RESEARCH ARTICLE OPEN ACCESS

River Valleys and their Topography: Examining the Relationship betweenWater Velocity and Gradient

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ABSTRACT:
rivers are transferring rocky materials that clipped towards the sea, where their velocity increases at every height levels, except rivers above the permanent snow line, whichStralherhas been called ground machines, where they drain water. In addition to the processes of transport, erosion and deposition with the presence of mutual interrelations of natural features represented in the geological formation, terrain, climate and soil that interact together to have the graded state or not through river processes. Different landforms pass through the equilibriumstate and their stability is relative as long as the contribution of the previous elements in their formation is stable and when any increasing or decreasing happens resulting in changing these forms and is reflected on streams when dimensions of the canals (depth – width)or when streams expansion type changes (twisted – straight).

Date of Submission: 17-02-2019 Date of acceptance: 03-03-2019

I. INTRODUCTION:

earth has huge natural resources, such as soil, surface water, geographical, natural plants and landforms resources. Human was able to conserve many of these resources. This is represented increasingly throughout the past two hundred years, which in turn would expose the well-being of next generation to the most serious environmental threats. [1]

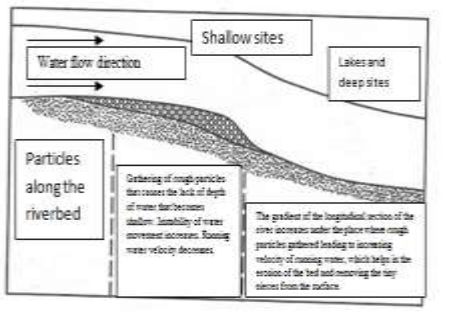
Research problem and questions: streams suffer from geomorphological phenomena related to the vertical and lateral erosion because of the variation in gradients and the presence of many determinants, thus streams take the equilibrium state. Opinions and theories have varies on this topic as factors participate in determining streams. The research problem is to recognize the relationship between water velocity, river gradient and load nature.

The purpose:the current research seeks to recognize river valleys and their topography through examining the relationship between water velocity and gradient or recognizing their impact on soil and land degradation.

The importance:studying the geological survey is important as it connected to the landforms, soil types, variety of vegetation density, and variety of environmental threats and problems and processes affecting it [2].Therefore, this research determines features affecting the formation of river valleys and how such valleys are impacted by velocity of the running waterand the severity of the sloop.

Simple theoretical literature: river canal style is an important indicator for the general features of the riverbed and geomorphological processes within the canal that change with the extension of river valley towards the river mouth. It may be shaped like a box. The cross-section of the river canal, their dimensions and geomorphological processes within the riverbed and along it represent a try to modify that style through controlling the velocity of the running water that control and organize sediments. The river canal rarely seems to be straight for a long distance, and they are rarely straight except areas of fault zones and human activity. It is affected by the size of particles transferred, their distribution along thestream bed, the amount of drainage and the width and depth of the river canal [3], where it leads to form successive different sections from the Riffles and where water moves quickly or form deep pools with calm water [4] figure(1).

Figure (1) The sequence of shallow and deep sites along the river



Source: Daoud, TaglebGerges, page 103

The line in the middle of running water moves towards the outer edge of the canal, where the erosion intensifies in a place under the twisting axis towards the mouth and leads to the emergence of a phenomenon. Then materials remaining from river processes,through water currents and whirlpools by their lateral movement to the following bank to be deposited there forming point bars. So that, when one bank is affected by an erosionprocess or receding levels of water, the water movement is rough and the other bank is expanding for the continuing erosion in shallow areas with calm water [5].

The type and size of sediment is the determinant of the vertical and lateral erosion and deposition, in addition to the variety between the amount of the water on one side and the type and size of sediments on the other side. Therefore, the proportionality is direct between the amount of water and the size of sediments and their amount. The velocity of water controls the river load. The critical velocity is highlighted here that is capable of carry materials, transport it and define solid materials called rocks that are more than 2/1 micron in diameter transported by running water [6]. Many pilot studies have found interaction between the size of sediments and the diameter of particles resulted from erosion and deposition [7] as in the following figure:

Particles that are 10 mm in diameter need a water velocity of 100 cm/second to move them.

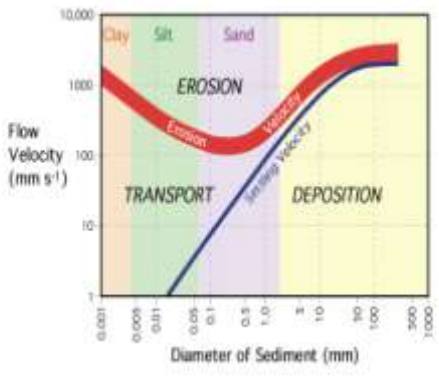
Particles that are 1 mm in diameter need a water velocity of 25 cm/second to move them.

The critical velocity, necessary for water to transfer particles that are 0.5 mm, increases.

