Indian Journal of Ecology (2019) 46(3): 521-524

Manuscript Number: 2870
NAAS Rating: 4.96

Application of Synthetic Aperture Radar Imagery for Spatio-temporal Assessment of Flood in Nagavali River

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Abstract: In recent years, the frequency and magnitude of the flood extremely increased due to the effect of climate change. Nagavali River is one of the major flood contributing regions in Andhra Pradesh, India. Synthetic Aperture Radar (SAR) data from Sentinel-1 satellite has been used to perform the flood assessment in Nagavali River. SAR data has the capability to provide accurate, cost-effective, and rapid flood mapping. The preparation of the flood inundation map from SAR imagery involves two major processes such as image pre-processing and image classification. The image pre-processing includes radiometric calibration, speckle filtering, and geometric correction. The pre-processing carried out for raw data obtained from the Sentinel-1 satellite. The unsupervised image classification technique has been used to classify the inundated regions from SAR images. In the present research work, image analysis performed for before, after, and during the flood for the year 2018. Flooded regions have been estimated from the difference of permanent water body extent available from the open street map (OSM) with classified flood inundated region generated from the SAR image. The estimated inundated areas for before, during, and after flood are 89.5, 130.6, and 87.1 km^2, respectively.

Keywords**:** Nagavali river, Flood inundation mapping, Unsupervised classification, SAR data, Open street map