

Assessment of Rainfall Erosivity, Comparison among Methods: Case of Kakheti, Georgia

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Abstract : Rainfall intensity change is one of the main indicators of climate change. It has a great influence on agriculture as one of the main factors causing soil erosion. Splash and sheet erosion are one of the most prevalence and harmful for agriculture. It is invisible for an eye at first stage, but the process will gradually move to stream cutting erosion. Our study provides the assessment of rainfall erosivity potential with the use of modern research methods in Kakheti region. The region is the major provider of wheat and wine in the country. Kakheti is located in the eastern part of Georgia and characterized quite a variety of natural conditions. The climate is dry subtropical. For assessment of the exact rate of rainfall erosion potential several year data of rainfall with short intervals are needed. Unfortunately, from 250 active metro stations running during the Soviet period only 55 of them are active now and 5 stations in Kakheti region respectively. Since 1936 we had data on rainfall intensity in this region, and rainfall erosive potential is assessed, in some old papers, but since 1990 we have no data about this factor, which in turn is a necessary parameter for determining the rainfall erosivity potential. On the other hand, researchers and local communities suppose that rainfall intensity has been changing and the number of haily days has also been increasing. However, finding a method that will allow us to determine rainfall erosivity potential as accurate as possible in Kakheti region is very important. The study period was divided into three sections: 1936-1963; 1963-1990 and 1990-2015. Rainfall erosivity potential was determined by the scientific literature and old meteorological stations' data for the first two periods. And it is known that in eastern Georgia, at the boundary between steppe and forest zones, rainfall erosivity in 1963-1990 was 20-75% higher than that in 1936-1963. As for the third period (1990-2015), for which we do not have data of rainfall intensity. There are a variety of studies, where alternative ways of calculating the rainfall erosivity potential based on lack of data are discussed e.g. based on daily rainfall data, average annual rainfall data and the elevation of the area, etc. It should be noted that these methods give us a totally different results in case of different climatic conditions and sometimes huge errors in some cases. Three of the most common methods were selected for our research. Each of them was tested for the first two sections of the study period. According to the outcomes more suitable method for regional climatic conditions was selected, and after that, we determined rainfall erosivity potential for the third section of our study period with use of the most successful method. Outcome data like attribute tables and graphs was specially linked to the database of Kakheti, and appropriate thematic maps were created. The results allowed us to analyze the rainfall erosivity potential changes from 1936 to the present and make the future prospect. We have successfully implemented a method which can also be use for some another region of Georgia.

Keywords : erosivity potential, Georgia, GIS, Kakheti, rainfall

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