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ESTIMATING THE AMOUNT OF WATER EROSION (CHANNELING) INDICATING THE WATER NETWORK OF AL-MUHMMADI VALLEY BASIN THROUGH THE USE OF REMOTE SENSITIVITY TECHNOLOGY AND GIS

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ABSTRACT
The current research aims to quantify channeling water erosion depending on Bergsma equation that depend on water drainage network, using the methods of both visualizations and topographical maps that are automatically processed using GIS software, to determine the environmental dangers of erosion, Particular land degradation to take appropriate solutions according to successful planning and management, and the results showed that the study area is suffering from water erosion in different degrees of intensity, as characterized by spatial variation of levels of environmental degradation as a result of varying activity of water erosion. Land which was not affected by erosion reached a Ratio of (1.20), light erosion reached on the other hand a ratio of (31%) Of the study area, while medium erosion ratio reached a percentage of (36.73%), whilst high erosion amount reached a ratio of (31.07).

KEYWORDS: AL-Muhmmadi Valley- Remote Sensitivity- Water Erosion

INTRODUCTION
Groove water erosion is defined as one of the most dangerous types of erosion on land uses in water basins, especially seasonal ones including search area, due to the overlapping of number of natural and human factors, which lead to erosion and transfer thousands of tons of Sediments by runoff water, water tends to dismantle and move the fragments hillsides sloping land as a result of high pressure impact flux in breaking up soil components and construction of a network of water overflowing depth portions over time until forming grooves. This issue requires an extensive study to estimate the size of water erosion and the resulting environmental risks in order to address the problems of land degradation, particularly soil erosion problem.

Study Area
The Mohammedan Valley basin is located in Hīt Administrative Unit/ Anbar province, and runs between the view (33° 32′ 30″ – 33° 12′ 60″) North latitude and longitude (42° 55′ 40″ - 42° 10′ 34″) eastward, as shown on the map (1), bounded from the North Valley of Al-Baghdadi, Northwest Valley Horan and from West the valley of AMIJ, South and Southwest its bounded by ALGHADV Valley and empties into the Western side of the Euphrates River at Mohammedan area. And the area of Wadi al-muhammadi is estimated with (2216) km^2.

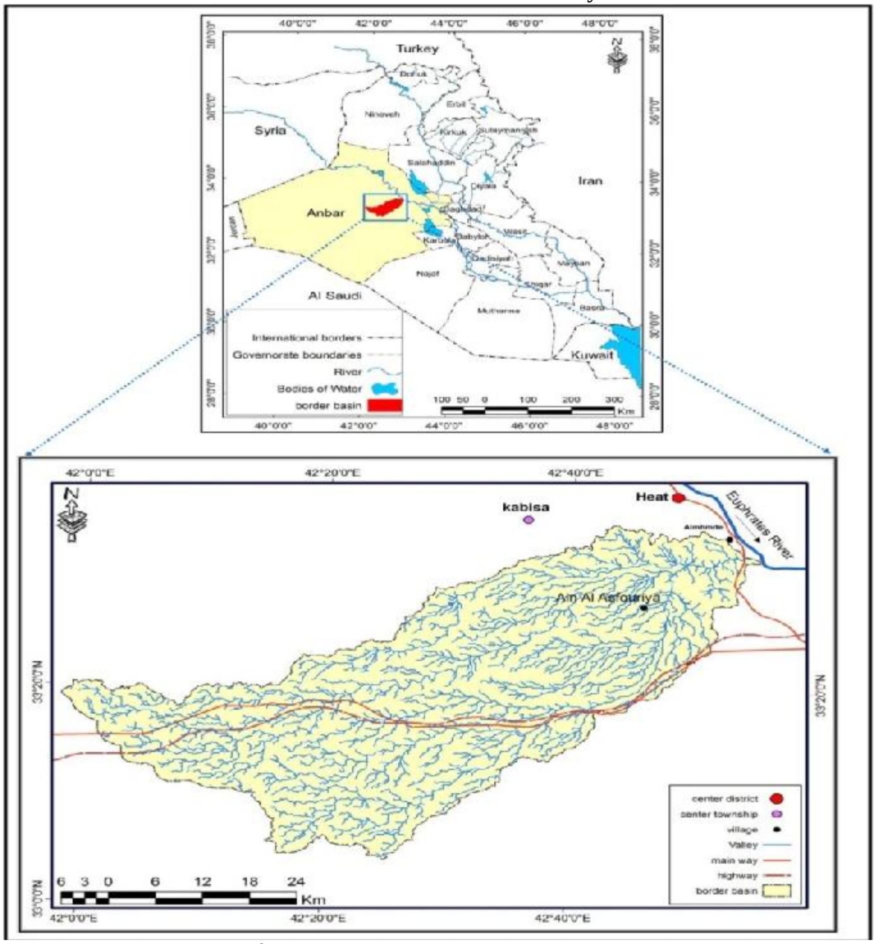
Objective of the study
The research aims analyzing the geological and geomorphological characteristics as well as the amount of surface flux size in the Mohammedan Valley basin and its effect on the spatial variation of the volume of groove water erosion in order to take measurements and means by which to limit its impact on land use in the search area.

