Monitoring and Assessment: Evaluating Reclamation Success of Surface Coal Mine Reconstructed Rangelands[1]

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Abstract: Evaluation of surface coal mine reclamation is ultimately based on the specific requirements of the reclamation plan and the functional requirements of the post-mining land use. The scope of this discussion focuses on monitoring and evaluating the successes of reclamation following surface coal mine disturbances. The Surface Mining Control Reclamation Act of 1977 regulations require bonding by the operator prior to mining activities. An assessment of reclamation is conducted by the regulatory agency prior to bond release for three Phases of reclamation. For Phase I, the performance of the reconstructed landform topography is evaluated; Phase II assesses attributes such as topsoil depth, vegetative cover, soil/site stability, and hydrologic function. Final bond release for Phase III requires the reclaimed plant community(s) meet specified criteria indicative of diverse, effective, and permanent plant communities for their intended post-mine land use. Vegetation success standards for Phase III bond release having a post-mine land use of rangelands are largely based on indicators such as foliar and ground cover, shrub density, plant diversity, and biomass production compared to either a reference area(s) or technical standard. Reclaimed rangeland watersheds should capture, store and release water effectively into re-constructed watersheds. Indicators such as vegetative cover and composition may suggest successful reclamation. Process-based indicators such as water-flow patterns, rills, soil compaction, and plant community composition and distribution relative to water infiltration and runoff may help to identify ecological processes in need of repair. The graded spoil in all reclaimed mining areas should be systematically sampled to identify the extent, nature, and location of unsuitable materials for plant growth. Further research focused on effectively linking remotely sensed data with site-based data is warranted and can help to address ecological questions concerning reclamation across a gradient of spatial scales. Monitoring program design should be an integral part of the reclamation planning phase and indicators reflecting landscape-scale processes can be adapted to monitor reclamation success over the long-term.

Additional Key Words: Restoration, Revegetation, Invasive Species, Geomorphic Reclamation, Non-parametric Statistics.

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