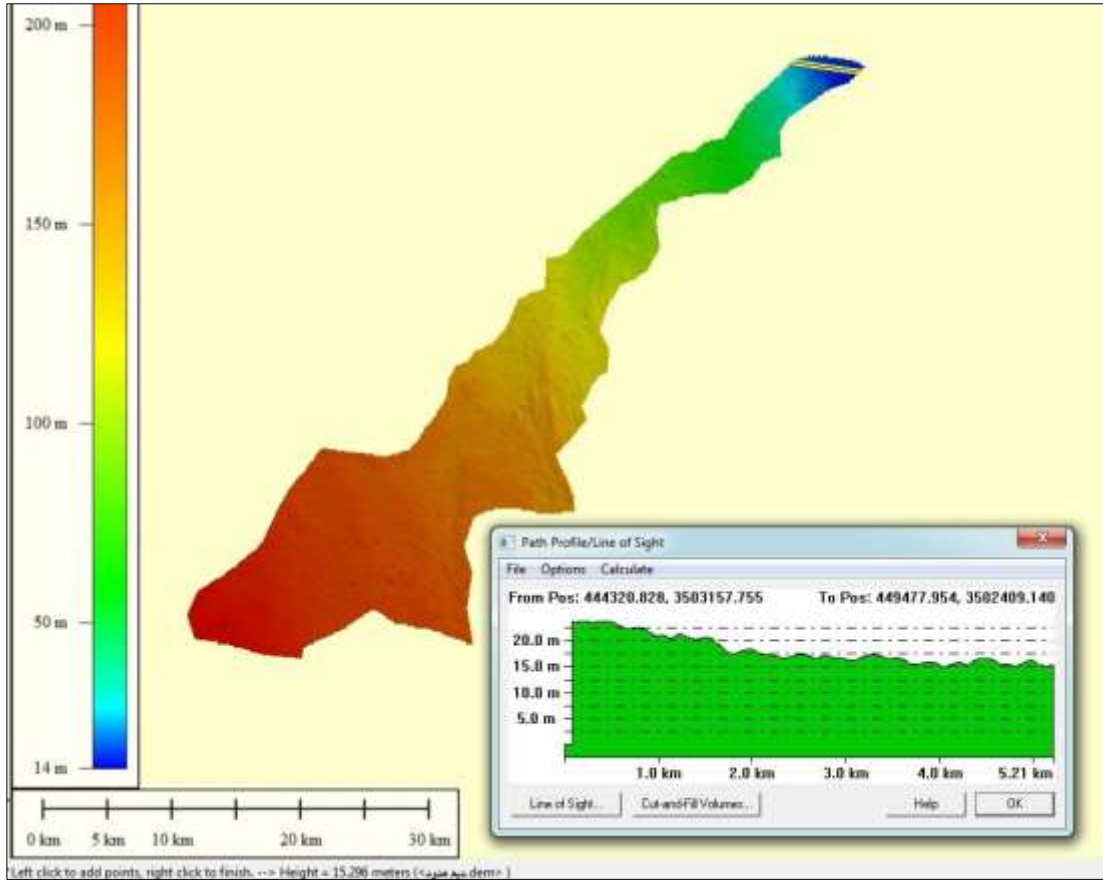
Figure 1 A longitudinal slope section of the Wadi Mudud basin



Source: From the researcher's work, based on digital elevation maps Dem and the Globalmapper15 program

Cross section -B 1 This section was taken in the northeastern part of the study area and within the : sedimentary plain. The highest height was about 25 meters above sea level, while the lowest point was 15 meters above sea level and for a distance of approximately 5.21 with a slope 1.9 m per 1 km Figure 2 .

