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Degraded versus restored rangeland states in Jordan – hillslope to small-catchment level implications on runoff and erosion

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Over the past decades, migration, overgrazing and mismanagement transformed the Jordanian rangelands into degraded badlands. Almost bare and crusted soil surface conditions are interlinked with accelerated runoff, soil erosion and gullying. Immense restoration efforts are being conducted to counter-measure further degradation. Mechanized micro-Water Harvesting (WH) based plantation of shrub seedlings is among the most promising techniques for large-scale application. The tractor ploughed micro-catchments collect surface runoff and locally increase soil moisture, which boosts the out-planted seedlings' growth and eventually leads to shrub patches, enhancing biodiversity and habitat quality. 'Al Majidyya' rangeland monitoring site near Amman, Jordan, provides the according monitoring data for the present rangeland transition-state study using Rangeland Hydrology and Erosion Model (RHEM). The study investigates surface runoff and erosion pattern of the three different rangeland states: the i) supposed baseline, based on literature recherché and community feedback, ii) the present degraded status, and iii) micro-WH based restored scenario, combining field observation and modeling. Hillslope level RHEM modeling was performed for a long-term erosion risk assessment, and event based spatially distributed watershed simulations were conducted for various scenarios' landscape response investigation. Comparison of the water and sediment dynamics of the baseline, degraded and restored state add on knowledge for the sustainability assessment of the micro-WH based restoration approach.