Gorphological Analysis of the Mereg Mahidasht River

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1-Introduction

Rivers and river systems can be considered the most important active geomorphic factor on the earth's surface. River behavior determines channel patterns. Changes in channel characteristics cause changes in the surrounding landscape. By studying existent channel characteristics, the behavioral patterns of the river can be judged in different ranges. Rivers can be classified according to common physical characteristics. River classification is essential for maintaining the health of catchments and coastal systems for long-term sustainability and the health of ecosystems. Planners need a consistent classification framework to discuss the ecological status of an area and help guide them in making practical management decisions that prevent degradation.

2-Methodology

A digital elevation model with excellent resolution has been used to extract the morphological parameters and determine the Bankfull discharge. First, GIS software was used to determine the Bankfull discharge and analyze the data, and HEC-RAS software (version 5.0.3) prepared a hydraulic model. After running the model, discharge with a return period of 2 years was the basis of the study. Finally, data related to cross-sections and water surface profiles were obtained.

Morphological variables such as Width/Depth ratio (W/D), Entrenchment Ratio (ER), Bankfull cross-sectional area (Area$_{bkf}$), Bankfull discharge width, maximum depth, Flood prone width (W$_{fp}$), and Water surface slope were calculated in HEC-RAS software environment. The geometric characteristics of the river meander were divided into four sections according to the geomorphological features, and the amount of curvature coefficient was calculated for all. Mereg River was analyzed at levels (I, II) Rosgen.

3- Results and Discussion

Moreover, according to the difference in the slope of the river, Mereg was divided into four sections. The amount of curvature coefficient and radius of curvature in the GIS

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environment were calculated for each section. To calculate the river in Rosgen level II, 44 cross sections were used. Moreover, the results of this study show that the Mereg River is in the first reach in the F6 class, in the second and third reaches of the river in the C6 class, and in the fourth reach of river in the B6 class. Regarding the sensitivity to disturbance, the river was very high in the first and fourth reaches of the middle class and the second and third periods.

Regarding sensitivity to disturbance, the river was moderate in the first and fourth reaches and very high in the second and third reaches. Sediment supply is high in the first, second, and third reaches and is moderate in the fourth reach. Moreover, the stream bank erosion potential in the first to third reach is very high and was low in the fourth reach. Moreover, its recovery potential has been relatively good, and the impact of vegetation on river stability is moderate.

4- Conclusions

Moreover, according to the difference in the slope, the Mereg River was divided into four sections. The amount of curvature coefficient and radius of curvature in the GIS environment were calculated for each section. To calculate the river in Rosgen level II, 44 cross sections were used. The results of this research show that the Mereg River is in the F6 category in the first reach, in the C6 category in the second and third reaches of the river, and in the B6 category in the fourth reach of the river. Regarding the sensitivity to disturbance, the river was in the middle category in the first and fourth reaches and very high in the second and third reaches. Sediment storage was high in the first, second, and third reaches, and it was moderate in the fourth reach. The stream bank erosion potential in the first to third reach is very high and was low in the fourth reach. The erosion potential of the banks is very high in the first to third reaches, and it was low in the fourth reach, and its restoration potential is relatively good. The effect of vegetation on the stability of the river is average.

Regarding the difference in the slope of the Mereg River, it was divided into four parts. The curvature coefficient and radius of curvature were calculated in the GIS environment for each section. To calculate the river in Rosgen level II, 44 sections were used. Mereg River from the upper reaches of the basin is in the F6 category in the first reach, and the slope of the bed of the river is high; the level of entrenchment ratio is lower than in other reaches. In the second and third reaches of the river, it is in the C6 category. The slope has decreased, and the entrenchment ratio has reached about 2.2 in the second section. In the third reach, the entrenchment ratio has increased to more than 2.5, and the sign of the floodplain has developed. In the fourth reach, the river is in category B6, and the slope is

reduced, and it is average in terms of the entrenchment ratio. Rosgen's classification method for the Mereg River showed that some channels were well-compatible with this classification.