

Evaluation of the effect of hydroseeded vegetation for slope reinforcement

ABSTRACT

A landslide is a significant environmental hazard that results in an enormous loss of lives and properties. Studies have revealed that rainfall, soil characteristics, and human errors, such as deforestation, are the leading causes of landslides, reducing soil water infiltration and increasing the water runoff of a slope. This paper introduces vegetation establishment as a low-cost, practical measure for slope reinforcement through the ground cover and the root of the vegetation. This study reveals the level of complexity of the terrain with regards to the evaluation of high and low stability areas and has produced a landslide susceptibility map. For this purpose, 12 conditioning factors, namely slope, aspect, elevation, curvature, hill shade, stream power index (SPI), topographic wetness index (TWI), terrain roughness index (TRI), distances to roads, distance to lakes, distance to trees, and build-up, were used through the analytic hierarchy process (AHP) model to produce landslide susceptibility map. Receiver operating characteristics (ROC) was used for validation of the results. The area under the curve (AUC) values obtained from the ROC method for the AHP model was 0.865. Four seed samples, namely ryegrass, rye corn, signal grass, and couch, were hydroseeded to determine the vegetation root and ground cover's effectiveness on stabilization and reinforcement on a high-risk susceptible 65° slope between August and December 2020. The observed monthly vegetation root of couch grass gave the most acceptable result. With a spreading and creeping vegetation ground cover characteristic, ryegrass showed the most acceptable monthly result for vegetation ground cover effectiveness. The findings suggest that the selection of couch species over other species is justified based on landslide control benefits.

Keyword: Hazard; Landslide; Hydroseeding; Slope; Vegetation; AHP