



## Using remote sensing data to evaluate the impacts of re-vegetation on soil moisture of the Loess Plateau

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**Abstract:** A large-scale re-vegetation supported by the Grain for Green Project (GGP) has greatly changed local eco-hydrological systems of Loess Plateau, in the meantime, with an impact on soil moisture conditions. It is important to know how exactly re-vegetation influences soil moisture condition, which not only crucially constraint growth and distribution of vegetation, and hence, further re-vegetation in the region but also determine the degree of soil desiccation and thus erosion risk. In this study, three eco-environmental factors, which are soil water index (SWI), the Normalized Difference Vegetation Index (NDVI) and precipitation, were used to analyze the response of soil moisture in the 1-metre layer of top soil to the re-vegetation. SWI was estimated based on the back-scatter coefficient produced by the European Remote Sensing Satellite (ERS-1/2) and Meteorological Operational satellite program (MetOp) while NDVI was derived from SPOT imagery. Two separate periods, which are 1998-2000 and 2008-2010, were selected to examine the spatio-temporal pattern of the chosen eco-environmental factors. It has been shown that the amount of precipitation in 1998-2000 was close to that of 2008-2010 (the difference being 13.10 mm). From 1998-2000 to 2008-2010, the average annual NDVI increased for 80.99%, while the SWI decreased for 72.64% of the area on the Loess Plateau. More specifically, 57.65% of the area on the Loess Plateau experienced an increased NDVI and decreased SWI. These results indicate that re-vegetation and climate changes have impacts on soil moisture. However, re-vegetation may be the major factor for soil moisture change in most areas of the Loess Plateau. It is, therefore, suggested that soil moisture content (SMC) should be kept in mind when carrying out re-vegetation in the arid and semi-arid regions.

**Keywords:** Grain for Green Project (GGP), soil water index (SWI), Normalized Difference Vegetation Index (NDVI), Loess Plateau, remote sensing