RULE BASED CLASSIFICATION OF FLOOD INUNDATED WATER BODIES FROM LANDSAT8 SATELLITE IMAGES

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ABSTRACT

Multi-spectral & Multi-resolution remote sensing satellite images acquired in visible & infrared bands are being used extensively for environmental monitoring. Extraction of water bodies from satellite images is of great use for many water related studies, including studies of river dynamics, watershed analysis, flood mapping etc. During floods water bodies occupy large nearby areas, which needs to be efficiently classified and delineated for the preparation of GIS maps. Floods are the most frequent natural hazards globally and the hazard of floods can be divided into primary, secondary and tertiary effects. The primary effects of floods are those due to direct contact with the flood waters. Secondary effects, such as disruption of infrastructure and services and health impacts, while tertiary effects are viewed as the long-term changes that occur, for example changes in the position of river channels. Floods cannot be prevented, but damage can be reduced by proper planning.

Water has a spectral property of the high absorption rate in visible and near infrared bands. Water can be easily classified using normalized difference vegetation index (NDVI) and normalized difference water index (NDWI). Over the past decade, a significant amount of research has been conducted to extract the water body information from various multi-resolution satellite images. Concerning on the disaster caused by the floods, our foremost concern relies on the water flow, its distribution, twists and turns on its path and accumulation. Post –disaster, water get dispersed and forms an unpredicted patterns with its different streamlines. The open sources satellite images like Landsat ETM+ is the best resource for global change monitoring and applications in agriculture, geology, natural disasters, forest fires, regional planning and so on. Classification of water bodies in rugged areas using satellite data is obstructed by atmospheric and topographic distortions. The topographic variability causes a problem of differential illumination due to steep and varying slopes in rugged terrain. Different methods for topographic correction of Landsat Thematic Mapper images have been assessed in the context of water body's extraction. In this research work the surface water drainage have been digitized from the Landsat 8 satellite images to form a vector data of water boundaries with the help of digitization tools present in ArcGIS 10. Changes occurred due to flood can be inferred from digitized pre and post flood images. Further analysis has been carried out to check the accuracy of classified images. Among the various methods decision tree classifier has been extensively used. In this research investigation the authors develop classified images and GIS maps using "knowledge engineer" in ERDAS Imagine and ARCGIS respectively. Thresholds for NDVI and NDWI were calculated for better classification of water bodies. To analyse the elements possibly being damaged by the flood, the extent of the inundation can be calculated. The spatial extent of areas most vulnerable to flooding have been captured from the satellite images acquired during the peak flood period and these may prove helpful for prioritizing appropriate flood control measures in the flood-affected regions.

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