



Remediation and restoration of contaminated soils for plant growth and establishment

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Degradation and contamination of soils is a serious issue, affecting soil and water quality, human health, and plant health and productivity. Degradation of soils can result in the mobilisation of high concentrations of trace metals as a function of both anthropogenic activities which can also be exacerbated by natural processes.

Sulfidic sediments frequently underlie coastal floodplains globally. Oxidation of sulfidic sediments can result in the formation of acid sulfate soils and acidification and mobilisation of associated trace metals in soils, sediments and water. The geochemical processes which occur in these environments can be similar to those in acid mine drainage environments. For example, oxidation of sulfides following surface mining for coal can also result in low pH and high concentrations of trace metals in waste material. Remediation and restoration of such sites for plant growth and establishment can be challenging due to the geochemical characteristics of the soils and sediments.

Remediation of oxidised sulfidic sediments on coastal floodplains and mine sites both require an increase in soil pH via incorporation of alkaline materials, and addition of nutrients via organic amendments. This paper presents the findings from two case studies on the remediation of contaminated acidic environments on i) a coastal floodplain, and ii) a coal mine site.

We found that addition of lime and organic material increased pH and decreased trace metal concentrations in the coastal floodplain sediments. Organic carbon increased due to the incorporation of additional organic material and increased plant growth. Similarly, pH decreased and trace metal concentrations in leachate also decreased following additions of alkaline wood chip waste and compost in the mine site rehabilitation trials. Plant growth increased with increasing volumes of compost addition. These results, and those presented in SSS8.3 highlight the importance of appropriate ameliorants in the restoration and rehabilitation of contaminated soils in a range of environments.