

Influence of Environmental and Site Factors and Biotic Interactions on Vegetation Development Following Surface Mine Reclamation Using Coversoil Salvaged From Forest Sites

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Abstract

Industrial activities such as surface mining are responsible for disturbing large areas of forest land. Reclamation methods must facilitate the development of soil, of a diverse natural understory plant community, and of a tree canopy. In my thesis research, I examined the response of vegetation diversity, cover and composition to constructed topography, tree seedlings planted at different densities, and coarse woody debris at a surface mine reclamation site in Alberta, Canada. These responses were studied in areas capped with coversoils salvaged from two forest types. Results suggested that seedling planting density and topographical aspect primarily influenced vegetation diversity, while coarse woody debris abundance primarily influenced vegetation cover. Diversity was higher on cooler, moister aspect and in areas with higher seedling planting density. Cover was negatively associated with coarse woody debris abundance. Studying characteristics of reclamation sites that reflect ecological processes can offer a deeper understanding than short term (often occurring in the first 1-5 years of vegetation development) surveys of vegetation composition. To better understand these processes, I explored the variation explained by environmental factors and by spatial patterns ('space', representing biotic interactions such as competition or facilitation) at reclamation sites capped with coversoils salvaged from two forest types, and at two ages. For sites constructed with both

material types and at both ages, space explained more variation than environmental factors, suggesting that competitive and facilitative interactions were the main structuring processes at these sites.