

Heavy metals contamination and their risk assessment around the abandoned metal mines in Korea

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Heavy metals contamination in the areas of abandoned metal mines in Korea was investigated in order to estimate the pollution level of metals, and to draw general conclusions on the fate of toxic heavy metals in different environments. The contamination level, chemical forms, and plant uptake of heavy metals in each mine site were compared. In the base-metals mine areas, significant levels of Cd, Cu, Pb and Zn were found in mine dump soils developed over mine waste materials and tailings. Leafy vegetables tend to accumulate heavy metals (in particular, Cd and Zn) higher than other crop plants, and high metal concentrations in rice crops may affect the local residents' health. Arsenic was the most characteristic contaminant in the nearby Au-Ag mine areas. Arsenic and heavy metals were found to be mainly associated with sulfide gangue minerals, and the mobility of these metals would be enhanced by the effect of continuing weathering and oxidation. According to the sequential extraction of metals in soils, most heavy metals were identified as non-residual chemical forms, and those are very susceptible to the change of ambient conditions of a nearby environment. The concept of pollution index (PI) of soils gives important information on the extent and degree of multi-elements contamination, which can be applied to the evaluation of mine soils before their agricultural use and remediation. The risk assessment process was discussed and the results of non-cancer risk of As, Cd, and Zn, and those of cancer risk of As were suggested.