



## Effects of depth and land use on vertical soil properties and their contributions to ecosystem services in Yanhe watershed

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**Abstract:** The increasing atmospheric carbon dioxide (CO<sub>2</sub>) and nitrogen (N) deposition along with human activities had important effects on soil properties and influenced ecosystem service (ES) delivery. Since GFGP (Grain for Green Project) implementation in China, dominant ES in Loess Plateau such as soil conservation and carbon storage increased substantially. However, there are few researches on ecological mechanism to explain provision of multiple ES, which may result in weak theoretical foundation to support policy and management. Here, we assess the impact of different land uses (forest, shrubland, grassland, cropland and orchard) on soil properties (texture, moisture, SOC, TN, TK, TP, C:N ratio) at different depths (0-100 cm) in Yanhe watershed (China). The results showed that soil texture sand and silt content were significantly higher in shrubland than in orchard and cropland, while clay content was significantly higher in forest. No differences were observed in soil moisture. Similar results were identified in TP and TK. SOC was significantly higher in forest soils compared to other land uses while TN had the lowest values among land uses, which cause carbon storage ES increased after transforming cropland to forest and grassland. Though there were significant differences in SOC and TN, the C:N ratio was significantly consistent in different depths and land use types. In addition, Redundancy analysis revealed that altitude and precipitation were the factors that influenced more soil properties.