

Investigating the erosion of formations and Marl units using BLM Factor (Case study: Varamin County)

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Abstract:

Based on the stratigraphic information obtained from the combination of stratigraphic columns in geological maps with a scale of 250,000: 1 and sometimes 1: 100000, the four sheet of Varamin, Tehran, Damavand, Semnan and field survey were determined. There was a general absence in the area. all Marl formations and units, which specifically include three shale units, Marl gypsum, sandstone, brown and red Marl unit with interbedded sandstone, which belong to the Senozoic period and in the northeast, east, south and south. The southwest is scattered. From the distribution of Marl, 29 samples of Marl soil were chemically and physically tested, and because the evaporative sediments were distributed in most areas, the results did not show a significant difference. The erosion of the region, relying on the BLM factor, had a high numerical value and showed very erosion. Due to the solubility of salt and also rarely gypsum and lime and their capillary properties, the density of vegetation is very low and the dominant vegetation type was itchy and boneye *Alhagi camelorum* and *Aeluropus lagopoides* and the species of *Bromus tectorum*, *Hordeum marinum*, *Peganum harmala*, *Artemisia sieberi*, *Prosopis stephaniana*, *Phragmites australis*, *Seidlitzia rosmarinus*, *Capparis spinosa*, *Chenopodium murale*, *Convolvulus arvensis*, *Tamarix* sp, *Haloxylon* sp, *Pteropyrum aucheri*, *Salsola arbuscula*, *Salsola tomentosa* as a species with limited distribution in the region.

Keywords: Geology, Erosion, Marl, Soil Characteristics, Varamin County.

Introduction:

In general, Marl are plants that, due to their special physical and chemical properties, have very little vegetation in most arid and semi-arid regions, and the establishment of vegetation cover in these areas is associated with several limitations. This manufacturer has a lot of erosion compared to other geological sites. Due to their special structure, these fine-grained structures have sufficient density and need to withstand the effects of climatic factors, and if they are exposed to unfavorable conditions, they will be rapidly destroyed and regenerated. Due to the lack of ionic balance, as well as the extreme stress of the soil, the establishment, germination and growth of vegetation have been difficult to deal with in the Marl soils, so the surface of these formations is usually less vegetated. Increasing the density of pebbles in the marni plain has a direct relationship with increasing the percentage of vegetation requirement. Since Marl is a plant that has many physical limitations due to its special physical and chemical properties, it has several limitations.

The term Marl, commonly used to describe lake sediments and is widely used in North American geology, is Marlstone's calcium carbonate, or calcium-rich limestone, which consists of variable amounts of variable clay, rosacea, calcite, and argon. In arid areas, they are considered to be highly erosive deposits and sources of sediment production. In these areas, the erosion processes in the marl are very active due to the low permeability and lack of vegetation, especially in the marl hills. However, various forms of erosion, especially millennial erosion, are one of the salient features of Marl fields in arid regions (Mohamed, 2000). For example, marl containing blue aging, marl containing iron-black phosphorescent iron, blue marl containing organic matter in black or dark gray, marl containing iron oxide in red, and Marl containing 13 minerals, 7 color chlorides, green and gluconite.).

Several tables are available for color detection (Tucker, 1982). These criteria are used to sample colorful marl with high color variations.

The size of the particles and minerals involved in the construction of the snails can vary in the amount of clay, silt, sand, and even the size of the sand. Thus, according to the texture and percentage of the constituent particles, the percentage of clay, the type of clay, the percentage of carbonate, the percentage of calcium and the type of oxides (iron oxides, aluminum, etc.), Marl form different marginal groups. Abbasi et al., 2005 (Considering that Marl rocks are easily aerated due to weathering and become soil, so wherever there are geological formations containing Marl rocks, a layer of Marl soil is next to or on top of it). It is also observed. In general, Iranian Marl are divided into two main categories (solubility (such as gypsum, salt, anhydrite) with solubility, evaporative margins (at the age of neogenesis) and non-evaporative margins (before neogenesis)). Each of them has unique characteristics (Faiznia, 2003) and in general, the land area of Tehran province has both types of Marl.

