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SENSITIVITY ANALYSIS OF ROADS TO SNOWDRIFTS IN THE AUTONOMOUS PROVINCE VOJVODINA AREA, REPUBLIC OF SERBIA

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Abstract

Successful planning and maintenance of roads in winter conditions require knowledge of the factors that cause snowdrifts and their complex interactions. For this reason, analyses of snowdrift formations rely on the simplification of empirical and analytical patterns of mutual relations between the snowdrift formation factors.

This paper analyzes snowdrift endangerment of the state road network in the Autonomous Province (AP) of Vojvodina, through which the important international roads E-75, E-70 and E-662 pass. High wind speeds, low forest cover and flat terrain make AP Vojvodina highly susceptible to snowdrifts. The formation factors of snowdrifts that cause snow drifting in this area, namely the quantity of transported snow, wind speed and extreme winter temperatures, were analyzed. Data on wind speed and extreme winter temperatures from 11 climatological stations were analyzed for the winter period from 2000/2001 to 2019/2020. As one of the principal factors in the formation of snowdrifts, the quantity of transported snow was calculated based on data on the height of the snow cover for these stations and the research period. The sensitivity of each snowdrift factor was calculated using fuzzy logic. Thereafter, the overall sensitivity of the road network to the formation of snowdrifts was determined by synthesizing the sensitivity to each of the selected factors of snowdrift formation (sensitivity to the quantity of transported snow, wind speed and extreme winter temperatures) and was classified into five classes (very low, low, medium, high and very high). The highest degree of sensitivity to the formation of snowdrifts in AP Vojvodina was observed on the roads in South Banat. By identifying the road network sections at greater risk of snowdrifts, this research can serve as a valuable guideline for developing management plans during the winter period. Understanding the potential hazards posed by snowdrifts can help in implementing measures to ensure the safety of road users and minimize the environmental impact associated with road maintenance activities, thus contributing to sustainability and environmental protection.

Keywords: fuzzy logic, road endangerment, snowdrifts, spatial modeling

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