Problem of the study
The characteristics of rocky formations, terrain and the influx of surface water in Al-Muhmmadi Valley affecting channeling water erosion activity in the light of prevailing rain precipitation, and their impact of the amount of volume of on water erosion in the basin.

Hypothesis of the study
Channeling water erosion activity increases in fragile rock formations especially with the tendency of land surface sloppiness despite lack of rain's continuity, which might determine the amount of water erosion in terms of water network and the resulting environmental risks in the search area.

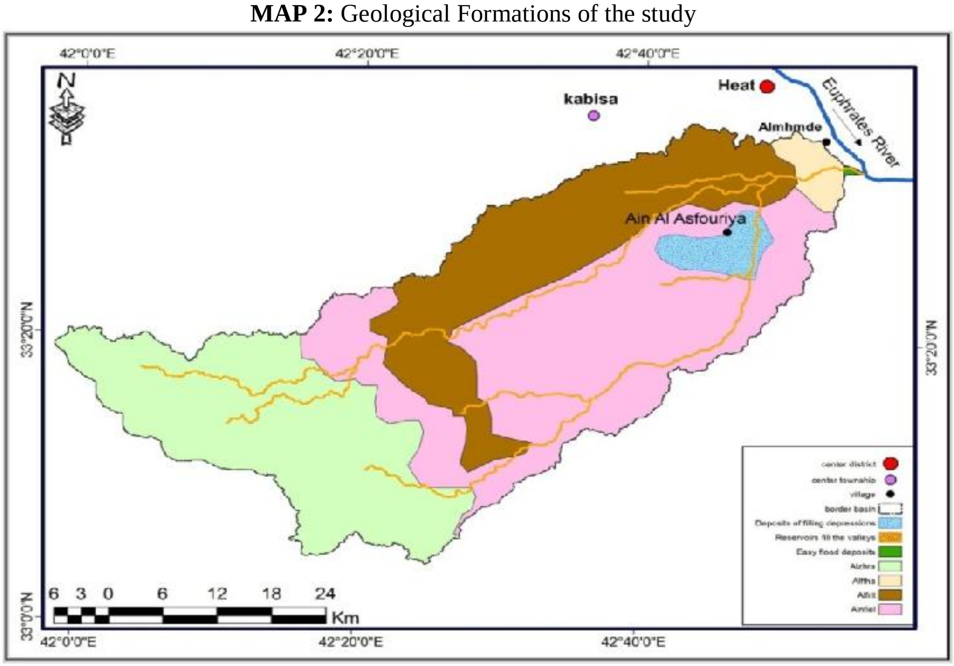
Geological Features
In the research field, a rocky components area revealed, its age varies between the quarterly and trio ages, as shown in Map (2) as follows:

MAP 1: The Location of the study



Source: researcher depending on the Ministry of industry and minerals, geological survey and mineral investigation, Iraq, geological map scale 1000000:1, 2000.

