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Decreasing soil erosion rates with evolving land-use techniques in a central European catchment

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Agricultural societies around the world have caused accelerated soil erosion. Soil erosion and a decrease in soil fertility may also have caused the abandonment of entire landscapes and the collapse of civilizations. In central Europe, Medieval land-use is thought to have lead to the largest loss of top soil in history, which in turn lead to a malnutrition of the population and abandonment of agricultural land. However, this might be only part of the picture, as people are also able to adapt to changing environmental conditions, including the type of land-use they adopt. Within a catchment in the central European mountain belt, we were able to distinguish the evolution between three main types of land-use techniques between $\sim$ 900 AD and 1950 AD: horticulture, agriculture and shifting cultivation. We were able to relate these techniques with different soil erosion rates, which differ by an order of magnitude, ranging from 0.83 ± 0.09 mm/yr to 1.62 ± 0.17 mm/yr. Using high-resolution surface data and chrono-stratigraphical methods in combination with soil charcoal analysis, we were able to reconstruct past land-use techniques on a local scale. This illustrates that less erosive and more sustainable techniques were developed through time, and hypothesize that people were able to adapt to the less favorable environmental conditions by changing the cultivation techniques. Although cultural adaptation to changing environmental conditions has been extensively discussed, this study is able to quantitatively demonstrate improved soil management with evolving land-use in central Europe.