

Road network exposure to deep-seated and shallow slides at the basin-scale (Grande da Pipa River basin, Portugal)

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Abstract. Landslides are well-known for their destructive capacity; however, risk only exists if an interaction with people, activities, structures and infrastructures occurs. When landslides affect roads and potential human losses, both road damage and road disruption can cause significant economic losses. Therefore, in the framework of spatial planning, civil protection, emergency and risk management, the evaluation of road network landslide exposure is necessary. The primary goal of this work is to assess the present road network exposure to deep-seated and shallow slides at the Grande da Pipa River basin (North of Lisbon region, Portugal), an area naturally prone to geomorphological hazards. Our approach to assessing road network exposure is sustained by two different dataset inputs: (i) three landslide susceptibility maps and (ii) one road network map. The susceptibility to landslides, computed with the Information Value method and validated with success and prediction rate curves, as well as with the estimation of the area under the curves, was individually assessed for deep-seated rotational, shallow rotational and shallow translational slides. The road network exposure to each landslide type resulted from the intersection between the two top landslide susceptibility classes and the classified road network according to its rank, allowing the critical road sections to be identified. The road network is mainly exposed to deep-seated rotational slides. However, the other landslide types can also disrupt the road functionality and affect residents and economic activities.

Keywords: Deep-seated and shallow slides, Road network, Susceptibility, Exposure, Basin-scale