

## **Flood Risk Assessment, Mapping Finding the Vulnerability to Flood Level of the Study Area and Prioritizing the Study Area of Khinch District Using and Multi-Criteria Decision-Making Model**

**Authors :** Muhammad Karim Ahmadzai

**Abstract :** Floods are natural phenomena and are an integral part of the water cycle. The majority of them are the result of climatic conditions, but are also affected by the geology and geomorphology of the area, topography and hydrology, the water permeability of the soil and the vegetation cover, as well as by all kinds of human activities and structures. However, from the moment that human lives are at risk and significant economic impact is recorded, this natural phenomenon becomes a natural disaster. Flood management is now a key issue at regional and local levels around the world, affecting human lives and activities. The majority of floods are unlikely to be fully predicted, but it is feasible to reduce their risks through appropriate management plans and constructions. The aim of this Case Study is to identify, and map areas of flood risk in the Khinch District of Panjshir Province, Afghanistan specifically in the area of Peshghore, causing numerous damages. The main purpose of this study is to evaluate the contribution of remote sensing technology and Geographic Information Systems (GIS) in assessing the susceptibility of this region to flood events. Panjshir is facing Seasonal floods and human interventions on streams caused floods. The beds of which have been trampled to build houses and hotels or have been converted into roads, are causing flooding after every heavy rainfall. The streams crossing settlements and areas with high touristic development have been intensively modified by humans, as the pressure for real estate development land is growing. In particular, several areas in Khinch are facing a high risk of extensive flood occurrence. This study concentrates on the construction of a flood susceptibility map, of the study area, by combining vulnerability elements, using the Analytical Hierarchy Process/ AHP. The Analytic Hierarchy Process, normally called AHP, is a powerful yet simple method for making decisions. It is commonly used for project prioritization and selection. AHP lets you capture your strategic goals as a set of weighted criteria that you then use to score projects. This method is used to provide weights for each criterion which contributes to the Flood Event. After processing of a digital elevation model (DEM), important secondary data were extracted, such as the slope map, the flow direction and the flow accumulation. Together with additional thematic information (Landuse and Landcover, topographic wetness index, precipitation, Normalized Difference Vegetation Index, Elevation, River Density, Distance from River, Distance to Road, Slope), these led to the final Flood Risk Map. Finally, according to this map, the Priority Protection Areas and Villages and the structural and nonstructural measures were demonstrated to Minimize the Impacts of Floods on residential and Agricultural areas.

**Keywords :** flood hazard, flood risk map, flood mitigation measures, AHP analysis

**Conference Title :** ICWRSD 2022 : International Conference on Water Resources Sustainable Development

**Conference Location :** Tokyo, Japan

**Conference Dates :** December 02-03, 2022