MAP 2: Geological Formations of the study



Source: Made by the researcher depending on the Ministry of Industry and Minerals, Geological Survey and mineral exploration, Iraq Geological Map, Scale: 1:1000000 for the year 2000.

Triple-time formations

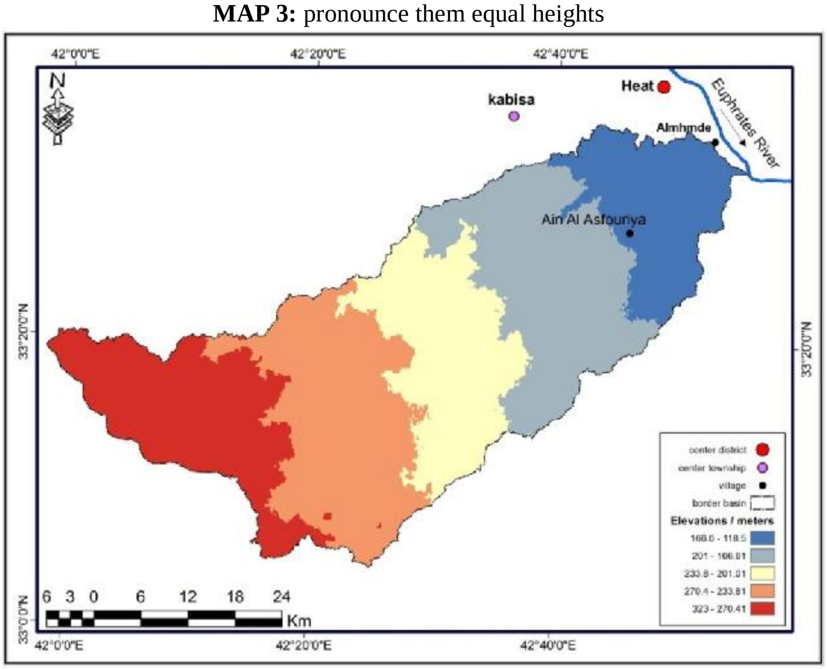
1. **Formation of the Euphrates**: This configuration is unveiled in the northwestern part of the search area, as shown in bar-like which extends from the mouth of the basin and then takes an extension in the top middle of the basin. Consists of limestone and gravel and steel of the clay and the component that make all the materials cohesive ingredients are Calcareous and clay[1]. Successive ground movements contributed to make cracks and breaks, evolved over time by water erosion thus became water courses that increased its depth and established river levels.
2. **Al Fat'ha Formation**: The formation concerned is unfolded in the search area in a limited way, especially in the lower part of the inlet area at the confluence of the Euphrates River Valley. Consists of gypsum and inhydrotomarl with thin layers of limestone containing fossils and salt layers and layers of sandstone, it features a general lack of hardness and the presence of cracks and breaks[2].
3. **Composition of Venus**: this configuration unveiling in the western area of the study, especially in the headwaters of the basin. Its established by successive sedimentary cycles of sandstone and limestone forming a solid base, and that the adhering matter consists mainly by silica and limestone[3].
4. **Al-Nifayil configuration**: this configuration appears vastly in the search area, particularly in the middle and lower basin of the Southeast side. Its layers are consisted of green clay as well as lime rock and features pertain and hardened components and contain fossils [4].
5. **Deposits of time Quartet**: deposits of time quartet covers scattered parts of the research, especially for deposits filling depressions that appear clearly at the bottom of tub which is represented by (Ayen AL-Asfoora 'Sparrow Eye') and deposits of the alluvial plain at the downstream area, as well as deposits of filling valleys in the main streams, these are the most important Sediment traps imparted by floodwaters and sediment quantity depends on torrents and activity of water erosion in sediment transport from slopes, sediment is composed of loose materials of clay, sand, gravel and silt in various sizes.