Marl formations have always been problematic in watersheds and are one of the most important sources of sediment production. Studies conducted inside and outside the country regarding sedimentation of watersheds have identified the basic map of Marl formations in sediment production (Ismailpour, 1375; Ardakani, 1381 and Khomehchian) Ismailzadeh (2002). In the study of Marl soils and different types of erosion in Iran, he believes that marl in arid areas have a huge difference in erosion and sedimentation in different lands. Due to the lack of vegetation cover, the erosion process in the Marl has reduced permeability, as a result of which different types of erosion, such as badland erosion, are clearly visible in the Marl areas. Sarda (2002) studied the seasonal effects and raw materials in water erosion of eroded soils in eastern Spain. The results showed that in erosive soils in areas that do not have adequate vegetation, the nature of raw materials plays a key role in hydrological and erosion phenomena.

Studies on three types of soil, including Marl, clay and sand, have shown that Marl soils have the least penetration, the most runoff (81%) and the highest erosion. Due to its special physical and chemical properties, most of Marni's units and formations have very poor vegetation in most arid and semi-arid regions, and the establishment of vegetation on them is often accompanied by various limitations. These units have a lot of flexibility compared to other geological formations) Bagherian et al., 2007. (Among the characteristics of non-evaporative Marl in Iran, the following can be mentioned:

- Their location is often the sea with normal salinity, and calcium carbonate is one of the main components of the chemical component of this type of Marl.
- They are older than evaporative marl in terms of age and mainly "have the appearance of sheet erosion and shallow grooves".
- They do not have a variety of colors and are often seen in the color of chickpea cream and do not have the evaporative minerals of gypsum, salt and energy and are alternated with limestone and shale layers.
- It is possible to place plant cover on them

Emami (2013) in the study of erosion indices of Chahar Mahal and Bakhtiari provinces showed that the Marl belonging to this formation with an area of 67.38 square meters occupy about 4.15% of the province's area and therefore They contain more than 64% of the total Marl outflows in the province. gives. The results of the correlation between soil texture and sediment production indicate positive and good correlation and significance of silage balance with sedimentation and good and negative correlation of clay content with sedimentation and non-correlation of sand with sedimentation.

Unfortunately, today, unprincipled and unplanned exploitation on the one hand, and lack of proper management and maintenance on the other hand, has increased the destruction of vegetation and subsequent destruction of Marl soils. In classifying Marl based on their physical-chemical properties in the Tafresh region, the element is important as a chemical agent in creating various types of erosion in marbles.

Examining the effect of soil physical and chemical properties on the number of hawthorn plants in the Marl plains of Tabas, he stated that there is a significant relationship between the percentage of cover and the number of shrubs of hawthorn plants with soil characteristics of these lands, but the correlation rate varies according to soil characteristics.

Research Methods:

The summary of the various stages of the research method is based on the collection of statistics and information, studies and field research. The condition of the soil surface and erosion have been investigated with BLM (Management Land Bureau) factor. Erosion and subsequent sediment production can be one of the main and effective factors in maintaining and establishing vegetation cover, and in this regard, the BLM factor and its influential factors are mentioned. Today, the new method of Psychiatry has given much importance to the eighth factor "soil condition study" and erosion, so that the main factor of erosion and sediment production in the eighth factor, which includes 7 factors that have been studied using BLM method.

Geographical and general location:

Varamin city is one of the cities of Tehran province. This city with an area of 1580 square kilometers is located 25 km southeast of Tehran and geographically between latitudes 35 to 30 and 35 and longitudes 30 and 51 to 52 and with an altitude of 750 to 900 meters above sea level. Due to its location on the edge of the central desert, it has a semi-arid and desert climate (Figure 1)



Map number (1): Location map of Varamin county in Tehran province

Varamin county is located in the southeast of Tehran province in a flat and fertile plain and from the south to Namak Lake, from the west to Hassanabad Qom and from the north to the southern slopes of Alborz and from the east to Garmsar. The total area of this area is 1627 square kilometers. Is. Which covers about 17% of the urban complex area and 8.7% of the total province of Tehran. The area of the alluvial plain is about 139700 hectares. Varamin Water Hydrological Unit is about 1916,000 hectares larger area. Varamin Plain in terms of national divisions, which includes parts of Varamin, Rey and Pakdasht counties, most of Varamin urban area in terms of watershed division in Varamin plain and its southeastern parts in hydrological unit Garmsar, is located.

Area Geomorphological:

Varamin city has most of the geomorphological areas and has a variety of mountain units - Mahur hill - entrance plain and generally the mountain unit and its major hill are in the northern, northeastern and western areas and are often located in the central and southern part of the plains.

In general, geomorphological studies are very important with the aim of achieving and planning the necessary units for determining the work units and implementing watershed management, rangeland management projects or land management plans in general. Or the sensitivity to erosion and even in the preparation of permeability maps had the necessary operation so that the connection between geomorphology and watershed management plans is of special necessity and importance.

