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Analysis of Qualitative Units and Bridges, and Geomorphologic Effects of Watershed Hajji Bakhtiar, Ilam Province in Iran

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ABSTRACT

The geology of the watershed has significant formations and stratigraphic units. In general, its formation and stratigraphic units include the Sourgah Formation, the Ilam Formation, the Simareh section of the Gurpi Formation, the Gurpi Formation, the Cheile section of the Pabadeh Formation, the Pabadeh Formation Pabadeh Formations, the Pabadeh Formation, Kalhor Formation Asmari Formation, Asmari Formation, Gachsaran Formation, Old Coniferous Fossils, and eventually flood sediments of the river bed and its marginal zone. Gurpi Formation with an area of 255.87 hectares and Sourgah Formation with the area of 26.5 hectares have respectively the highest and the least area in the basin. Their dominant lithology (Gurpi Formation) consists of gray-blue shale and mildew of marl limestone and Sorgah Formation including shale Pirate dark gray and yellow limestone. Geomorphologically, there have been typically three mountainous, clay and plain mountains in the region that have had almost different types and facies. Its mountainous area with the most regular and irregular slopes (MIOM, MROM, mio, miom, MRom and mro) has had the most expansion in the area with an area of 5311/80 hectares. The irregular facies of this unit have been covered with bulk fores which has low soil and low rock shedding in MIom, and the erosion of dull and permafrost, and oak forest has been covered with the low depth of soil, and its outlook has been prominent (miom) with very low cover of soils. There have been separate and abundant masonry deposits (mio), but the regular facade of the mountainous region has been regular with a range of an oak tree cover, but in a small area, there have been MRom and a regular low mountain range with low oak coverings and mro. The mountainous area, has been as high as the increased density of its tree cover (mostly oak). So that it would be forested in the upstream of its density. The plain area with a plain slope type and facies in agricultural fields (QA), flood deposits (Qdc), alluvial deposits (Qal) and its expansion in the middle part of the area with the north-west-south-east trend, has had the smallest area. The total breadth has been 1767.6 hectares which has been equivalent to 17.7 percent of the total area.

Keywords: *Geomorphologic Units, Geological Formations, Unit Size, Brigade, Ilam Province.*

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1. INTRODUCTION

Hajibakhtyar watershed with an area of about 846.99 hectares is located 26 kilometers northwest county of Ilam and 15 kilometers south-east county of Iwan (Arman Gostar Atyeh Company, 2007). It has longitude of 43.32, 03, 46, 92.0, 15, 46, and its northern latitude is 96.20, 44, 33 to 21.46, 49, 33 (Geographic organization of the country). Physiographically, the above domain has 22 independent and dependent working units.

Geomorphologic studies have been very important for the purpose of obtaining and planning for the determination of work units and the implementation of watershed management, rangelands, or land planning plans in general. In addition to the above-mentioned cases, geomorphologic studies can be used to provide erosion type maps or erosion sensitivity maps, and even for the development of permeability maps, it would be necessary to establish a link between geomorphology and watershed management plans (Rafahi, Hossein Goli, 1978).

The process of preparing geomorphologic maps includes surveying topographic maps, geology and aerial photographs with an appropriate scale and their photo geology with stereoscopic devices with the field operations and accurate surveys (National Mapping Organization). The map provided by National Mapping Organization shows the geomorphologic units, types, and facies that were studied in the region.

2. MATERIALS AND METHODS:

Topographic maps and aerial photographs with the appropriate scale and accuracy were used to produce the paper. Their photogeography was carried out using a stereoscope with field operations and necessary surveys (National Mapping Organization). A geomorphologic map has been prepared by determining the geomorphologic units, types and facies in the studied area. The existing map has a mountainous unit with a regular and irregular types, dominant facies of the mass and rock outflow, a hill unit with a regular and irregular types and facies with different depths of soil and tree cover, and finally a plain area with plain types and facies of agricultural plains, flood plains and Sediment T, whose symbols or their naming symbols have been determined in general by using Geographic organization of the country (See

Table 1). After describing and generalizing the geomorphological units, types, and facies, only the units, types and facies in the region have been described in detail (Darwishzadeh, 1991).

