

THE ROLE OF SUBSTRATES IN ECOLOGICAL RESTORATION

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Substrates — growing media — underlie successful ecological restoration. Matching substrates, topography and climate with revegetation regimes and faunal habitats is fundamental to ensuring sustainable ecosystems and biodiversity. Substrates have primary roles of supplying water, air, and nutrients, and providing physical anchorage for plants. Soil is also a habitat — a living medium with its own diverse animal, insect, fungal, actinomycete, and bacterial life. Compaction, whether natural or man-made, can be a major problem as it is difficult to ameliorate after plant establishment, unlike nutrient deficiencies. The engineers' compacted 'table top' approach creates challenges for the ecological restorer. Ameliorating noxious materials, such as acid producing (pyritic) rock and contaminated soils, present challenges for site restoration. Ameliorants such as peat, sand, sawdust, bark, sewerage sludge and industrial residues have niche roles in restoration projects as mulches or soil conditioners.

The gardening approach of some landscapers — “plant and pray” — aimed at appearances and context rather than ecology is another challenge, especially for what is below ground. Topsoils play a crucial role in restoration and every effort should be made to conserve them. The role of subsoils is usually less critical, provided there is sufficient rooting depth to meet plant requirements. Synthetic soils can be constructed to provide substitute rooting media but their abiotic nature needs attention. Soil variability, whether natural or created, is an important consideration — the use and interpretation of soil maps in land restoration projects are valuable planning tools. Salvage and direct transfer of indigenous vegetation, with soil or root plates attached, is under-utilized in ecological restoration projects. Native trees up to 3–4 m high and wetland vegetation have been successfully relocated at mine sites on the West Coast.

The role of substrates in ecological restoration is illustrated using positive and adverse examples from mine / quarry site rehabilitation, landscaping and wetland projects. These examples show that substrates provide the fundamental building block of the ecosystem, controlling the health and wealth of restored sites.

