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## Effects of the construction of the lower Yarlung Tsangpo River tunnel project on the stability of organic carbon in forest soils

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**Abstract:** Tunnels are widely used in road construction in areas such as the highlands and mountains, however, their effect on soil organic carbon stability has been less studied. Soil organic carbon stability is a sensitive index to evaluate the response of soil ecosystem to environmental changes. In order to detect the soil organic carbon (SOC) the anti-interference ability of the engineering construction of the tunnel, the stability of soil organic carbon was analyzed by using labile soil organic carbon (LOC), soil aggregates and enzyme activities. Based on the construction of the lower Yarlung Tsangpo River tunnel, fixed monitoring plots were set up in the Engineering disturbance areas (ED) and undisturbed areas (CK) as a control to investigate the influence of tunnel construction on SOC stability. Results showed that the SOC and LOC in the ED were 291.40 mg/kg and 110.28 mg/kg, respectively, which were slightly higher than those in the CK area 255.31 mg/kg and 91.19 mg/kg, but the difference was not significant ( $p=0.6$ ). The proportion of >0.25 mm aggregates in all soil fractions was more than 80%. With the decrease of aggregate size, the content of organic carbon in aggregate showed a decreasing trend, but there was no significant difference between ED and CK areas. This study showed that tunnel construction has no significant effect on soil organic carbon stability, which may be associated to the abundant precipitation in the study area. Because vegetation mainly absorbed soil water in top layer and the input and output of soil organic matter were not affected. The results of the study provide a reference basis for the evaluation of the impact of tunnel construction on the environment and for the management of the forest ecosystem in the lower Yarlung Tsangpo River.

**Keywords:** Tunneling; Forest soils; Organic carbon stability; labile organic carbon; Soil enzyme; soil aggregates