LINKING FOREST PRODUCTION AND SOIL CARBON ACCUMULATION ON SURFACE MINE LANDS: A LITERATURE REVIEW[1]

C.C. Rhoades[21] and R.K. Kolka

Abstract: To offset increases in atmospheric CO_2 resulting from anthropogenic activities, society is challenged to better exploit the natural capacity of terrestrial ecosystems to accumulate carbon (C). Since the initial C inventory of reclaimed lands is typically extremely low, the potential to increase mineland C inventory may be significant. As soil often contains equal or more C as forest vegetation, assessment of the total reclaimed mineland C capital must quantify both above- and belowground C pools. To develop a regional estimate of the potential to store significant C on mine lands reclaimed to forest, we review both studies of forest productivity and soil development on mine spoils. Our estimate of C accretion during a century of spoil development is based on a chronosequence of mine spoils from 7 independent studies. Soil C stocks ranged from 3-33 in the upper 10 cm of mineral soil and 17-82 Mg C ha^{-1} in the top 50 cm. Soil C increased by an average of 0.2 and 0.7 Mg C ha^{-1} yr^{-1} in the upper 10 and 50 cm of mineral soil, respectively. Our calculated rates are comparable to a global estimate used by policy makers to predict C accumulation on unspecified degraded lands (0.3 Mg C ha^{-1} yr^{-1}). We will discuss the linkages between forest production and strategies to maximize C sequestration on reclaimed min lands.

Additional Key Works: Reforestation, Soil development, pedogenesis, carbon sequestration

---

[1] Poster was presented at the 2002 National Meeting of the American Society of Mining and Reclamation, Lexington, KY, June 9-13, 2002. Published by ASMR, 3134 Montavesta Rd., Lexington, KY, 40502.

[2] Charles C. Rhoades, Assistant Professor Department of Forestry, University of Kentucky, Lexington, KY 40546-0073
Randall K. Kolka, USDA Forest Service - North Central Research Station, 1831 Hwy. 169 E., Grand Rapids, MN 55744