



Synergistic effects of grass coverage and dam land sedimentation on runoff and sediment yields in slope-gully system on the Loess Plateau of China

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Grass coverage and check dam construction are important measures for soil and water conservation in Loess Plateau. They have a significant effect on the reduction of runoff and sediment, but the synergistic effects of their regulation of hydrological processes are not well understood. To understand the synergistic effects of grass and check dam construction on water erosion process, physical models of 10 slope-gully systems were established including grass cover slopes (0% and 33%) and dam land settlement slope-gullies (0, 1, 2, 3 and 4 m during settlement). The single grass coverage reduced runoff and sediment of 155.91 L and 15155.33 g, respectively. Sediment reduction increased with siltation depth: 4 m (18056.73 g) > 3 m (15990.79 g) > 2 m (14173.79 g) > 1 m (6027.13 g), and the runoff reduction followed as: 4 m (122.21 L) > 3 m (87.48 L) > 2 m (50.37 L) > 1 m (28.77 L). Grass coverage and sedimentation had synergistic effects on water erosion, and the synergistic effects of sediment reduction increased with sedimentation process: 4 m (19.83%) > 3 m (18.68%) > 2 m (17.39%) > 1 m (16.70%). The results indicated that grass coverage on the slope and dam land sedimentation had a synergistic effect on hydrological process, which should not be ignored in the evaluation of soil and water conservation measures regulation.