



University of Zabol

Graduate School

Faculty of Water and Soil

Department of Range and Watershed Management

**The Thesis Submitted for the Degree of M. Sc  
In the field of Watershed Management**

**The Effect of Pondering Crests on the Quantity and Quality of  
Groundwater in Gohar Kouh Plain**

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## **Abstract:**

Watershed management measures are among the projects that are carried out with the aim of reducing erosion and sedimentation, flooding and flooding in the watersheds. Evaluation of these projects is essential for future planning. The aim of this study was to evaluate the effect of watershed management measures on flooding using HEC-HMS model in Manzalab watershed. The study area, with an area of 49338.1 hectares, is located in Sistan and Baluchestan province, Zahedan city, central part and Cheshmeh Ziarat village. The average annual rainfall of the region is 101.55 mm. In the study area, watershed management measures in 1393 have been implemented in the form of mortar stone structures and earth dams. In order to evaluate and evaluate the effect of these measures, Lar hydrometric station statistics were used to compare discharge changes before (1999-2014) and after (2014-2019) watershed management measures and HEC-HMS model. To determine the impact of watershed management structures, the concentration time for after the implementation of watershed management projects was calculated and by applying changes to the model input, flood simulation was performed. Then the model was calibrated and validated with observational data and flood hydrographs were simulated for different return periods in the period before and after watershed management operations and concentration time, peak discharge and flood volume indices for evaluation before and after watershed construction (At least two corresponding rainfall and flood events). The two corresponding rainfall and flood events were calculated. The results showed that with increasing the return period, the flood peak flow increased and the flood risk will increase with increasing the return period. Makes changes in the objective function.

**Key words:** Watershed Management, Flooding, HEC-HMS, Manzalab Watershed