General Characteristics of Terrain

The terrain surface topography is a product of geomorphological processes interact with structural and geological characteristics and climate contribute to watershed topography study in detecting many geomorphological signs of basins as the age of the basin, area, length, density Drainage and others, as well as hydrological implications relating to the movement of surface water quantity and speed of water drainage and flow directions[5].

Research area height ranges (118.5) above sea level in the lower part of the basin to (323) meters above sea level in the upper part of the basin. As shown in the map (3).

MAP 3: pronounce them equal heights

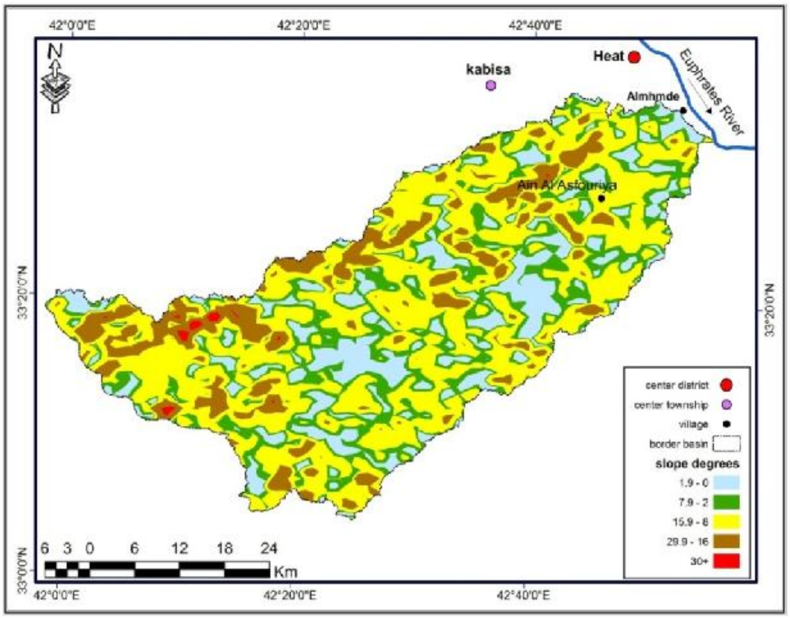


Source: researcher depending on space visible satellite (Landsat) type (DEM) for the year 2010, and processed using a program (Arc MAP GIS10.2).

The value of the basin ratio is of (2.29) m / km relative decrease in the intensity of the basin and this is due to the process of adjusting the surface, which is affected by the nature of rock formations prevailing, as water drifting operations increase in fragile rocks and fall in hard rock.

The importance of the study of the terrain from hydrological aspect stems from its impact on the speed of surface water influx and the amount of river load. As the ratio of terrain increases, the speed of water flow and its ability to carry larger amounts of sediments and rock deposits increases[6].

MAP 4: Degrees of slopes



Source: From the work of the researcher relying on the satellite (Landsat) type (DEM) for the year 2010 and processed using Arc MAP GIS10.2.

Estimation of runoff size:
Researcher used the equation of Berkeley to acknowledge the volume of annual flux for the research area, from schedule (1) it shows that the expected annual flow rate of the Wadi Al-Mohammadi basin is about (0.029) billion / m^3. This is due to the small size of the basin and to the rock components of the basin, especially the gypsum and limestone rocks, as well as the lack of rain and the different distribution during the rainstorm, all these factors are directly linked to the annual flow in the water basins, and the variance in the volume of revenues affects the variation in the activity of water erosion, as these processes increase with the increase of the rate of decline, and increase the volume of water flow.

