



The effects of land-use changes and check dams on runoff and sediment yield on the Loess Plateau of China

Peng Shi (1), Peng Li (1), guoce Xu (1), Zongping Ren (1), Shengdong Cheng (1), Kexin Lu (1), and Yan Zhang (2)

(1) Xi'an University of Technology, Xi'an, China (shipeng015@163.com), (2) College of Urban and Environmental Sciences, Northwest University, Xi'an, China [U+FF08]yanz@nwu.edu.cn[U+FF09]

Revegetation and check dam construction are two widely applied soil erosion control measures on the Loess Plateau of China. They play important roles in sediment yield reduction. However, it remains unclear how these large-scale land-use changes and in-channel structures affect water yield and sediment load on the watershed scale. A combination of field work and modeling exercises were used to quantitatively assess the effects of land-use changes and check dam construction on hydrological processes in the Wuding River watershed. The study area suffered important land-use changes with increases in forestland and grassland, coupled with decreases in cropland, from 1980 to 2010. A large number of check dams were constructed from 1970 to 1980. Runoff and sediment yield in the watershed showed significant decreasing trends, with change points occurring in the early 1970s. Human activity contributed to 75% and 89% of runoff and sediment changes, respectively. The simulations showed that in a scenario without check dams, runoff and sediment increased by 12% and 11.7%, respectively. Vegetation recovery reduced runoff and sediment yield. 'Grain for Green' resulted in decreasing runoff and sediment levels, and reforestation had more hydrological regulatory effects compared with scenarios involving the conversion of cropland to grassland. Moreover, the combination of revegetation and check dam construction had a greater impact on water yield and sediment transportation. Check dams provide short-term flood control and sediment reductions, whereas land-use changes are long-term sustained soil 24 erosion control measures. It may be more efficient to combine check dam construction with revegetation strategies.