

Sand Mining Impacts on Heavy Metal Concentrations in Two Important River Systems of Northern Kwazulu-Natal, South Africa

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ABSTRACT Sand mining of the bed, banks, riparian zone and floodplains of rivers are known to cause major morphological and hydrological changes that impact both on their functioning and on riverine habitats and biota. In this study, the impacts of sand mining on sediment textural characteristics and heavy metal concentrations of twelve metals (Al, As, Cr, Cu, Fe, Pb, Mn, Ni, P, Ti, V and Zn) and three nutrients, Ca, Mg and P and their impacts for instream and riparian biota are presented for two important river systems, the Mvoti and the Mdloti Rivers of KwaZulu-Natal, South Africa. With the exception of Mn in the Mvoti system, the concentrations of all elements increased downstream of the sand mining operations. This is echoed by the Contamination Factor, Combined Pollution Index, and Pollution Load Index analyses. Enrichment Factor (EF) analysis indicates a slightly variable picture in that metals Pb and Ti for the Mvoti and Cu for the Mdloti as well as nutrients Ca and Mg for the Mvoti and Ca and P for the Mdloti decreased downstream of mining operations. Despite the variable EF, these results clearly highlight the importance of monitoring sediment geochemistry of sand mining operations, particularly for their potential hazardous impacts on downstream habitats.