Table 1: Guidance for determining the unit code, type and facies of geomorphologic map

Geomorphology unit	Geomorphology Type	Geomorphology facies	Symbolic geomorphology
Mountains	Irregular	The irregular range and its tree cover are almost massive and forested and have soil with a low depth and rock shedding due to its very low coverage, and in some places, it has a massive mass, and rarely has a stone outflow.	*Miom*
		Irregular range with more erosion of dwarf and abyssal and oak forest cover to the depth of soil. In this unit, geomorphology is very negligible, and it is more commonly a fragmentation, and its appearance is as a stone outflow.	*Miom*
		Irregular slopes with very low soil cover and very abundant rock deposits with negative effects and disturbance on flood plains and crops.	*Mio*
		Regular slopes of mountains with tree cover (oak) are abundant, but with a small area, low soil and a high slope, and sometimes with an outflow, but mostly to a massive mass with a tree cover.	*Mrom*
		Regular mountain ranges with very low cover (mainly oak tree), shallow soils and a large rocky outgrowth, and rarely gully erosion, shallow soil depths, falling in stone or limestone.	*Mro*
Hill	Irregular	The hill has irregular slopes and tiny tree coverings and large rocky falls, which mostly include large parts, and the soil on this geomorphology unit is low.	*HIO*
		The hill has an irregular range and high rocky outcrops, and it is negligible since it has a very tiny tree and plant cover, and a potential for rocky and heavy melting.	*Hio*
	Regular	The hill is characterized by irregular slopes, uncovered soil coverings, and rocky outflow (rarely), and it is more massive, and its tree cover, especially oak, is significant.	*HIom*
		The hill has regular slopes, the depth of the soil is high but more erosive, and in some parts, it has a massive covering and a slight (slightly) outcrop. There is a tiny tree cover(rarely oak).	*HRO*
		The hills have regular ranges, good soil depth, poor erosion, high tree coverings (mostly oak trees), isolated deposits, rocky outcrops and very low masses.	*HRom*
Plain	Smoothly	Crop lands are low in size and scattered over the old deposits of alluvium.	Q^{A}
		There are flood plains with abundant deposits and low cement and high soil permeability and light texture.	Q^{dc}
	Uneven	There are alluvial sediments of the river bed, which are mostly concentrated on the main river, and its width is very variable.	Q^{al}

Various factors should be considered in determining and distinguishing geomorphologic units in mountains, planes or in other units such as coniferous or terraces, alluvial deposits of river bed and flood, meander plains, etc., including factors such as the elevation of points relative to the surface free sea water, the regional slope, the morphology, their altitude relative to each other in a given region, with an exact observation of the horizontal slope and geomorphology distances and expert view, which is a very important and essential factor (Sharifi, 1997 a). For example, in a slope classification, a maximum of 20 percent has been considered as a mountain unit, and slopes less than that were considered as a hill and plain. Meanwhile, from a different point of view, the criterion of the measure for the separation of units was the gradient of up to 7 percent as a mountainous unit; the slope more than 3% and less than 7% as a hill, and finally a slope of less than 3% in the area was considered as a plain. Considering the above points, special attention has been paid to geomorphology and a precise expert view of the area, the trend of increasing or decreasing the longitudinal and transverse profiles of the region from the viewpoint of elevation, relative elevation of points to neighboring complications or the other effective factors for the separation and determination of the geomorphologic units. The implementation of the watershed management projects in the studied areas is very important, and merely paying attention to the elevation of the points and the slope of the regions for the separation of geomorphic units would never be an issue (Ahmadi, 1995; Tahriri, 2002; White, 1988).

As indicated in Table (1), it has been necessary to state the method of introducing and naming geomorphologic facies in the studied area. For each unit, the geomorphologic types and faces have been symbols, and these signs have been used by naming the different parts in accordance with certain criteria and conditions (Sharifi, 1999). For the introduction of the mountain unit, the letters M or m; for the hectare units, the letter H or h; and for the alluvial river beds, agricultural lands and flood plains, Qal, QA and Qdc have been used; respectively. But for the determination and display of the geomorphologic types which have been based on the discipline of the domains (Geological Survey of Iran), the letter I has been used as irregular, and R has been meant to be regular, but to represent the geomorphic facies, the symptom of o meant stone outcrops, and C meant the domains covered by the separated deposits and the soil which have been used, and the average percentage for each of these two types of outcrops has been indicated by the letter m. The above symbols have been used to indicate the type of unit, the type of facies and outcrops, and their percentage in the zone, from left to right; respectively. Finally,

based on the mentioned explanations, the geomorphology units, types, and facies have been studied in detail (Sharifi, 1997 b).