As mentioned, the study area has a mountain unit with regular and irregular type and the predominant facet of rock mass and rocky outcrop and also with soil cover with fruitful and fruitful trees (of course often non-productive), hill unit with regular and irregular type and different facies with depth. The soil and cover are small and finally mostly plain plain with smooth type and facade of agricultural plains and alluvial sediments.

Investigating the condition of soil surface and erosion with BLM

(Management Land Bureau) factor:

Erosion and subsequent sediment production can be one of the main and effective factors in maintaining and establishing vegetation cover, and in this regard, the BLM factor and its influential factors are mentioned. Nowadays, the new method of Psychiatry has given much importance to the eighth factor "soil condition" and erosion, so that the main factor of erosion and sediment production in the eighth factor, which includes 7 factors that have been studied using BLM . These factors include surface erosion, corrosion, gravel cover of the soil surface, the effects of damage to the surface of the earth, erosion, surface runoff and sediments and ditch erosion. Add together, then divide the sum of the maximum scores of each factor by multiplying the result by 100 to get the number X8. Then put this number in the formula $Y = 0 / 25X8$ so that if the number obtained is between 0 to

20, 21 to 40, 41 to 60, 61 to 80 and 81 to 100, respectively, the region is insignificant in terms of erosion, respectively. It is low, medium, high and very high, which is summarized in Table 1.

Table No. (1): The overall erosion status for each erosion type is a factor BLM

Class	Erosion status	A total of seven factors
1	Very Low	0-20
2	Low	21-40
3	Medium	41-60
4	High	61-80
5	Very high	81-100

Based on the available studies and with the help of aerial photographs 1: 55000 (photos of the range 4458 to 4465 and route 4405 to 4411) and geological maps of Garmsar quadrangle with a scale of 1: 100000, Tehran quadrangle with a scale of 1: 250000 and Damavand quadrangle with a scale of 1 : 250,000 Geological Survey of Iran, along with field operations, the study area has geological units and structures, generally sedimentary rocks that are distributed in almost all parts of the region. It has the gap Precambrian, paleozoic, and most mesozoic time (except Cretaceous), the most important stratigraphy formations and units, including sandstone and conglomerate sand, thick lined limestone unit, thick gypsum rock rotation unit, green marble unit, green unit, The alternation of shale and marble with gypsum, the unit of conglomerate rotation with sandstone, the unit of metallurgical deposit, the unit of deposits and sediments of old alluvium and finally the unit of deposits and alluvial rivers of the present era. In the area (Map No. 4). But most parts of it have the least vegetation due to evaporative sediments. Most of the mentioned units and formations belong to the Mesozoic (Cretaceous) and Senozoic eras (Paleocene, Eocene, Oligocene, etc., and Quaternary) and, as mentioned, in the times of Precambrian, Paleozoic and Mesozoic (except for Cretaceous) There is in the area.

According to these studies, all the rocks, formations, deposits and chronological units of the present era (Holocaust) and with different Marl have been studied locally and have been evaluated in terms of lithology and vegetation, which are as follows:

Shale unit, Marl Gypsum, sandstone:

The unit has not expanded significantly on the geological map and is located only at the southwestern and northeastern ends of the region. Due to the presence of shale and sandstone, which has shifted the soil from light texture to semi-heavy texture, this unit has a cover for planting pine and turmeric and has been allocated for animal husbandry in many places. In this unit, there are sometimes fruit trees such as berries, pomegranates and pistachios.

Red and brown Marl gypsum, interbedded sandstone:

The unit has not expanded significantly on the geological map and is only located in the southern and southwestern extremities of the region in the form of an arched band. Due to its proximity to the main road from Garmsar to Qom in the leather area of the city, this unit is very likely to be exploited in the future. has it .

Marl gypsum:

This unit has not significantly expanded on the geological map and is located only in the southern and southeastern extremities of the region. This unit is much more unsuitable than the above two units due to its gypsum covering conditions.

