

Optimizing height and spacing of check dam systems for better grassed channel infiltration capacity

ABSTRACT

The check dams in grassed stormwater channels enhance infiltration capacity by temporarily blocking water flow. However, the design properties of check dams, such as their height and spacing, have a significant influence on the flow regime in grassed stormwater channels and thus channel infiltration capacity. In this study, a mass-balance method was applied to a grassed channel model to investigate the effects of height and spacing of check dams on channel infiltration capacity. Moreover, an empirical infiltration model was derived by improving the modified Kostiakov model for reliable estimation of infiltration capacity of a grassed stormwater channel due to check dams from four hydraulic parameters of channels, namely, the water level, channel base width, channel side slope, and flow velocity. The result revealed that channel infiltration was increased from 12% to 20% with the increase of check dam height from 10 to 20 cm. However, the infiltration was found to decrease from 20% to 19% when a 20 cm height check dam spacing was increased from 10 to 30 m. These results indicate the effectiveness of increasing height of check dams for maximizing the infiltration capacity of grassed stormwater channels and reduction of runoff volume.

Keyword: Grassed channels; Check dam system; Stormwater; Infiltration capacity; Water resources modelling; Modified Kostiakov model