Silt (0.01mm) needs 70 cm/second to move

Figure (2) show the relationship between velocity of running water in rivers, erosion velocity, size of transferred materials and deposition [8]

Figure (2) The relationship between velocity of running water in rivers, erosion velocity, size of transferred materials and deposition



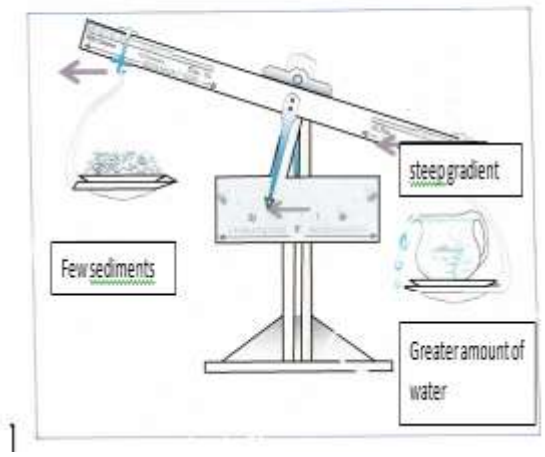
Source: Pidwirny, M. (2006). "Erosion and Deposition". Fundamentals of Physical Geography, 2nd Edition. Date Viewed. http:// www. physicalgeography.net/fundamentals/10w.html

Rivers are running usually above rocky scopes vary in their nature and composition, thus the ability to erosion is varied. A layer that is resistant to erosion may appear along the valley, preceded by the highest river level and followed by the lowest river level, in addition to other soft layers varying the erosion process.The river erosion of its steam at exist, thus the water discharge and the river is settled down and have a gradedprofile [9].

Scientific and theoretical opinions confirm that if the river has a few sediments, large water size and a steep gradient, thus the erosion reaches maximum levels, especially the vertical one. This is because the fast water is able to carry different types of sediments. Reaching a specific gradient is enough to provide river with the ability to conduct erosion processes. The steam segment is shaped like an arch, as you will see later, where it is high at the source at the beginning and its end is low at the sea level, which represents the base level regarding the erosion. The erosion continues slowly after river get the graded degree. The river always carries materials to transport it to the sea, and this reflects the opinion of the scientist Devins. This phenomenon happens at an early stage, because the movement indicates that existence or formation of a narrow valley. It could happen also at a late stage, where the vertical erosion is more effective.

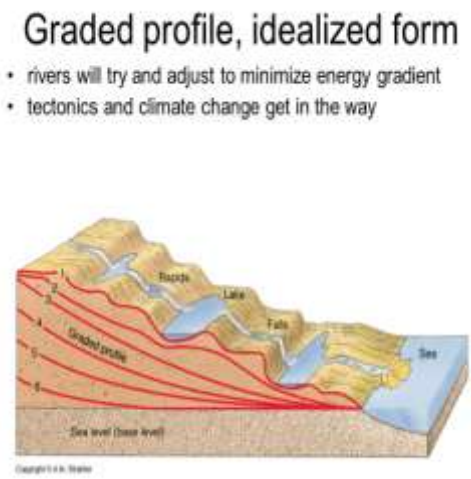
Many geomorphologists have supported the concept of graded-river as it explains many phenomena related to erosion and deposition. The river sometimes does vertical erosion as its load is not too much, as mentioned before, sometime does lateral erosion because it has a graded profile, and it deposit at other times. Many geomorpholosists have questioned and criticized the concept of graded riverand do not recognize it presence. Equilibrium can be inferred by finding a river that does not do erosion of the bed or the deposition, but a river that keeps its balance between the lack and plenty of loads [10]. Figure (3).

Figure (3) Less sediments more water with steep gradient



Gilbert has confirmed that the river full of loads can does lateral erosion as he thought that running water is always capable of undermining and riverbanks erosion whatever the circumstances of the erosion, transport and deposition in is bed. Figure (4).

Figure (4) the graded river



Source: SabriMahsoub, main geomorphological phenomena, analytical study with figures and drawings.

Dives confirmed that the presence of ongoing changes in the expansion of the river stream and the amount of its load throughout the normal erosion course. Similar continues change, even small, in the steam gradient is required to keep the equilibrium state of any river. It is said that in order for the river to maintain the long-term graded state, it should losethe equilibrium state for a short period [11].

Sediments of large size lead to the formation of deposited forms in river stream, because of the lack of flowing. In addition to that, the lateral erosion increases, which in turn leads to the retreat of bank, where the load decease in size and the precision of its components increases. The river in this case has an excess of energy.Kisseley thinks that rivers cannot be fully loaded as he sees that rivers are under loaded. The reason is that the river needs to continue moving the load. Based on that, if the river does not have the energy from the beginning, it will not be able to overcome the load particles settled down. The river reaches the maturing state when its valley is deepened, and when the river can create a gradual coordinated stream. Then the river in a balanced state and the average of what comes to it of tiny rocky pieces from all its tributaries and slops is equivalent to the average of the river's ability to transport the load.The longitudinal section of the river, that represents the river stream from top to bottom, reflects the equilibrium section of the river itself. We can say that the gradual river means that the river is forming a graded section. It is necessary to understand that equilibrium between the carrying process and the extent of river's ability is reflected only in an equilibrium state. Rivers are doing deposition in the period of discharge, and they are maintaining theirlevels for a while through removing these sediments temporarily under the increasing power of floodwater [12].

II. CONCLUSION:

what mentioned above arenatural processes without the interference of the human, but the geomorphological processes, including the equilibrium, according to the nature of the human interference when building and changing the river stream, when the river became a threat to his vital facilities. Therefore, human creates obstacles or build berms in order to change direction of river seams. Such processes resulted in side effects the may lead to a bigger change within the stream, in addition to the erosion of river banks on the other side, which provide us witha clear impression that the river tries, through its power and stream, to reach the equilibrium state, despite the direction of its stream by human. The equilibrium process happened in a random and disorganized, thus sediments fill the basin or the stream and is unclassified and the river attempts to have the graded state is unstable. Such processes are represented in Iraq' rivers from their source to their mouth down to expansion process of the floodplain and the formation of Multi-canal River.

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Abdulaziz Alwashmi" River Valleys and their Topography: Examining the Relationship betweenWater Velocity and Gradient" International Journal of Engineering Research and Applications (IJERA), Vol. 09, No.03, 2019, pp. 06-09