

UMBRELLA

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The overall goal of UMBRELLA is to use microorganisms to develop cost-efficient and sustainable measures for soil remediation at heavy metal contaminated sites throughout Europe. This will be facilitated by research (WP1-3) in microbiology, plant uptake and (hydro)geochemistry which centers on the study of microbial influence on metal biogeochemical cycles and their impact for use in soil (and water) protection. Modeling of the processes occurring and their influence on large-scale landscape levels (WP 4) will provide the basis to modulate the impact on downstream river systems. The transfer of technologies (WP 5) developed provide a speed-up of existing bioremediation techniques and will provide a tool-box to end-users with microbes for remediation actions in different European climatic, geological and biological settings that will allow low-cost, sustainable, on-site bioremediation of metal contaminations. Dissemination (WP 6) of results will be ensured by international congresses and publications; at the same time, the introduction of a concerted, internationalized education of interdisciplinary trained PhD students across Europe will ascertain a long-lasting, sustainable education profile with relevance to soil remediation. The involvement of government agencies is chosen to provide governments with combined guidelines (WP 7). The project will focus on ecotoxicological risks resulting from metal contamination on-site as well as by transport through water paths in ground water and international water ways, provide rules to overcome the current practise of regulation by individual European agencies for soil and water protection. The management (WP 8) of an integrative, multi-partner consortium ensures the applicability by combination of eight sites across Europe in one modeling approach that will cover northern, southern, middle and eastern European sites, guaranteeing future applicability across all of Europe. All parts of the proposal are verifiable through milestones for each year and each participant as delineated in section B 1.3. The project directly addresses topic 3.1.2. ENV.2008.3.1.2.1 "Recovery of degraded soil resources", and supports also the topic ENV.2008.3.1.1.1. "Rehabilitation technologies for degraded water systems presenting quantity and quality problems". It aims at the development of innovative techniques that will provide a milestone in biotechnology for soil remediation. The S&T objectives are: 1. to establish optimal techniques for coupling microorganisms and plants for the remediation of soils influenced by mining activities; 2. to improve and geochemically monitor metal stabilization by mineralization depending on biotic and abiotic factors; 3. to produce mathematical models of key processes at ecosystem and landscape scale relevant to the distribution of contaminants; 4. to design an integrated bioremediation methodology for different landscapes across the European Union influenced by mining. The project addresses "new frontier" promising technology for the remediation at ecosystem scale, and by its landscape approach explicitly connects the soil remediation with the reduction of the risk for other environmental compartments (mainly water, but implicitly relevant also for biodiversity). A broad EU dimension is ensured by the development of a remediation methodology using mathematical models built using data sets obtained from contaminated sites distributed across large latitudinal and longitudinal gradients. The ultimate goal is a technique for soil remediation allowing unrestricted land-use after recultivation of former mining sites or other areas with metal contamination. Project WEB page