

An AHP GIS-based Methodology for the Stability Assessment of the Djebel El Ouahch Collapsees on the Numidian Flysh Formation in Northeast Algeria's Constantine Region

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ABSTRACT: This study presents a comprehensive investigation into the factors underlying the collapse incident that occurred in the Jebel El Ouahch Tunnel in the Numidian flysch, Constantine region, Northeast Algeria. This methodology focuses on evaluating landslide susceptibility through the application of the Analytic Hierarchy Process (AHP) along the reconfigured path of the collapsed A1 highway tunnel section in the Constantine region of northeastern Algeria. Various influential factors contributing to landslides were analyzed, including lithofacies, slope gradient, slope aspect, elevations, fault density, plan curvature, distance from streams, and distance from roads. Utilizing a Geographic Information System (GIS), these eight causative factors were prepared for assessment. The findings indicate that slope gradient and lithology play pivotal roles as primary controlling factors in landslide susceptibility. The model exhibited a commendable success rate of 93% in predicting landslide susceptibility, as demonstrated by the area under the curve (AUC) plot generated from the landslides susceptibility map. Most of the new road falls within the highly susceptible area to landslides. This validated model can serve as an effective tool for mapping landslide susceptibility zones along the newly established road path following the collapsed tunnel. Moreover, its applicability extends to similar environments, showcasing its potential as a valuable resource for hazard assessment and planning in comparable terrains. The deviation road, as well as tunnel T01 of the A1 highway, is in a state of proven instability. It is certain that they will experience continuous, recurrent, and intense landslides. A radical solution to all the geotechnical issues plaguing this section of the highway is to reroute it far away from the Subnumidian formations. A deeper comprehension of the geological and geotechnical intricacies in challenging terrains can significantly enhance the safety and reliability of transportation networks in these demanding contexts.

KEYWORDS: tunnel collapse, geological complexities, landslide susceptibility, Analytic Hierarchy Process, construction hazards.

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