Study of engineering geomorphology of Sistan River

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Abstract
The Sistan River, located in southeast of the Sistan Plain in Iran and Afghanistan border, is a branch of the Helmand River and after passing a distance of around 72 km, reaches lake Hamoon in the Helmand. On this meandering river, numerous hydraulic structures have been made which whose major usage is in agriculture. Due to its gentle slope, construction of longitudinal and latitudinal structures, human interventions, and natural harsh, the morphology of the Sistan River has undergone many changes during the recent 50 years. The meanders of the river have longitudinal and latitudinal movements and these movements have made changes in the river path, bank erosion, land degradation, etc. In this research, the role of influencing factors in morphological changes of the Sistan River has been studied in a geomorphologic engineering scheme. In these evaluations, different intervals of the river have been checked based on geometrical parameters and it showed that the Sistan River has a stable status in all of the studied intervals. Then, sampling was done on river edge, over and under hydraulic structure sediments and the status of the erodibility of the edges and its reason have been investigated using sedimentology and geotechnical tests. In addition to the effects of the structures, human interventions and natural harsh, our investigations show that sediments of the edges of the Sistan River do not have enough elasticity and flow ability. Instead, they show non-plastic, low adhesion and shear strength behavior and appearance of tensile fractures against the flow, land damage, and threatening of surrounding villages by the flow of the water. Due to the importance of the Sistan River as the main source of drinkable and agricultural water in the Sistan region, based on the results of the geomorphologic engineering, major strategies in conducting engineering projects and organizing the river are necessary to be considered. Incorporation of geomorphologic engineering and river engineering studies will lead to protection of the river edges stability and lands around the river. In addition, it could be possible to utilize these lands efficiently with the minimum social stress and problems.

Key words: morphological changes, longitudinal and latitudinal structures, Sistan River, erodibility.