

# Mine Spoil, Microbes and Functional Rehabilitation of Central Hunter Ironbark/Spotted Gum/Grey Gum Endangered Ecological Community.

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At Mount Owen Mine Complex, Hunter Valley, NSW (32°23'13"S 151°06'10"E), the capacity of spoil (rock from above and between coal seams) to act as an alternative to soil replacement for rehabilitation is being tested. Approximately 4 years after spreading, some characteristics of the spoil represent challenges for rehabilitating a functional ecosystem (eg. lack of water stable structure; pH 8.6; electrical conductivity 48-130  $\mu$ S/cm; average 0.8% potassium permanganate oxidizable organic Carbon). In order to improve the spoil character, it was treated with microbial inoculum (rhizobia, mycorrhizal fungi and endophytic fungi) and municipal waste compost during planting.

Growth and survival of *Hakea sericea*, *Acacia parvipinnula*, *Corymbia maculata* and *Dodonea viscosa* plants were monitored over 2.5 years. All plant species responded positively to inoculation. Trends in spoil organic Carbon content and water stable aggregates were difficult to ascertain. These were not robust indicators of function in this system, due to parent rock and coal influencing analytical outcomes. Microbial DNA profiles (from spoil and plant roots) using Internal Transcriber Spacing (ITS) and 16S regions suggest dispersal of fungi and bacteria into the experiment from surroundings (and/or capacity to survive mining). The likely occurrence of non-inoculum organisms may potentially assist the rehabilitation process (eg through bioweathering or spoil particle aggregation).

Defining the capacity of Mount Owen spoil to facilitate rehabilitation of a functional Central Hunter Ironbark/Spotted Gum/Grey Gum endangered ecological community based on the results is difficult. However, the value of having microbes in the system is clear. In addition, the potential for important above/below ground community diversity and linkages are apparent.