Differentiation of debris flow deposits through image classification of Landsat 8 images in Nueva Ecija after Typhoon Koppu

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As Typhoon Koppu traversed the northeastern provinces of Luzon last October 2015, massive debris flow events were triggered in the foothills of the Sierra Madre range, causing devastation in the municipalities of Gabaldon, Laur and Bongabon in Nueva Ecija. These fast moving hazards had carried boulders as large as 6.5 m in diameter and had buried houses and destroyed structures situated within the alluvial fans where human settlements had thrived. Fortunately, early warnings had been issued and the citizens were able to act accordingly, thus no casualties were reported. Though it was a disaster that had been averted, this event could happen again and thus, it was important to study the deposits and their extent in order to gain further data that could be useful in scenario based hazard modelling. The extent and character of the debris flow deposits were identified from processing pre and post-typhoon Landsat 8 images. Delineation of the deposit was done through change detection via image differencing and thresholding applied to NDVI indices and Tasseled Cap Transformation indices. The differentiation between boulder to pebble and finer sediment deposits, as well as stream delineation was done by unsupervised image classification of the NDVI index of the post-typhoon image and the 3rd principal component produced from the Principal Component Analysis of the stacked red and NIR bands of the pre and post-typhoon images. Accuracy assessment based from field data showed that the methodology was able to give a good delineation between the different types of deposits.