Title: Soil degradation in the Kori Ouallam watershed in southwestern Niger: spatio-temporal analyses using the RUSLE model and ecosystem implications.

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Abstract

The Kori Ouallam watershed is located in the southwestern part of the Republic of Niger and covers an area of 6,612 km², with a highly elongated shape. This watershed is subject to significant human pressure and changing climatic conditions, which are exacerbating the accelerated degradation of its ecosystems. This study aims to analyze and model water erosion in the Kori Ouallam watershed using the RUSLE model integrated with GIS and remote sensing, in order to understand hydro-erosive dynamics and identify priority areas for intervention. Analysis of these data reveals that the annual average soil loss is 1.9 t/ha/year. At the watershed scale, the erosion risk ranges from a very low erosion rate of 0–1 t/ha/year, which covers 56.40% of the watershed's area, to an extremely severe erosion rate (>37 t/ha/year), which covers 0.05% of the watershed; these areas are concentrated mainly in the eastern part and along certain drainage channels. The study shows that in the southern and central parts of the basin, topographic LS factors are the main determinants of soil loss, ranging from 1.6 to 48. These values are the highest and lead to flow accumulation and gully formation. Soil erodibility and rainfall erodibility are secondary factors influencing the soil loss process in the basin.

In the Sahelian context, population pressure, inappropriate human activities, and climate uncertainties call for enhanced monitoring to ensure the sustainable management of natural resources.