

## ENVIRONMENTAL IMPACTS OF COPPER MINING IN THE MIDUK AREA

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The accurate estimation of metal bioavailability in soils is becoming more important in ecological risk assessment. In this study, 60 soil samples at two depths (0-5 cm and 15-20 cm) in the vicinity of Miduk Porphyry Copper Mine, Kerman Province, Iran, were analyzed for total concentration of 45 elements. To determine the bioavailability of various heavy metal forms, sequential extraction analysis (Tessier procedure, 1997) was carried out. In order to study the relationship between the metal concentration in soil and underlying bedrock and finding the geogenic source of pollution in soil, 20 rock samples were analyzed for total concentration of 45 elements. 20 thin sections of rocks were prepared from different rock types of Miduk area to study alteration zones and mineralogy of rock units. Average concentration of Ag, As, Cd, Cu, Ni and Pb in soil samples are 0.88, 28.57, 0.6, 482.69, 53.05 and 122.3 mgkg<sup>-1</sup>, respectively. The results of sequential extraction analysis show that more than 66% of Cu is bound to Fe-Mn oxides fraction. The highest As content is leached from residual fraction (48.6%). The following average mobility sequence was observed: Mg > Cd > Mo > Ag > Ni > Zn > Cu > Cr > Pb > As > Fe. In order to assess the possible bioaccumulation of these elements, the roots and the overground parts of 3 plant species (Astragalus: Fabacea, Acanthophyllum: Caryophyllaceae, Artemisia aucheri: Asteraceae) were collected, analyzed and compared with geochemical distribution of elements in soil. The highest transfer factor (Tf) in the plant species is found for Cd, Mo, Cu, and the lowest is for Cr, Co and Al. High levels of As, Cu and Ag in soil samples poses a potential risk in the area. Results highlighted the need for continuous monitoring of elements in Miduk area to prevent the serious environmental and pollution problems in the future.

Keywords: miduk porphyry copper mine, Iran, trace element, soil, sequential extraction, plant, rock