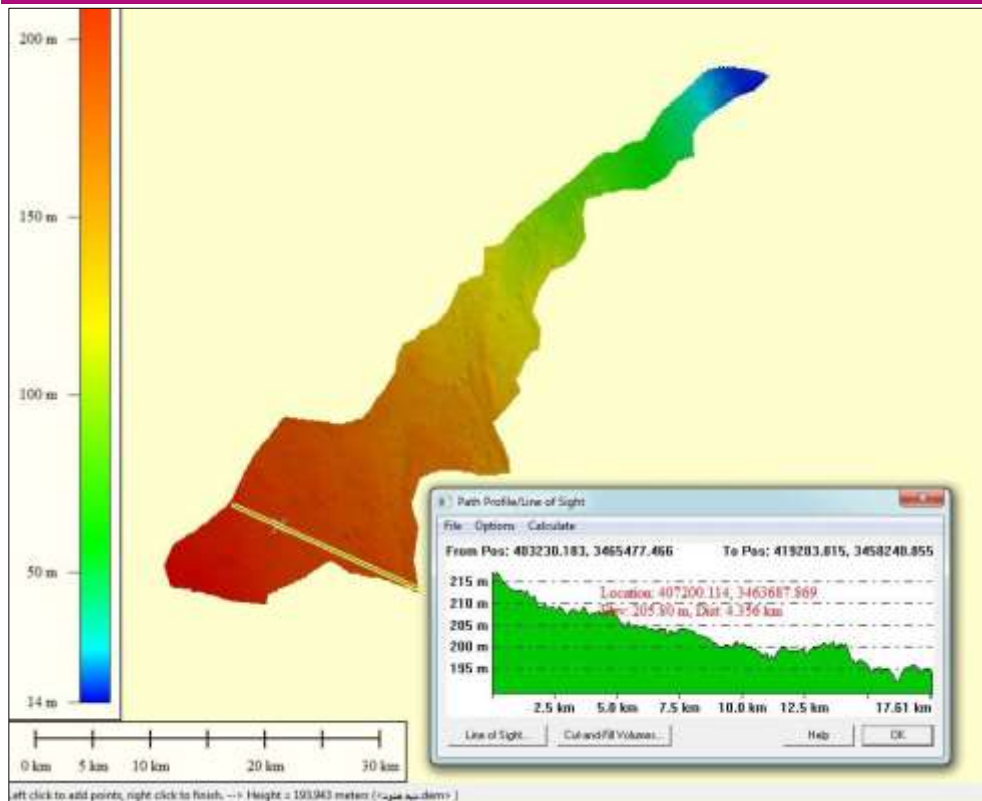
Figure 2 slope section within the sedimentary plain of the Wadi Mudud Basin-A cross



Source: From the researcher's work, based on digital elevation maps (Dem) and Globalmapper 15

Cross section -C 2 This section was taken in the southern part of the study area and within the western : plateau. The highest height was meters above sea level, while the lowest point was 215 meters 195 above sea level and for a distance of km 17.61 with a slope per km 1.1m Fig. 3 .

Figure 3 A transverse slope section within the western plateau of the Wadi Mudud Basin



Source: From the researcher's work, based on digital elevation maps Dem and Globalmapper 15

Conclusions

- 1- It was found that the study area, according to the division of Buday 1973, is located within the stable pavement within the Salman range, and the study area was subjected to several movements during the year period-three .
- 2- extending from the Pliocene era to the Pliocene era appear, as well as In the study area, rock deposits sediments dating back to the Quaternary time within the Holocene era .
- 3- The characteristics of lines of equal elevations vary in the study area, as the lowest height was (20 m) above sea level in the far northeast at the mouth of the basin, while the highest height was (230 m) above sea level in the far southwest of the study area .
- 4- The study area extends within two natural regions: the western plateau, with an area of 507 km², and sedimentary plain, with an area of 7 km², with a general slope from the southwest towards the the northeast .

It is clear from the foregoing that the research hypothesis is valid the role of geological factors and geomorphological characteristics of the Meddawad Valley Basin topography varies in determining the .

References

- 1.Khatib, Azhar Ali Ghaleb, Geomorphological Study of Najaf Hill, Master Thesis, College of Science, -Al University of Baghdad, 1988 .
2. The General Company for Geological Survey and Mining, Najaf PlateNH-38, scale 1/250,000

3. The General Establishment for Geological Survey and Mining, Structural Map of Iraq, scale 1/100,000, Plate No. 2, second edition, 1996 .
4. General Authority for Surveying, the natural map of Iraq, Baghdad, 1991 The Sabah Youssef Yaqoub and Anwar Mustafa Barori, Report on Iraq Map of Quaternary5. Sediments, General Company for Geological Survey and Mining, Baghdad, 2002
6. Razzazah secondary valleys and related landforms, a study in -Ajili, West Al-Abdullah Sabar Abboud Al physical geography, PhD thesis, College of Arts, University of Baghdad, 2005
7. Razaza and Sawa and Their -Zamili, Ayed Jassim, The Intermittent Landforms Between Lakes Al-Al Relationship to Human Activity, PhD thesis, College of Arts, University of Baghdad, 2007
8. Anbar -Asadi Basin in Al-Halbousi, Study of the Geomorphology of Wadi Al-Fadel Jawad Khalaf Al Governorate, Master Thesis, College of Education, Ibn Rushdfor HumanSciences, University of Baghdad, Foreign sources .2005
9. Kamel Hamza Fleifel, Variation in Morphometric Characteristics of the Western Plateau Valleys in Najaf Governorate and its Relationship to Agricultural Activity, PhD thesis, College of Arts, University of Kufa, 2012
10. Rahima Plateau-Razzaq, Magnetic Survey in Al-Muhammad Ibrahim Abd Al southwest of Najaf, Master Thesis, College of Science, University of Baghdad, 19980
- 11.-Attiyah, The Land of Najaf: History, Geological Heritage and Natural Resources, Al-Jaafar Al Musa Nibras Corporation for Printing and Publishing, Najaf, 1st edition, 2006
12. Buday, T. and Jassim, z. 1987. The Regional Geology of Iraq. vol. 2. Tectonism and Magmatism Metamorphism directorate of Geological survey and mineral investigation, Baghdad.
13. Saad Z. Hassim and Jeremy C. off. Geology of Iraq, 2006 .