

Abstract:

The destructive floods make a lot of damage in alluvial plains, so that, the need for prediction of the hydraulic behaviors of floody rivers has a particular importance in establishing an appropriate development in such a region. Zahak-Niyatak spillway has been designed and constructed on Sistan river to reduce the risk of overflow and also to increase the potential of inflow from Hirmand river with a discharge rate of 2,200 cubic meters per second during the flood periods. After nearly a decade past from the construction of this structure, the long period of the draught occurred in this region, at one hand, and the raise of the river bed due to sedimentation at the other hand have deformed the morphology of the Sistan river reducing the capacity of the river for carrying out the floods. In this research the effects of Zahak-Niyatak spillway on flood plain of Sistan River have been studied using HEC-RAS. This software has been shown to have a very good ability in simulating the hydraulic behavior of the rivers upon computation of the water surface profiles. In this regard, the plans and cross sections of river are transferred from the GIS environment to the HEC-RAS model by the use of HEC-GeoRAS software, and then the geometric data of the hydraulic structures located along with the path such as Zahak-niyatak spillway and Kohak and Zahak dams are introduced to the model. After calibration, gradually varied flow is simulated by the standard step method in steady state condition. Finally, for computation of the flood zone the area, the output data of the HEC-RAS model, is transformed to the HEC-GeoRAS. The results show that the peak of flood rate of Sistan river is 1677/18 cubic meters per second for a flood with 100 year return period which is more than the capacity of the river. The maximum discharge rate which can be carry by the sistan river is calculated to be 1000 and 900 cubic meters per second for the existence and non-existence of the Zahak-Niyatak spillway, respectively. The flood zone for these two states are respectively 478.73 and 415.92 hectares. Thus, result shows that the link of HEC-RAS and GIS models are very useful tool in determining design flood for the hydraulic structures in Sistan river. It also shows that and also Zahak-Niatak spillway is not an effective structure to increase the inflow of Sistan river from Hirmand river.

Keywords: Flood, Zahak-Niyatak Spillway, Sistan River, HEC-RAS, Arc-GIS



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Determination using HEC-RAS Model
and GIS**

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