Soil Water Environment under Plantation and Suitable Setting of Vegetation in Taiyuan, China

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Soil water content is an effective indicator of soil desiccation, and significantly affect the integrity and function of soil environment and practices of agriculture and forestry. It is important to maintain adequate levels of soil moisture at the depth of root zone to support plant growth and determine plant density. Modern loess plateau soil and the soil water contents can be significantly influenced by modern climate changes. The objective of this study was to investigate the relationship between global climate change and regional response including characteristics of soil moisture and effects of plantation in the Taiyuan region in Shanxi, China. Soil core samples were collected to a depth of 6 m below the soil surface. The soil moisture deficiency was estimated as: $R = (\text{Soil field capacity} - \text{Soil water content}) / \text{Soil field capacity}$. Based on field survey and modelling calculation and with applying qualitative and quantitative research approaches, this study found the followings: (1) soils with low water contents were primarily found in fall/spring and winter seasons in Taiyuan because of a low precipitation and a rough wavy landform in the research region. Soil moisture contents were generally high in summer. Plantation further reduced the soil water content. Most arbor forests and farmlands has dried soil layers exceeding the depth of 6 m or beyond 7 m in a slope field. (2) Applying GIS and indexes of soil moisture, soil moisture content in the study region had been divided into three different zones: soils with abundant soil moisture, soils with adequate levels of moisture, and soils with low water content. (3) This study also recommended the plantation density of different tree species for specific locations or landscapes in the study area.