Appendix 18

Monitoring Technique: Landscape Function Analysis

Landscape Function Analysis (LFA) is a monitoring procedure developed by the CSIRO. It provides a rapid, reliable, and easily applied method for assessing and monitoring landscape restoration or rehabilitation projects.

LFA examines the way physical and biological resources[6] are acquired, used, cycled and lost from a landscape. For example, water is a landscape resource that can be stored in the landscape, providing for maximum benefits, or may run off and become lost from the system, often taking soil and other resources with it. The manner in which each type of landscape resource is utilised within local catchments influences the individual characteristics or 'function' of the site. These characteristics can be easily measured to provide indicators of different aspects of the functioning of the overall system.

LFA is based on assessment of specific landscape characteristics. On a broad scale, LFA assesses the location and size of vegetation "patches", where resources accumulate, and bare soil areas ("inter-patches"), where resources may be mobilised and lost. By measuring patches and inter-patches over time, the rate and extent of vegetation cover achieved by rehabilitation can be assessed, thus providing evidence of rehabilitation success. This information also gives an insight into whether the rehabilitation area is achieving self sustainability (i.e. a landscape is developing in which minimal resources are lost due to stress or disturbance). This insight is possible because patches of vegetation tend to correlate to areas where natural resources accumulate, whilst inter-patches represent areas where resources are easily transported and, therefore, potentially lost from the system. A landscape where resources are well retained and utilised is referred to as "functional", whilst one that loses resources is, to some extent, "dysfunctional".

On a finer scale, LFA also assesses the "quality" of the patches and inter-patches. Eleven simple, rapidly collected soil surface indicators are used to give an estimate of the effectiveness of a number of landscape processes (refer to table A18.1). In different combinations, these indices can also be combined to indicate the surface stability, infiltration capacity and nutrient cycling potential of the study area. Overall, these indicators can be interpreted to assess whether the natural resources of the site are being lost, maintained or enhanced over time.

LFA is recommended for the assessment and monitoring of rehabilitation work because it offers a range of advantages, including the following:

- At the pre-rehabilitation stage, LFA allows the specific processes needing improvement to be identified.
- LFA can be applied to sites of all sizes, from an individual patch to a hillside; and all ecosystem types.
- LFA also offers a detailed insight into how the landscape function at the rehabilitation site changes over time, and facilitates numerical comparison of restored/rehabilitated sites against reference sites.

LFA is an ideal monitoring tool for rehabilitation work because it is easy to learn, simple and quick to apply, and it provides clear indicators of the progress and condition of rehabilitated areas.

[6] Landscape resources include substances such as topsoil, organic matter, seeds, water etc.

Further information and LFA training workshops can be organised by contacting:

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Table A18.1: Soil Surface Indicators considered in LFA

Indicator	**Significance**
Rain-splash protection	Indicates how well soil surface is protected from the impact of rain drops, which influences erosion and crust formation. Crusting on the surface of the soil increases water runoff, and hence, the potential for the system to loose resources.
Perennial Vegetation Cover	Amount of vegetation cover is an indicator of below-ground biomass accumulation, an indicator of nutrient cycling.
Litter	The amount of litter, its origin and degree of composition has a strong influence on soil stability and nutrient cycling.
Cryptogam Cover	The presence of algae, fungi, mosses and lichens on the soil surface indicate surface stability and nutrient availability.
Crust Brokenness	Broken crusts indicate innately unstable surfaces that provide loose soil material that is easily eroded.
Soil Erosion Type and Severity	Indicates relative soil stability and potential for the loss of resources from the system. Soil erosion also infers a low water infiltration rate.
Deposited Materials	Detects instability upslope by observing the presence of materials washed down from areas above the site.
Soil Surface Roughness	The presence of surface irregularities contributes to the ability of the ground to capture and retain resources carried by water flowing across the surface.
Surface Nature	Indicates how easily the soil is able to release erodible material when mechanically disturbed. Also indicates potential for infiltration and run-off.
Slake Test	Assesses the stability of natural soil fragments when subject to rapid wetting. Unstable soil may begin to erode simply because it becomes wet.
Soil Surface Texture	Classifies soil texture, which influences permeability.