

# **Evaluating Drilling & Geochemical Methods for the Exploration of Alluvial Gem Deposits**

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## **Abstract**

This research introduces an integrated strategy to the investigation of alluvial gem deposits in the point bar settings of the Mahaweli River in Nawalapitiya, Sri Lanka, through the synthesis of systematic drilling and geochemical methods. Over the shortcomings of conventional surface prospecting, five boreholes were investigated through core logging, sieve-based heavy mineral separation, and ICP-MS analysis to trace subsurface gem-bearing horizons. The highest concentrations of gems occurred in the upstream sections of the point bars, specifically within the Blackish Gray Fine to Medium Sands, which showed high levels of aluminum, chromium, and light rare earth elements. The stratigraphic study revealed a downstream fining trend with a corresponding decrease in gem and heavy mineral concentration. Geochemical ratios Rb/Sr, Ba/Sr, and  $(Rb \times Ba)/Sr^2$  were effective in demarcating zones of high potential. The results illustrate that the synthesis of stratigraphy-oriented drilling with selective geochemical profiling improves the accuracy and efficiency of resource identification. The methodology introduced is a cost-effective and robust framework for sustainable gem exploration in fluvial environments and has applicability to analogous depositional settings worldwide.