



CALCULATION OF THE SEDIMENT YIELD OF THE ČOLOVICA BROOK CATCHMENT, WESTERN SERBIA

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ABSTRACT

This study involves the evaluation of soil erosion within in small catchment within the Kamenica catchment, part of the Zapadna Morava catchment.

As regards the initiation of the wearing away of soil particles from the catchment slope, the methods were used to quantify soil erosion. The aim of this study was to evaluate erosion factor in the catchment area of the Čolovica brook, classified as a dry valleys and small flash flood. The annual erosion intensity is 95.18 m³ km⁻² of soil. Based on natural and anthropogenic factors, the Čolovica brook catchment area belongs to erosion category IV, weak intensity, deep type, with the erosion coefficient of 0.33.

Key words: sediment yield, catchment, erosion intensity, dry valleys and small flash flood

INTRODUCTION

Land degradation and soil loss are global events. Human induced pressure on natural ecosystems are still in progress, along with conservation efforts [1]. The main factor causing soil degradation worldwide is water erosion, which threatens 56% of the world's arable land [2].

Over 90% of the total land area in the Republic of Serbia suffers from different types and intensities of erosion [3]. The erosion process can have both direct and indirect impacts, inducing permanent soil disappearance. The calculated value of the total annual sediment yield suggests that some 16.0 cm of soil are annually eroded off the 21,000 ha of land in Serbia [4]. In the Republic of Serbia (Central Serbia), there are 1,221 km² of eroded soil, and 36,000 ha are in a steady state, now [5].

Erosion has mostly affected strongly sloping, deforested or cultivated soils on slopes, formed on impermeable geological substrates, due to the effects of intense rainfall and fluctuating air temperatures [4].

The tendency of air temperature to increase and of rainfall to decrease is evident in the region of Čačak [6]. Climate change leads to degraded soil properties, increases soil erodibility and reduces the protective role of vegetation

The above factors cause intensification of both surface and deep-cutting processes of erosion.

Given the above, the objectives of this study are quantitative assessment of soil erosion induced by a range of factors and estimation of sediment yield in one part of the catchment area of the Kamenica River (part of the Zapadna Morava catchment), i.e. its subbasin the Tinja, including its second order left-hand tributary the Čolovica brook.

MATERIALS AND METHODS

The Čolovica brook is located near Čačak (43° 53' N; 20° 21' E), Western Serbia, and belongs to the catchment of the Zapadna Morava river.

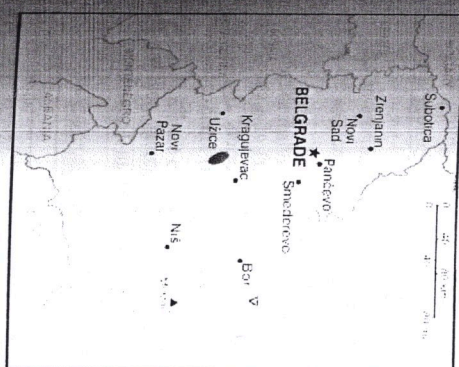


Figure 1. The Čolovica brook catchment

Natural characteristics of the Čolovica brook basin were studied using map data (topography, relief, geological substrate and soil), literature data (elements of climate: rainfall and air temperature) and data obtained through an immediate reconnaissance survey of the area (Vegetation).

Maps of the studied area have the following scale: topographic map (1:25,000 Figure 1; 1:50,000) [7], geological map (1:500,000) [8] and pedological map (1:50,000) [9]. Meteorological parameters for the catchment area were calculated using the method of interpolation of rainfall data [10] by the rainfall gradient [11], and air temperature [12] calculations for any altitude [13].

Erosion-induced soil losses can be predicted by various analytical models.

However, according to the experience of a number of researchers, the Erosion Potential Method – EPM [14] is the most suitable on catchment level for watershed management purposes in this Region and is used in: Bosnia & Herzegovina, Bulgaria, Croatia, the Czech Republic, Italy, Iran, Montenegro, Macedonia, Serbia and Slovenia

