



Small watershed response to porous rock check dams 10 years after construction in a semiarid watershed

Mary Nichols

USDA-ARS, Southwest Watershed Research Center, Tucson, United States (mary.nichols@ars.usda.gov)

Small rock check dams are often incorporated in restoration efforts in western US rangelands; however, their impact on watershed response and channel morphology is not well quantified. In 2008, 37 porous rock structures were built on two small (4.0 and 3.1 ha) instrumented watersheds on an alluvial fan in southern Arizona, USA. We examined the structures periodically through the 10 years following construction and interpreted their impact on watershed outlet runoff, sediment yield, and channel geometry. During the first 2-3 years after construction, the check dams altered event rainfall/runoff ratios. The persistence of this impact was not consistent between the treated watersheds. The primary impact of the check dams was retention of channel sediment and reduction in channel gradient; however response varied between the watersheds with 80% of the check dams on one of the watersheds filled to 100% of their capacity after 7 runoff seasons. Within the watersheds the mean gradient of the channel reach immediately upstream of the structures has been reduced by 35% (from 0.061 to 0.039) and 34% (from 0.071 to 0.047). After 10 seasons of rainfall and runoff, new concentrated flows paths have developed through sediment deposited upstream of several of the structures, and in some cases have scoured around the structures. The primary impacts of the check dams are seen in the treated channels, and 10 years after construction, most of the interfluvial areas remain devoid of vegetation. These results point to the need to include maintenance into restoration projects that employ check dams, especially in highly dynamic runoff and erosion environments.