Assessment of soil erosion differences in paired grassland and forestland catchments using RUSLE and GIS on the Chinese Loess Plateau

Siqi Yang[1], Da Luo[2], Hao Han[2], and Zhao JIN[2]

[1]Beijing Normal University
[2]Chinese Academy of Sciences Institute of Earth Environment

June 15, 2022

Abstract

In this study, two neighboring catchments on the Chinese Loess Plateau were selected, in which one catchment was restored with natural vegetation and the other was afforested over 60 years. The spatial and temporal distributions of the soil erosion modulus between 2010 and 2020 were formulated with a spatial resolution of 2 m in the paired catchments based on the revised universal soil loss equation and geographic information system. The results showed that the average soil erosion modulus in 2010-2020 was 12.58 and 8.56 t ha $^{-1}$ a $^{-1}$ for the grassland and forestland catchments, respectively. Areas with high soil erosion rates (> 80 t ha $^{-1}$ a $^{-1}$) were mainly distributed in the topography of the middle transition zone with a steep slope gradient (> 45°). Moreover, the average annual rainfall erosivity for the grassland and forestland catchments in 2010-2020 was 1628 and 1851 MJ mm/ (ha ·h ·a), respectively. In this study, the forestland catchment showed high rainfall erosivity and a low soil erosion rate. We conclude that a dense cover of trees and understory in the gully of the forestland catchment played a crucial role in controlling soil loss. This study fills a gap in mapping the spatial distribution of soil erosion with high-resolution data and provides a reference for soil conservation and water management at the catchment scale.

Hosted file

`Main manuscript.docx` available at https://authorea.com/users/489412/articles/573129-assessment-of-soil-erosion-differences-in-paired-grassland-and-forestland-catchments-using-rusle-and-gis-on-the-chinese-loess-plateau