



The possible influence of terracettes on surface hydrology of steep-sloping and subalpine environments

Philip (Phil) Greenwood, Samuel Kuonen, Wolfgang Fister, and Nikolaus Kuhn
Basel, Environmental Sciences, Basel, Switzerland (philip.greenwood@unibas.ch)

Alpine and mountain slopes represent important pathways that link high altitude grazing areas to meadows and rangelands at lower elevations. Given the often acute gradients associated with such environments, they potentially represent highly efficient runoff conveyance routes that presumably facilitate the downslope movement of runoff and associated material during erosion events. Many such slopes host series of small steps, or 'terracettes'. The position of terracette systems, usually juxtaposed across the natural downslope flow-path of acute slopes, lead us to hypothesise that their presence may influence typical hillslope processes by intercepting or capturing surface runoff during its downslope transit. Here we report preliminary results and some tentative conclusions from on-going work to explore this possibility. Google Earth was used to initially identify a ca. 400 m² area of well-developed terracette system situated on a west-facing slope with gradients ranging from 25-40° (46-84%). A digital elevation model (DEM) of a section of the terracette system was constructed using spatial data taken from a relevant excerpt of a topographic map. The DEM was then queried using a flow accumulation algorithm and the results were displayed in a Geographic Information System (GIS). The output data provided 'proof of concept' that terracettes are able to capture surface runoff. A series of rainfall / runoff simulations was then performed on the same section of terracettes. Results from both components of the investigation indicate that certain sections of a terracette system intercepted surface runoff and acted as preferential flow-pathways during runoff events. By contrast, and despite being subjected to intense rainfall, some sections of the same terracette system did not generate surface runoff. Based on these contrasting findings, we cautiously predict that areas where surface runoff was not generated may actually act as depositional sites, or retention zones, and could provide temporary storage for runoff-associated substances. Greater understanding of the exact influence of terracettes on surface hydrology in steep-sloping and subalpine environments could benefit the future management of grazing and rangelands in such areas.