The effects of a traditional surface runoff harvesting structure (Sowma) on soil characteristics

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ABSTRACT

An indigenous soil and water conservation practice called “Sowma” is used by farmers in the arid and semi-arid regions of the Golestan province in northeast of Iran. They are short height earth dams constructed cascadingly across the relatively wide and flat valleys in hilly areas. The Trooty watershed in northeast of the Gonbad city is such a hilly area where there are several typical Sowmas across its main river valley. To assess the effects of these structures on soil properties, a field survey was carried out on spring 2010. To this end, ten Sowmas were chosen for soil sampling and analysis. Within contributing area (domain) of each Sowma, soil samples were collected from three pits (90 cm deep) at 0 – 30, 30 – 60, and 60 – 90 cm depths. One pit near to the lower end, one in middle, and the other near to the upper end of domain of each Sowma. For a paired observational study, ten fields in the neighboring areas of Sowmas were also sampled. The dataset was analyzed using the Statistical Analysis Software. The results indicated that for most of the soil chemical variables including K, P, CaCo3, pH, EC, and organic matter there are significant differences between soil samples taken from the domain of Sowmas and neighboring fields. However, considering the soil physical variables, except the clay content of the surface layer (0 – 30 cm), no statistically significant differences was observed between soil samples within and out of the Sowmas’ domain. All observed differences indicate an amelioration of soil properties within Sowmas’ domain. Therefore, it can be concluded that construction of Sowmas not only control flooding events and conserve water resources within soil media but also maintain the productivity of land and contribute to long term sustainability in arid and semi-arid environment of the study area.

Keywords: Sowma, Surface runoff harvesting, Soil properties, Arid