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IMPACT OF GEM MINING BY RIVER BED DREDGING IN THE UPPER CATCHMENT TRIBUTARIES OF KALU GANGA, SRI LANKA

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River bed dredging is one of the conventional gem mining methods in Sri Lanka. The unregulated river dredging process frequently causes channel deepening or bank erosion, as evidenced in the main rivers of *Kelani, Kalu, Nilwala,* and *Deduru Oya*. As a result, such rivers get eroded to compromise the sand budget of the river beds, and the natural sedimentation process in the upper catchments of these rivers is disturbed. This study aimed to analyse the adverse effect of gem mining by dredging on the natural river bed of the *Kalu Ganga* river basin, Sri Lanka. Initially, field investigations were carried out in *Wey Ganga* and *Hangamu Ganga*, tributaries of the *Kalu Ganga*, which are considered productive gem mining areas of Sri Lanka. Thirty-five stream sediment samples were collected from the middle of both rivers considering the flow patterns and mining locations. Eighteen sampling locations were about 2 km downstream from the selected dredging sites, whereas other sampling locations were evenly distributed upstream from the dredging points. Grain Size Distributions (GSD) were determined for all the sediment samples, and the results were statistically analysed. Seventeen sampling sites were selected along the *Hangamu Ganga*, and of that, six were dredging sites. The average GSD of mining sites indicated 37% of gravels, 61% of sands, and 2% of fines, whereas non-mining sites indicated 7% of gravels, 92% of sands, and 1% of fines. Similarly, 12 sampling sites of dredge mining areas of *Wey Ganga* indicated 38% of gravels, 62% of sands with the absence of finer fractions. The non-mining sites of *Wey Ganga* showed 16% of gravels, 82% of sands, and 2% of finer fractions. The increased amounts of gravel compared to the sand fraction in mining regions were significant in both rivers. The finer fractions of the bedload were very few in all conditions, and it may be due to the high flow rates of the young stage of a river. Despite the sampling area, the sorting or skewness of the samples did not show any significant variations. However, the kurtosis indicated platykurtic nature for mining sites and mesokurtic or leptokurtic nature for natural river flows. The study found that the artificial dredging on the bedload has been reworked, and hence the river beds are disturbed by the mixing of coarse fractions. However, there was no continuous effect on the river bed sedimentation due to the sizes of grains except in suspended load, which needs to be further studied.

Keywords: Grain Size Distribution, *Kalu Ganga* basin, River dredging