A. Mountain Unit

The mountainous unit has the highest slope in each division, with the letters M and m shown. The mentioned unit in the region has been mainly composed of Asmari and Formation group of Pabedeh group with a dominant lithology of lime, Shale lime, and Dolomite limestone. It is a geomorphologic ally characterized regularly and irregularly (Table 2) at the beginning and the boundary. The beginning of this unit in all parts of the area has been mainly due to the erosion with rocky blocks, and completely eroded and deep-water canyon valleys. Their topographic slope has been often geologically in the opposite direction to the slope of the geology, and the mountainous area has been fractured and seamless. There have been multiple gaps and various faults along the prevailing northwestern part.

In general, mountainous units with dominant facies of mass and rock outflow, with separated deposits and stone debris (stone block), low soil cover, and oak tree cover (the decomposition of the oak tree in the low and gradually increased upstream, ie, the heights as a forest would be massive) have appeared in the field. This unit has been distributed along the northwest – southeast, and is often scattered in the north, northeastern, northwest and southwest regions of the region with an area of 5311.80 hectares including 53,2%.

B. Unit of the hill

The hill unit in the division has had a slope less than the mountain range and greater than the plain, and it has been represented by the letters H and h. This unit has been in the region with regular and irregular slopes, and has been concentrated in the middle part of the area. Gurpi Formation with lithology of gray shale and marl limestone has formed a large part of the Tapping unit in terms of the geomorphologic units. Regular slopes of the hill unit have had deeper soils, but in erotic state, sometimes erosive, and sometimes covered with lumber, rock outcrop and tree cover. The HRO type of oak, in depth soil, good soil, poor erosion, high tree cover (mainly oak) and separated deposits, rock outflow have been very low and HRom type has had a very low mass.

However, the irregular slopes of the hill unit have been mostly covered with tiny trees and large rocky shrubs with large parts, low soil (HIo type), high rocky outcrops and insignificant soil and very insignificant (hio) vegetation and vegetation cover as the soil cover. Stone outlets (rarely) have been mostly in oak mass, and the tree cover has been mainly oak (type HIom).

As mentioned, the hill unit has extended more in the middle areas of Haji Bakhteiar, and its area has been less than the area of the mountainous area, and more than the area of the plain area, and its value has been about 2990.2 hectares and equal to 29.1% of the total area.

C. Unit of the plain

The plain unit has been usually located after a hill unit, and has been represented by a sign or Q. It has been a rugged and uniform type in terms of type. It has had three faces, and has been characterized by a definite coincidence with the generally north-west-south-east trend, including the agricultural plains with the cobblestone deposits. Flood plains have been characterized by fine-grained and permeable sediments and alluvial deposits, which have been represented by the mark QA, Qdc and Qal; respectively (Khosrow Tehrani, 1988). (See Table 2). This unit has good capabilities for various activities, and most of the industrial, agricultural or economic activities have been focused on it. But, the flood potential of this unit seemed to put all the industrial and agricultural activities at risk from some forms of the unexpected events such as floods and landslides (Stone and Stone debris), which require predictions to control and prevent these events from the inevitable necessities.

The plain area in the region has had an extension of north east southwest with an area of 1767.6 hectares and which has been equivalent to 17.7% of the total area.

Table 2: Geomorphology units, types and facies

Geomorphology unit	Geomorphology Type	Geomorphology facies	Symbolic geomorphology	*Area (hectare)*	Area (%)
Mountains	Irregular	The irregular range and its tree cover have been almost massive and forested, and have had soil with a low depth and rock shedding due to its very low coverage, and in some places, it has had a massive mass and rarely had a stone outflow.	*Miom*	3219.8	32.2
		An irregular range with more erosion of dwarf and abyssal and oak forest cover to the depth of the soil. In this unit, geomorphology has been very negligible and more commonly fragmented, and its appearance has been as a stone outflow.	*miom*	535.7	5.4
		There have been irregular slopes with very low soil cover and very abundant rock deposits with negative effects and disturbance on flood plains and crops.	*mio*	1208.1	12.1
	Regular	Regular slopes of mountains with tree cover (oak) have been abundant, but with a small area, low soil and a high slope, and sometimes with an outflow, but mostly with a massive mass with a tree cover.	*Mrom*	157	1.6
		There have been regular mountain ranges with a very low cover (mainly oak tree), shallow soils and large rocky outgrowth, and rarely gully erosion, shallow soil depths, falling in stone or limestone.	*mro*	58.5	0.6
Hill	Irregular	The hill has had irregular slopes and tiny tree coverings and large rocky falls, which have been mostly large parts, and the soil on this geomorphology unit has been low.	*HIO*	181.3	1.8
		The hill has had an irregular range and high rocky outcrops, and has been negligible, with a very tiny tree and plant cover and the potential for rocky	*hio*	1885.5	18.9

