

The Contribution of Bank and Surface Sediments to Fluvial Sediment Transport of the Pra River

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Abstract

Sediment source studies involving a simple mixing model was undertaken in the Pra River Basin in Ghana using a single tracer ^{210}Pb to determine the relative contribution of surface and bank sediments to the fluvial sediment transport. Sediment source tracing was performed on the basis of sub-basins by comparing the concentration of ^{210}Pb in fluvial sediments to the bank sediments and potential surface sediment sources. The potential sediment source types sampled for analysis included surface sediments from arable top soils, illegal mining sites, path/untarred roads leading to rivers, gullies and gutters from settlements and farms. For bank erosion, river channel bank materials were sampled. Lead-210 fallout was determined by alpha spectrometry using the low background Gas-less Automatic Alpha counting system (Canberra iMatic™). Results showed that bank material was the dominant sediments and accounted for over 60% of suspended sediment loads in all tributaries. Measures should be put in place to control the entrainment of bank materials since bank sediments constitute a larger proportion of the fluvial sediments. High fluvial sediment load is known to have geomorphological, hydrological, water resource management and ecological implications.