



Remediation and rehabilitation of abandoned mining sites in Cyprus

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Due to a particular geological setting, Cyprus is rich in ore deposits, many of them subject to extensive mining. Most of the mines have a long history, sometimes dating back to prehistorical times. These abandoned mines cause severe off-site environmental problems and health risks for the local population. Groundwater supplies are affected by the leaching of pollutants, surface water is contaminated because of water erosion, and harmful dust containing heavy metals or asbestos is spread due to wind erosion.

In addition to the environmental risks associated with the abandoned mines, many of these sites are aesthetically unattractive, and remain an economic burden to stakeholders and the public in general, due to the downgrading of surrounding areas, non-development and hence loss of revenue. These factors are important in Cyprus where tourism is a significant source of income for local communities.

An EUREKA-project addresses the issue of abandoned mine clean-up and restoration. The main objectives of this study are :

- (1) To develop phytostabilization and -remediation techniques to stabilize and clean up sites characterized by high nickel and copper concentrations in the soil, using endemic plants (*Alyssum* spp. and mycorrhizal *Pinus brutia*). In some old mines, efforts were already made to stabilize slopes in an attempt to minimize soil erosion and spreading of pollutants. These restoration efforts, however, remained largely unsuccessful because vegetation that was planted could not cope with the harsh hydrogeochemical soil characteristics. Regeneration of the vegetation cover therefore failed ;
- (2) to demonstrate the risks associated to the environmental hazard of metal polluted mine spoils and outline a method by which to accomplish this type of risk assessment ;
- (3) to analyse costs and benefits of phytostabilization- and phytoremediation-based solution for the problem.

Results of the first experiments are still preliminary and incomplete. However, it is expected that a better knowledge on growing conditions of the selected plant species will contribute to the development of a phytoremediation technique for a low-cost and sustainable restoration of the old mine sites. Moreover, this will have direct utility to other areas in the Mediterranean region, that are similarly threatened by the presence of heavy metals in the environment.