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## Quantitative analysis of the debris flow risk to concentrated rural settlement in southwest Sichuan, China

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**Sichuan Province in southwest China is highly susceptible to debris flow disasters and suffers much damage to buildings and loss of human lives in concentrated rural settlements each year. By combining geographic information system (GIS) and Deep Encoding Network (DE-Net) methods, we proposed an automatic identification method for buildings highly susceptible to debris flows with large-scale digital elevation data and high-resolution remote sensing imagery based on a vulnerability matrix containing different threshold values of the horizontal distance (HD) and vertical distance (VD) between buildings and channels. A case study in Puge County, Sichuan Province, demonstrated the high identification potential of the method for buildings susceptible to debris flows in large areas with only scarce information available. Meanwhile, We chose a high-risk village in Puge County to study debris flow risk to buildings and residents. Different types of days and diurnal periods were considered in the analysis of societal risk to residents. The results indicated that societal risk to residents on holidays is always higher than that on weekdays, and societal risk at night is also much higher than that in the daytime. The identification results of buildings vulnerability provide valuable information regarding high-risk residential areas to governments and facilitate targeted measure design at the initial planning stage, and the proposed method of societal risk provides a basis for decision-making in the planning of mitigation countermeasures in a specific settlement.**