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Erosion processes in overbrowsed argan woodlands, South Morocco

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The endemic argan tree (Argania spinosa) populations in South Morocco are the source of the valuable argan oil, yet are highly degraded due to firewood extraction and their use as a biomass resource in dry years. The intensification and expansion of agricultural land lead to a retreat of the wooded area, while the remaining argan open woodlands are often overgrazed. Owing to the scarcity of undergrowth in this semiarid/arid climate the trees are browsed continually by goats, sheep and dromedaries of local and nomadic herds. Livestock is only excluded for two months in the summer during the harvest of the argan nuts, which are used to produce the argan oil. Young stands also face difficulty establishing themselves. Thus, canopy-covered areas decrease while areas without vegetation cover between the argan trees increase. How do infiltration rates, surface runoff and soil loss compare between tree-covered areas and bare and unprotected intertree areas? Could a degradation of the trees have a negative effect on their protective cover of the soil and thus on the runoff/infiltration rates and soil erosion? Although less affected by splash erosion, the tree-covered areas might still be degraded due to surface wash.
Linking the degradation of argan-tree populations to the degradation of the soil is the main research objective of this DFG-sponsored project. We used single ring and minidisk infiltration measurements as well as rainfall simulation experiments to investigate the potential difference between tree-covered areas and bare intertree areas. Hypothetically, infiltration rates are higher in the tree area, while surface runoff and soil loss show higher values in the intertree area, indicating that the soil cover and better permeability under the tree hinder soil erosion. In contrast, the intertree areas without vegetation and a high embedded stone cover are prone to erosion and dynamisation of geomorphic processes. Our first results show a wide range of infiltration rates, surface runoff and soil losses, which mostly support the hypothesis, yet are not conclusive, possibly due to the degradation of the tree area.