

Sediment quality in the water-level-fluctuation-zone of the Three Gorges Reservoir, China

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Abstract The water-level-fluctuation-zone (WLFZ) of the Three Gorges Reservoir (TGR) acts as an important area for sediment and associated contaminants deposition and remobilization. Knowledge of sediment quality in the WLFZ of the TGR plays an important role in evaluating geochemical baselines and understanding human influences on sediment geochemistry. When the water level of the TGR was low in summer 2010, sediment samples in the WLFZ were collected for the determination of heavy metals (Pb, Cr, Cu, Zn, Cd), and nutrients (TP, OM). Generally, concentrations of TP and heavy metals, except for Zn, in most of the sediment samples exceeded the Lowest Effect Levels, and the maximum concentrations of these elements were below the Severe Effect Levels. The results indicated the sediments were contaminated by Cu, Cd, Pb, Cr and phosphorus to some extent. In the sediment profiles, higher concentrations of Pb, Cr, Cu, Cd and TP were associated with subsurface sediment rather than surface material. In contrast to the nutrients, the generally higher concentration of heavy metals, except for Zn, in the bulk sediments appeared in the lowland at lower elevations rather than the higher elevation sloping land. Many of the spatial trends for heavy metals and nutrients were explained by the element properties, particle-size-selective deposition and post-depositional remobilization. As sensitive indicators of contaminants in aquatic systems, the heavy metals and nutrients in the sediments in the WLFZ reflect human activities in the TGR region and have implications for environmental management.

Key words Three Gorges Reservoir; water-level-fluctuation-zone; heavy metals; nutrients; sediment; pollution extent