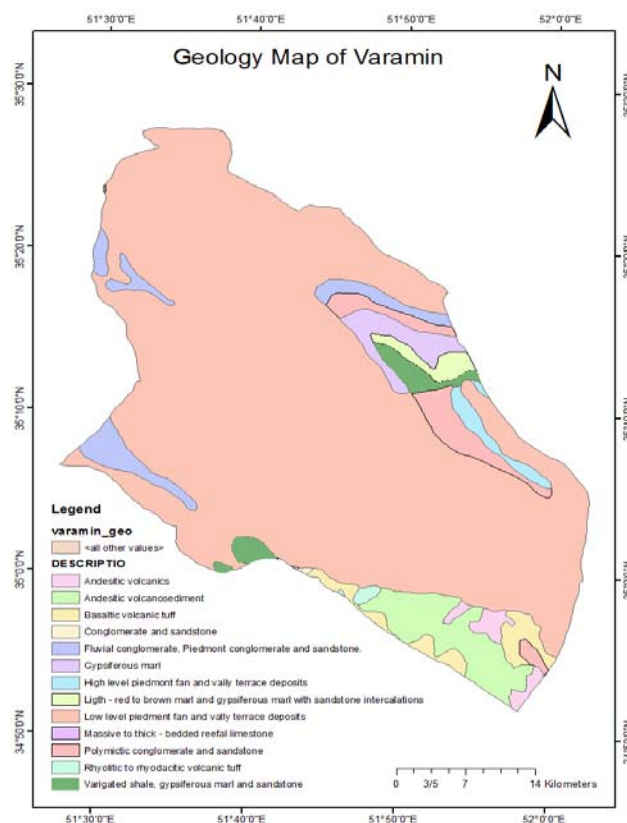


(1)



(2)

Image No. (1) and (2): Weathered shale lithology unit between thin layers of marble with little vegetation (see north)



Map No. (1): Geology of the region

Erosion and Sensitivity of Geological Units and Formations Based on BLM Factor:

In general, erosion is an inevitable phenomenon and cannot be completely eradicated, but human activities can exacerbate or reduce it. The erosion phenomenon and its adverse effects may not be very noticeable in the short term, but it will be noticeable in the long run because erosion usually leads to a decrease in yield.

To prevent its adverse effects, ie to reduce the yield, the soil should be used in such a way that there is no erosion, which requires careful planning and strong management. However, erosion is a permanent phenomenon and will always be there, but it is not a crisis if it is less than soil. When erosion is less than or equal to that of soil, the fertility of the soil remains constant over time. According to Bennet, a soil usually takes about 300 years to reach 25 millimeters of surface soil, which is important to consider and pay special attention to, to identify and provide appropriate control and protection strategies.

Genetically, while paying attention to the factors influencing erosion, erosion fragmentation is generally from two perspectives: geology (natural erosion) and aggravation (regression). However, according to the factors affecting erosion, it can be said that there are different types of erosion in the region and they are still active, but the type of water erosion is more active in the study area and its effects are more than wind erosion and water erosion is different. In the region, it is possible to erode along the seasonal landfill (middle and southern border), surface erosion, furrows, ditches, as well as falling parts and rock deposits (the subject of landslides) due to many fractures that pose risks to national resources. In addition, it has natural and agricultural lands that are very important to control.

Relying on the BLM factor and along with field operations and using existing geological maps, topography and aerial photographs, erosion (constructs and geological units) were studied and quantitatively and qualitatively evaluated. In this study, it was found that most of the area except real farms and orchards based on BLM factor (Proteodiconov-Resuscitus method) and the area has a numerical value above 41, which is in the middle and above erosion category, and therefore in terms of vegetation. It is very poor and the establishment of proper coverage and rehabilitation of the area before erosion control will be futile and fruitless. According to these studies, thick layer and mass limestone has the lowest BLM and river deposits and evaporators have the highest BLM.



(Image No. (3): View of erosion forms in the southern and southeastern highlands of the region see southeast)

Based on the expert opinion and field visits and considering the BLM factor, we examined the geological units in terms of seismicity. In general, after examining the hydrodynamic characteristics and their permeability, the correctness of their performance and seismicity were determined. Dominant coarse-grained limestone salinity units in the low-permeability category and aerobic shale-dominated saline-bearing units with thin layers and fragments of evaporative sediments in the high-permeability category and ultimately riverbed sediments and seasonal sediments of agricultural and non-agricultural fields. There are so many

In the study area, by examining topographic maps, geology and aerial photographs and field operations of units, types and facies of geomorphology and vegetation of the region were evaluated. The rocky outcrop is also covered with soil with fruitful and fruitful trees, the hill unit with regular and irregular type and facies with different depths of soil and tree cover and finally the plain unit with smooth type and facade of agricultural plains and alluvial sediments.