TABLE 1: The Expected Amount of Yearly Flow in the Search Area

The Yearly expected influx Billion/ m3R	Slope Average Km/mS	The Average of Basin Sidth Km W	The Length of Valley Km L	The Amount of Rain Billion/m^3	The Area of Basin Km^2	Average Of Yearly Rainfall mm	Basin
0.029	2.29	11.3	89.2	0.304	2216	137.6	AL-Muhammadi

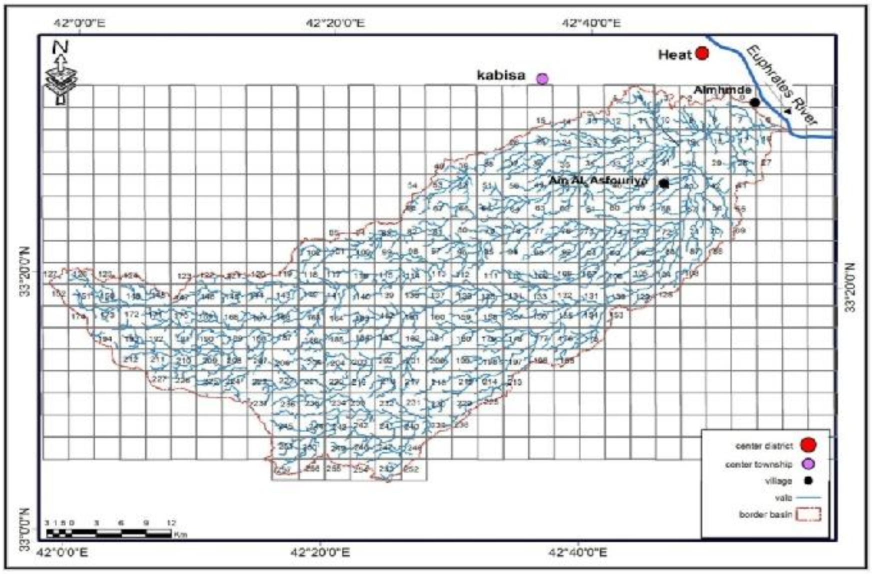
This was carried out by the researcher depending on Rainfall data of Haditha, Ramadi and Rutba Weather Forecast Station and GIS Images. ArcGIS10.2

Water erosion
The danger of groove of water erosion is defined as the main source of threat to human activities during heavy rainfall especially in the agricultural lands and hillsides due to the nature of the rock formations, the length of the slope, the intensity of rainfall, the concentration of runoff and the density of the vegetation cover, the length of the slope and the density of the vegetation, The erosion is due to the integration of small water bodies by river captivity and thus the more capacity and length, consequently increasing the amount of running water, which increases the ability to remove the products of weathering.

Measuring the Amount of Water Erosion
To estimate the volume of aquatic erosion in the research area, the Bergsma1982 method is used, which was based on the study of the surface water drainage system, which were derived from the images of space, and through it can identify the characteristics of water erosion and severity of the impact on the uses of land in the search area, and the method concerned work according to the following:

1. The distribution of the water drainage network map of the Wadi Al-Mohammadi basin on a network of units of equal area, the area of each unit (1 km2), depending on the program Arc MAP GIS10.2, while the area of equal units at the outer limits of the basin is less, A number or code indicates its location on the map, note the map (5).
2. Measuring the lengths of the grooves in each survey unit on the water network using the Arc MAP GIS10.2 program, based on the tool developed by researcher Omar Al-Qasab. This tool (Attributor Generalization) calculates the total lengths of grooves for each survey unit And then attribute it to the metadata table of that cadastral unit.
3. Calculate and classify the degrees of erosion by dividing the total lengths of grooves per unit survey on the area of that unit, note Table (1).

MAP 5: Area units to derive water erosion



Source: From the work of the researcher based on the satellite (Landsat) type (DEM) for 2010, and processing using the program (Arc MAP GIS10.2).

