Assessment of Soil Erosion and Torrential Flood Susceptibility: Case Study—Timok River Basin, Serbia

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Author	Slavoljub Dragićević
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Abstract: The territory of Serbia is vulnerable to natural hazards. The most frequent and destructive hazard regarding huge material damage, loss of human lives, and environmental problems are the torrential floods. The main objective of this study is susceptibility assessment to soil erosion and torrential floods in the Timok River Basin using Erosion Potential Method (EPM) and Flash Flood Potential Index (FFPI). The erosive processes in the Timok River Basin belong to the medium erosion ($Z_{av} = 0.42$), which represents the third category of devastation. More than half of the basin is in the category of very weak and weak erosion, but also the category of medium erosion is geospatial dominant (45.71%). The Timok River Basin is endangered by soil erosion, with 812 registered torrents, and it stands out in comparison with other rivers of Eastern Serbia. In the inventory of torrential flood events, which was made for the territory of Serbia for the period 1915–2013, 40 torrential floods and 21 casualties were recorded within the Timok River Basin. According to the number of casualties, the Timok River Basin is ranked on second place in the Serbian territory. Analysis of the FFPI values revealed that the class of very high susceptibility to torrential floods is registered on 2.24%, and a class of high susceptibility on 43.05% of the total basin area. This shows that 45.29% of the Timok River Basin is highly susceptible to torrential floods which indicates that this data should be seriously taken into consideration. The medium susceptibility class occupies 49.47% while 5.24% of the total river basin area belong to the low class. Therefore, only 5% of the basin are not significantly threatened by torrential floods. It was determined that the average annual rate of sediment transport in the Timok River Basin is about 833,682.83 t yr^{-1}. In addition to the damage caused to agricultural land and infrastructure, erosion sediments and torrential floods contribute to significant siltation of the Danube River.

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