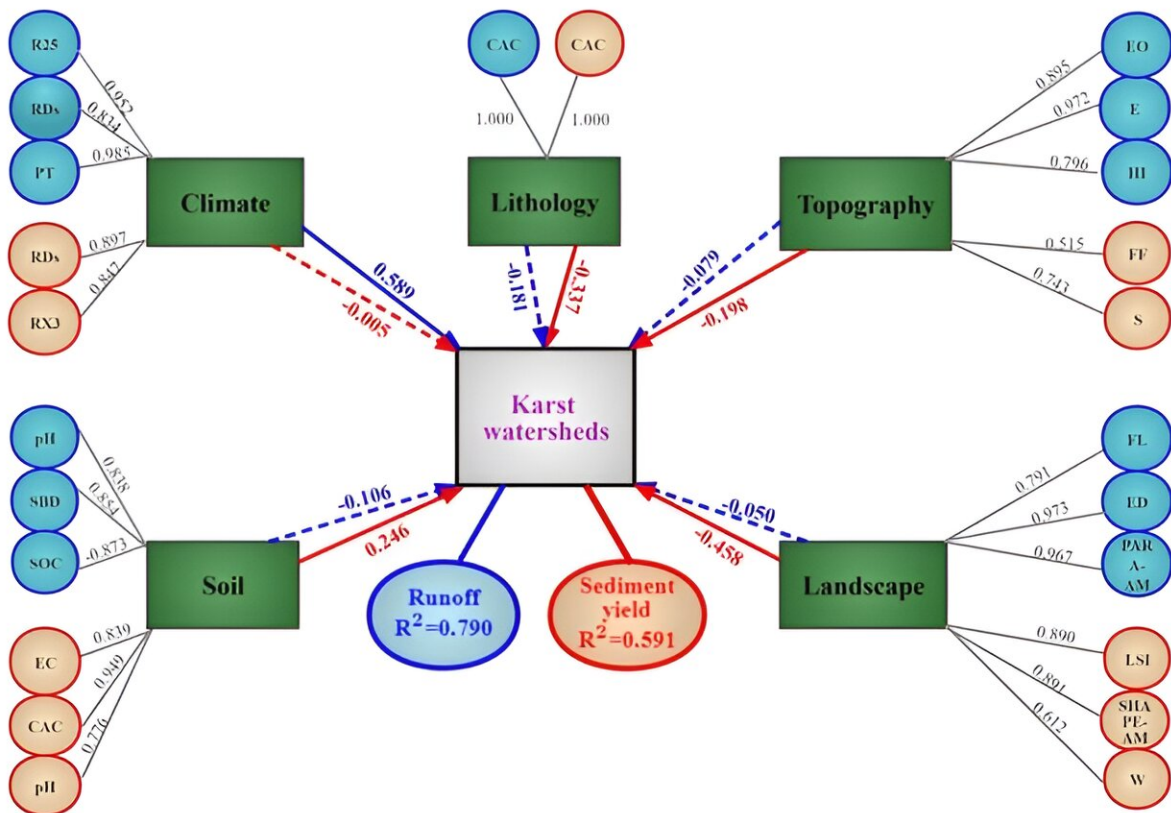


Researchers identify key factors influencing runoff and sediment yield changes in karst watersheds

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The PLS-SEM analysis of the effects of climate, lithology, soil, topography and landscape on runoff and sediment yield for 40 karst watersheds. Credit: Li Zhenwei

The ecological environment in karst regions of southwest China is fragile and sensitive. About 510,000 km² of highly irregularly exposed carbonate rocks are distributed there—a region characterized by frequent extreme rainfall, unique hydrogeological structures, shallow and discontinuous soil distribution, complex geomorphic types, and a highly heterogeneous landscape.

Recently, researchers led by Prof. Wang Kelin from the Institute of Subtropical Agriculture of the Chinese Academy of Sciences quantified the relative importance of the spatial variation and controlling factors of runoff and sediment yield (SY) in different karst watersheds in southwest China.

The study is [published](#) in the journal *Water Resources Research*.

Researchers selected the runoff and SY data of 40 typical karst watersheds in this area from 2009 to 2012 for analysis. Altogether, 103 factors of rainfall, lithology, soil, topography, and landscape properties were extracted.

They decoupled the complex relationships between runoff, SY, and their potential influencing factors with the partial least squares-structural equation model (PLS-SEM).

Their results showed that climate, lithology, soil, topography, and landscape can explain 79% of runoff variation in different karst watersheds, and 59% of SY variation.

The study also indicated that the influence of climatic factors on runoff is significant. Different from runoff, lithology, soil, topography, and landscape factors have significant impacts on SY, with landscape factors having the greatest influence.

"Our study confirms that the influence of extreme climate on [runoff](#) and the influence of landscape on sediment cannot be ignored," said Prof. Li Zhenwei, corresponding author of the study. "It will provide a scientific basis for [soil](#) erosion control and sustainable development of the ecological environment in [karst](#) regions."

More information: Si Cheng et al, Quantitatively Distinguishing the Factors Driving Runoff and Sediment Yield Variations in Karst Watersheds, *Water Resources Research* (2024). [DOI: 10.1029/2024WR037089](#)

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