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Check Dam-Trapped Farmlands on the Hilly and Ravine Region of the Loess Plateau: Soil Fertility, Crop Yields and Faced Challenges

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It is well known that soils are vulnerable to water erosion in the hilly and ravine region of the Loess Plateau. The soil and water losses induced by water erosion have both the on-site and off-site impacts in this region, which causes the on-site decline of soil fertility and reductions of crop yields on sloping farmlands, and drains the generated overland runoff and transports the eroded soils/sediments to the off-site valleys or rivers to threaten the safety of the river systems. Constructing the check dam in the valley has the long history and is regarded as one of the powerful measures to control the soil and water losses in a watershed in this region. On the one hand, the check dam plays the vital roles in trapping the large amounts of sediment generated from the sloping lands and buffering the drainage of runoff yielded from the slopes. On the other hand, the silted sediments or eroded soils by the check dam can develop the relatively flat lands in the valleys. The check dam-trapped lands can be utilized to grow the crops and become the farmlands in a watershed. The investigation indicates that the contents of soil organic matter, nutrients and soil moisture of the check dam-trapped farmlands are higher than those of the sloping farmlands or the terraces. According to the analysis on the survey data on the crop yield evolutions in the watershed in this region, the crop yields of check dam-trapped farmlands have been significantly higher than those of the sloping farmlands and terraces in the scenario of the similar fertilizer input and crop cultivars due to the optimum soil moisture condition in the check dam-trapped farmlands. However, the check dam-trapped farmlands face some challenges under the climate change. Some of the check dam-trapped farmlands or the grown crops in these kinds of lands are susceptible to the damage arose from extreme rainstorms because of the outdated measures of soil and water conservation for these kinds of farmlands. In some watersheds, the check dam-trapped farmlands are prone to salinization due to the outdated management. Therefore, the protective measures and techniques of harnessing salinization for the check dam-trapped farmlands should be updated over time in order to keep the check dam-trapped farmlands safe and maintain the higher crop yields in those farmlands in the hilly and ravine region of the Loess Plateau.