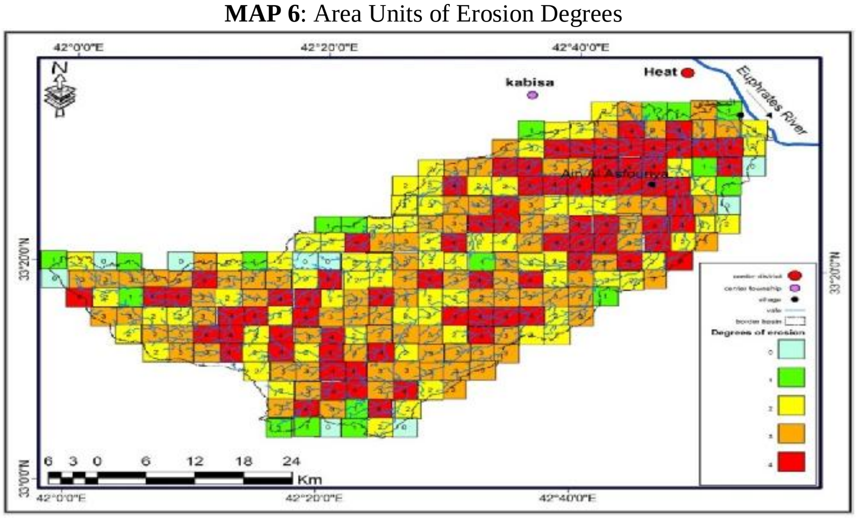
TABLE 1: Degrees of erosion according to Bergsma system

Type of Erosion	The Length of Groove/m	Degrees of Erosion
Non-erosion	Zero	Zero
Very light erosion	1-400	1
Light erosion	401-1000	2
Medium erosion	1001-1500	3
High erosion	1501-2700	4
Very high erosion	2701-3700	5
Severe erosion	3701-4700	6
Very severe erosion	More than 4700	7

Source: Muhammad Yunus Al-Alaf, Applications of Remote Sensitivity in the Inventory of Natural Resources on the Left Bank of the Tigris River between Mosul and Al-Kuwair, Dissertation (unpublished), Faculty of Agriculture and Forestry, University of Mosul, 1998, p53.

4. The values of the erosion and their coordinates (x, y) were applied to the map numbers that represent the degrees of erosion using Arc MAP GIS10.2 and with a random chromatic gradient corresponding to the erosion categories, see Table 2 and Map 6.

MAP 6: Area Units of Erosion Degrees



Source: From the work of the researcher counting on visual images of (Landsat Satellite) in 2010 and processing them by the use of program **(Arc MAP GIS10.2.)**

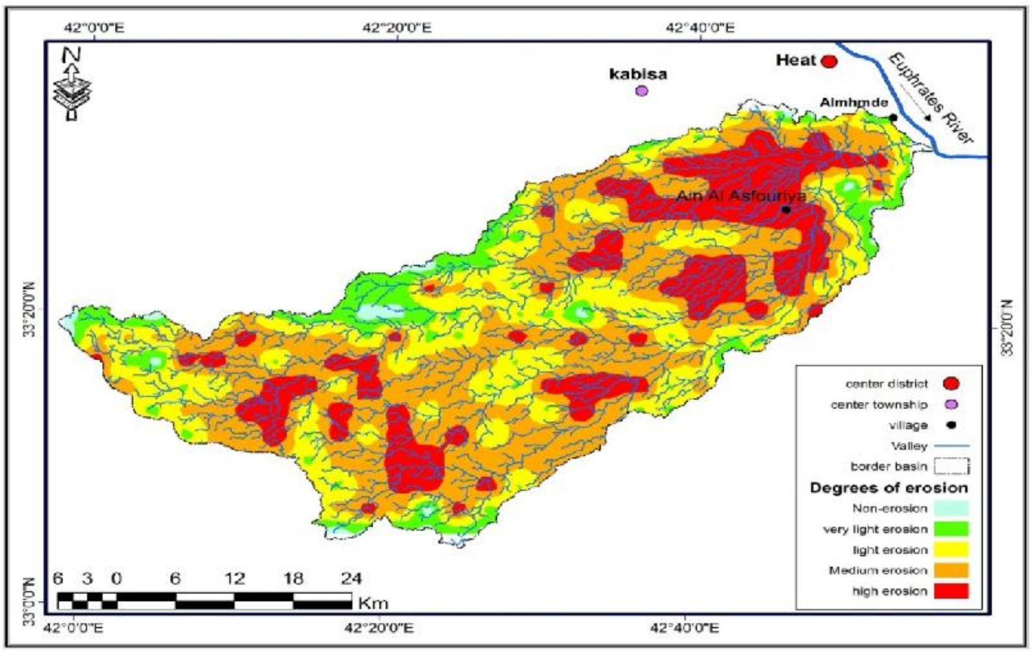
5 - Representation of degrees of erosion based on the distribution of the percentages of areas shown in Table (2), followed by the introduction of values of erosion to the calculator and using the program (Arc MAP GIS10.2), in order to prepare the map (7) to represent the area of water erosion and distribution in the search area.

