

Natural Recovery of Soil Properties on Steep-Slope Skid Trail Post Logging of *Fagus Orientalis* Lipsky Forest Northern, Iran

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Abstract:

Abstract Mechanized logging operations can have detrimental effects on soil properties. However, there is paucity data on the time required for fully recovery of disturbed soil properties. Persistence of soil disturbance and recovery process is likely to vary with traffic intensity and skid trail slope. This study was conducted (i) to assess the effect of different levels of machinery traffic and skid trail slope on recovery of soil physical and chemical properties even 20 years after cessation of logging (ii) to estimate how long it will take to fully recover for disturbed soil on abandoned skid trails in mountain forest. To achieve these purposes, some soil physical and chemical properties including, dry bulk density (Db), total porosity (TPS) and macroporosity (MPS), nitrogen (N), phosphorus (P), potassium (K) and organic matter (OM) have been used as indicators to evaluate recovery process. Soil properties were measured in three levels of traffic intensity, inclusive, Primary (PT), Secondary (ST), Tertiary Skid Trail (TT); and two levels of slope (0-20% and >20%) on a skid trail, where has been abandoned 20 years ago. All analyses were made based on 162 soil samples. The results indicated that traffic intensity and slope gradient affected soil properties recovery; albeit that the slope of skid trails had more effects than traffic intensity. In TT and PS treatments for slope gradient over 20%, TPS, MPS, N, K and Db, P was by about 22-27%; 26-35%; 0.00-0.00%; 0.00-0.08%; lower, and 43-51%; 0.044-1.22%, greater, respectively, compared to the undisturbed areas. In general, soil physical properties did not significantly recover, while, soil chemical did recover within the first twenty year after stopping logging in comparison with the undisturbed areas. Results evinced that 20 years was insufficient timescale for the recovery of disturbed soil physical and chemical properties in steep slope areas. Further researches may be required.

Keywords: timber skidding, soil disturbance, soil compaction, hyrcanian forest