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The hill unit, which has a slope less than the mountain unit and more than the plain in the division of the hill, has regular and irregular slopes with a brigade and is more widespread in the region than the mountain unit and is more concentrated in the middle and southern part of the area. The regular slopes of the hill unit are mostly eroded, with a slight slope and slight cover, and mostly composed of evaporative spheres.

The plain unit is usually located after the hill unit and often has a slope of less than 5% and in some places, it has a slope of less than 12% and in terms of type, it has a flat slope and a rugged slope. Quaternary and evaporative quaternary and drought-resistant vegetation such as halo phyto. This unit has good capabilities for various activities, but it seems that the potential of flooding and reducing vegetation of this unit exposes all industrial and agricultural activities to the risks caused by some forms of unexpected accidents such as floods, rockslides and landslides. Make sure that the necessary precautions for controlling and controlling the above-mentioned incidents are necessary and unavoidable. The plain unit in the area is used as agricultural lands where fruit trees such as pomegranate, fig, grape, berry, walnut, pear, peach, apple, apricot, elm, etc. and crops such as wheat and barley are used. As mentioned, most geomorphological units are erosive and play an effective role in sediment production and reduction of vegetation in the region. As a factor in controlling livestock grazing and optimal use of pastures in order to preserve water and soil and vegetation and maintain the balance of the environment is essential and of particular importance.

Discussion:

Geologically, the study area has most of the units and formations of the Mesozoic (Cretaceous) and Cenozoic eras (Paleocene, Eocene, Oligocene, etc., and Quaternary), and in pre-Cambrian, Paleozoic, and Mesozoic times (except Cretaceous) There is a general lack of space in the region. Studies have shown that the dominant formations and units in the region in terms of lithology have evaporative sediments on which it will be difficult to establish and rehabilitate vegetation. The low density of vegetation also indicates this. In this regard, Marl units such as Shale unit, Marl gypsum, sandstone, brown and red Marl unit, Marl Gypsum, interbedded sandstone, old and new Quaternary deposits and alluvium have no vegetation and they have little vegetation.

Erosion status based on BLM factor, it was found that most of the area except real farms and orchards have a numerical value above 41, which is in the middle to high erosion category and therefore very limited in terms of vegetation density and proper coverage. In addition, rehabilitating the area before controlling erosion

will be futile and fruitless. According to these studies, thick and massive limestone has the lowest BLM, and river deposits and evaporators have the highest BLM.

In terms of hydrodynamics, permeability, and flooding and reliance on BLM re flector, it was found that the dominant balytology units of thick-resistant layer of limestone in the region are part of the low permeability category and the dominant balytological units of aerated shale with penetrating thin layers Finally, seasonal riverbed alluvium, agricultural fields, quaternary deposits, and sediments have been identified as highly permeable. As a result, the same salt factor in evaporative sediments, due to its capillary properties, causes salt to settle on the earth's surface and reduces the soil of the area for the prone to washing, and consequently reduces the density of vegetation.

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Most of the geomorphology units (mountain, hill, plain) in the zone are erosion and they play an effective role in reducing the amount of erosion and production of land cover area, and in the next stage of field management as factor control control and optimal operation of rangelands is essential to preserve water and land cover and maintain environmental equilibrium.

Conclusion:

Geologically, there is a general absence in the region during the Precambrian, Paleozoic, and Mesozoic periods (except Cretaceous).

-The dominant geological formations and units in the region have lithological sediments in terms of lithology and it will be difficult to establish and rehabilitate vegetation on it.

-The large part of the region, relying on the BLM factor, has high erosion and will be one of the main factors in reducing the density of vegetation in the region. In this regard, the thick layer and mass limestone unit has the lowest BLM and the river deposits and evaporators have the highest BLM.

-Hydrodynamics, permeability, and flooding in the form of BLM factor, it was determined that the dominant with litology units of thick resistant limestone in the region are low permeability category and the baltic units of the dominant aerated shale with thin layers and fragments of permeability and vapor permeability. The seasonal riverbed alluvium of agricultural fields and quaternary fields and sediments have been identified as very influential.

-Studies have shown that the presence of evaporative sediments, especially saline, due to their capillary properties, has caused salinization of the surface of the earth and has greatly reduced the soil of the area for washing and subsequently reduced the density of vegetation.

-There are different units of geomorphology in the region and in most of them the vegetation is insignificant, but the plain unit in the region has a significant expansion compared to other units.

-Limestone formations and units, thick sandstone layers and to some extent shales of the region have the least role in the production of sediment and formations and evaporation units and deposits have the greatest role in this regard.

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