

Assessing the possible influence of human activities on sediment transport in the Saskatchewan River, Canada

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Sediment transport is a complex, multi-dimensional, and interactive dynamic process. Climate change and human activities (e.g., sizeable hydraulic infrastructure) have affected sediment transportation. In recent decades, the development of computer applications and computing capacities has made it possible to analyze soil erosion and sediment transportation through simulations. This study's primary goal is to understand how sediment transport in the Saskatchewan River below the E.B. Campbell Dam and the Saskatchewan River Delta is influenced by climate change and human activities. The study area commences at the E.B. Campbell Dam on the Saskatchewan River. The Hydrologic Engineering Center's-River Analysis System (HEC-RAS) was applied to identify sediment transport capacity. The HEC-RAS has a sediment transport function that can perform hydraulic computations of erosion, sedimentation, riverbed changes, and cross-section change calculations, all of which are critical in river engineering and the hydraulics of sediment transport. In this research, the Saskatchewan River sediment transport and hydraulic models were developed through HEC-RAS using cross-sectional data, historical flow data, elevation, and sediment data. This study uses HEC-RAS 6.2 for sediment transport analysis. The simulation results show sediment transport below E.B. Campbell Dam is experiencing sediment erosion activities. The selected study area has experienced significant erosion during periods of high flow, particularly during flood events. The study results demonstrate that the Saskatchewan River and river delta have been affected by human activities, climate changes, and the combination of both.