TABLE 2: Degrees of Erosion in the Search Area

Type of Erosion	Average of Erosion	The Comprehensive Area**%**	Total Area/ km^2	Lengths of Grooves/m	Number of Sites	Degree of Erosion
Non-erosion	0	1.20	27.8	0	9	0
Very light erosion	284	4.10	89.2	25367	27	1
Light erosion	722	26.9	596	430865	70	2
Medium erosion	1079	36.73	814	89312107	86	3
High erosion	1770	31.07	689	1219788	75	4
		100	2216			Total

Source: From researchers work depending on Map (No.6) with the employment of program **(Arc MAP GIS10.2.**

MAP 7: Area of Erosion in the Search Area



Source: From the work of the researcher counting on visual images of (Landsat Satellite) in 2010 and processing them by the use of program **(Arc MAP GIS10.2.)**

From the reading and analysis of maps (6, 7) and Table (2) it is clear that some areas are free of any watercourses because they represent water splitting areas or flat plateaus. The lengths of watercourses differ from one location to another based on structural structures, rock formation characteristics, Wet climate in the era (Pleistocene), as well as heavy rain falling in sudden showers.

Degrees of erosion in the research area ranged between zero and 4 degrees and were free from severe erosion. However, medium erosion in the basin was dominant, most of which were in the lower levels (1, 2), which formed after their confluence with wider and deeper grooves in their streams. The results can be summarized in following details:

First: Non-Affected Land: These lands are represented by the degree of zero erosion. The number of its sites reached (9) sites and registered area (27.8) and (1.20). Second: the land of light erosion: the degrees of erosion (1, 2) and the total number of locations are (97) reign in an area of (685.2) and by (31), or about one third of the area of the basin almost. Third: The average erosion areas include 3 degrees of erosion. The number of its sites reached (86) and amounted to (814) and (36.73), representing more than one third of the basin area. Fourth: High land erosion: This type of erosion of the number (4) and the number of sites are (75) and an area of (689) and (31.07).

CONCLUSION

A significant correlation between the map of erosion and watercourses is a spatial comparison, indicating high accuracy in calculating the risk of erosion as digital data is available and processed using GIS software and the possibility of building a digital database for the search area. The results of the derivation and analysis of the aquatic erosion maps showed that the research area suffers from varying erosion risks, as light, medium and high erosion is predominant in most parts of the basin. It was found that the activity of aquatic erosion is a product of rock characteristics, structural structures, degree of regression, and intensity and continuity of rainfalls, as well as random human activities in land uses.

RECOMMENDATION

1. The necessity of using modern techniques to study runoff, determine the risks of spatial erosion, and build a digital data center that avoids the danger of any development project in the research area.
2. Interest in the application of water harvesting technologies using modern information technology in accordance with modern scientific methods to benefit from rain water, especially through the establishment of small dams on the valleys to feed the underground stock or increase the area of vegetation cover and protect the soil from the dangers of surface drift.

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