Time series assessment on landslide occurrences in an area undergoing development

Abstract

This study assesses the influence of development on landslide occurrences in a rapidly developing area, Kota Kinabalu in Sabah Malaysia, across three assessment years (1978, 1994 and 2010). Two development indicators, land use and road density, were used to measure the influence of development on landslide occurrence. Land use was classified into four categories (*barren*, *forest*, *developed*and *other*), and road density was classified into low (< 50 m/40 000 m^2), moderate (50–150 m/40 000 m^2) and high (> 150 m/40 000 m^2). Landslide density analysis was used to calculate the concentration of landslide for the different land use and road density categories. The number of landslides in developed areas increased from 19 landslides/100 km^2 in 1978, to 29 landslides/100 km^2 in 1994 and to 50 landslides/100 km^2 in 2010, mirroring an increase in land use for development purposes from 8 per cent in 1978 to 27 per cent in 2010. Landslide density also gradually increased in the high road density class from 10 landslides/100 km^2 in 1978, to 30 landslides/100 km^2in 1994 and 62 landslides/100 km^2 in 2010. These results show that road construction activities influence landslide occurrences.