		and heavy melting.			
	Regular	The hill has been characterized by irregular slopes and uncovered soil coverings and rocky outflow (rarely) and being more massive; and its tree cover, especially oak, has been significant.	*HIom*	606.7	6.1
		The hill has been characterized by regular slopes, the depth of the soil has been high but more erosive, sometimes with a massive covering and a slight (slightly) outcrop. There has been a tiny tree cover(rarely oak)	*HRO*	132.7	1.3
		There have been hills with regular ranges, good soil depth, poor erosion, high tree coverings (mostly oak trees) and isolated deposits, rocky outcrops and very low masses.	*HRom*	231.7	2.3
Plain	Smoothly	Crop lands have been low in size and scattered over the old deposits of alluvium.	Q^{A}	930.3	9.3
		There have been flood plains with abundant deposits and low cement, and a high soil permeability and light texture.	Q^{dc}	518.8	5.2
	Uneven	Alluvial sediments of the river bed, which have been mostly concentrated on the main river, and its width has been very variable.	Q^{al}	318.5	3.2

3. CONCLUSION AND RECOMMENDATIONS:

In terms of geomorphology, Hajibakhtiar has three mountains, hills and plains. Mountainous units with regular and irregular types and various facies have a total area of about 5311.8 hectares, and plain area with a smooth and rugged type and facies of agricultural fields, flood deposits, alluvial deposits with an area of about 1767.6 hectares; equivalent to 17.7 percent of the total area, due to the strengths of the area in terms of the communication paths and easy access to the surrounding cities, especially in Ilam and Chavar Division. And due to the often flat type of plain units, and the provision of appropriate natural resources in the area, more attention of provincial and national authorities should be given to this region.

In general, about thirteen geomorphologic fancies in the Haji Bakhtiar area have been identified; among them, facies with the most separated deposits with the definite grain size have definitely played the most important role in the sediment yield and, on the other hand, deposits and sedimentary units and facies have been dense and hard in sedimentation. Thus, according to the mentioned explanations, and the expert views, the Qal fancies have had the highest and the least permeability in the area, and miom facies have had the lowest and highest role in the sedimentation of the basin. Therefore, the most important task in reducing the amount of erosion and sediment production in the studied area has been the comprehensive management of the land exploitation in proportion to their use. In the next step, the rangeland management has been an agent for controlling livestock grazing, and optimal utilization of the rangelands should be accomplished in order to preserve water and soil and vegetation cover. And, maintaining the environmental balance in the mentioned area has been essential and important.

REFERENCES

1. Ahmadi, Hassan. 1995. Applied Geomorphology, Tehran University Press, 614 pages. in Persian
2. Arman Gostar Atyeh Company. 2007. "Physiographic Report and Related Plans". in Persian
3. Darwishzadeh, Ali. 1991. "Iranian Geology" Amir Kabir Publishing House, 901 pages. in Persian
4. Geographic organization of the country, topographical maps 1: 50,000 Zarneh, Avangharb, and Serni.in Persian
5. Geological Survey of Iran, Geological map of Ilam rectangular, scale 1: 100000.in Persian
6. Khosrow Tehrani, Khosrow. 1988. "General About Stratigraphy of Iran and sections of the type of organization, Tehran University Press, 351 pages. in Persian
7. National Mapping Organization, aerial photographs 1: 20000 and 1: 550,000 studied areas.
8. Rafahi, H.G. 1978. "Water Erosion and its Control" Tehran University Press, 526 pages in Persian.
9. Sharifi, Rahman. 1997a. "Detailed Report on Geology and Mining of the Ecosystem of Kharaturan (Habitat Area)", Nomadic Development Plan of Semnan Province, 168 pages. in Persian
10. Sharifi, Rahman. 1999. "Geology and Geomorphology Report of Bridge of Abrisham Road, Nomadic Development Plan in Semnan Province, 107 pages. in Persian
11. Sharifi, Rahman. 1997 b Detailed Report on Geology and Mining of Ecosystems and Turan (Gheshlag Bayarimand Shahrud area), Nomadic Development Plan of Semnan Province, 210 pages. in Persian
12. Tahriri, Noorollah. 2002. "Geomorphology and Erosion Relations in Goharbaft Areas", Proceedings of the National Conference on Land Management, Soil Erosion and Sustainable Development, Natural Resources and Animal Sciences Research Center of Markazi Province, p. 316-306. in Persian
13. White W.B, 1988, "Geomorphology and Hydrology of the Karst Terrain", Oxford University Press, Oxford.