Restoration of Degraded Landscapes: Principles and Lessons from Case Studies with Salt-affected Land and Mine Revegetation

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ABSTRACT

Land is a finite resource. Every attempt must be made to prevent land degradation. In addition restoration of the legacy of already degraded land needs to be undertaken. Restoration is still a relatively new science. It is increasingly informed by the new discipline of restoration ecology. Land restoration occurs at a range of different scales. Mine rehabilitation has developed many successful practices of land restoration at a site-specific scale. The challenge ahead is to develop effective land restoration practices at a regional or landscape scale. Most success at both scales has to date been concerned with restoring key ecosystem functions like nutrient cycling and water balance. Case studies outlining restoration of each of these functions is discussed. Mining forms a striking comparison with land degradation associated with agriculture for example. Both can result in a catastrophic change in land suitability for plant growth, and may prevent the replacement of the original vegetation. However, whereas agriculture affects vast areas of land, mining has a relatively small footprint. They differ further in that considerably more money is available per unit area for restoration of mined land than can be justified for amelioration of degraded agricultural land. Finally, whereas land degradation caused by mining is closely regulated and mining companies have contractual requirements with Governments to restore mined land to an agreed standard, generally no such obligations are mandatory for agriculture.

LAND DEGRADATION

Land degradation has generally been defined from the utilitarian perspective of agricultural, horticultural or forestry uses of land. These definitions emphasize soil properties rather than landscapes. Lal and Stewart (1992), for example, suggest that soil degradation "implies diminution of productive capacity through intensive use leading to changes in soil …. physical, chemical and biological processes". Other authors define land degradation as a change in land quality that makes it less useful for humans. These definitions may be too restrictive in that they seem to overlook consideration of land degradation at a landscape or regional scale. Landscapes are repositories of biodiversity and the substrate for flora and fauna conservation and the maintenance of ecosystem services such as the provision of clean air, clean water, and nutrient cycling. Landscapes may also be the source of exploitable mineral resources and are used for the siting of infrastructure and human settlements. Blum (1998) takes a different approach and defines soil degradation as a loss or reduction of soil energy. Conacher and Conacher (1995) define land degradation more broadly as "alteration to all aspects of the natural (or biophysical) environment by human actions, to the detriment of vegetation, soils, landforms and water (surface and subsurface, terrestrial and marine) and ecosystems". Their definition whilst broadly encompassing still overlooks the significant cultural or archaeological heritage contained within land and