

Investigating Gorganrood River Morphological Indices and its Effects on Flood Zones using Remote Sensing Data and Spatial Analysis (Case Study: Aq' Qala City)

Kamran Ganji^a, Saeid Gharechelou^{b*}, Ahmad Ahmadi^c

^a MSc in Water and Hydraulic Structures, Shahrood University of Technology, Shahrood, Iran

^b Assistant Professor, Faculty of Civil Engineering, Shahrood University of Technology, Shahrood, Iran

^c Associate Professor, Faculty of Civil Engineering, Shahrood University of Technology, Shahrood, Iran

Receive: 22 August 2020

Revise: 25 October 2020

Accept: 21 November 2020

Abstract

Urban rivers are of the most important reasons for flood inundation in cities. This study aimed to investigate the morphological effects of the Gorganrood River in Aq' Qala City in a case of flood inundation on March 2019. The images of Sentinel-2 and Landsat-8 were downloaded for full flood monitoring. After preprocessing, the NDWI and MNDWI indices were applied on the images to extract the flood zones. The sinuosity index and the number and mean radius of meanders were calculated from Sallaq Yilqi village to Dogonchi village using Google Earth and AutoCAD. The NDWI index was appropriate to detect the permanent and clear waters, while the MNDWI index was appropriate to detect the muddy waters and high humidity terrains. The area of flooded zones which obtained from the MNDWI index was 88% more than those of NDWI index. The sinuosity index was 3.88 (sever meander) in the district of the Sallaq Yilqi village to the Yampi village. Destruction outer arc meanders and low radius of meanders and erosion of soils in upstream were caused overflow the flood in the Gorganrood channel. On the 20th March due to low channel width and very-low gradient of bed river (0.0002) from the Aq Tekeh Khan village to the Dogonchi village were caused slow velocity of flood stream, therefore the water level was raised and the city of Aq' Qala were flooded. According to the flood maps obtained, the northern and southern of the Aq' Qala city located at high-risk zone. Canalization of outer meanders curvature, planting the absorbent vegetation around the quantitative buffer zone of the Gorganrood river, widening and dredging the channel and modifying structure of channel on the northern plains of Gorganrood River can be prevented from flooding over the Aq' Qala city.

Keywords: Aq' Qala, Flood zoning, Gorganrood River, Remote sensing, NDWI, Morphology

*. Corresponding Author: Saeid Gharechelou Email: sgharachelo@shahroodut.ac.ir Tel:023 32300259