

The science and practice of erosion threshold theory in applied geomorphology

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Streambed erosion threshold theory is well-established with a century of research by scientists and engineers, but scientific advances continue to be made. Collectively as river science practitioners we are looking for ways to improve and innovate our watershed management practices, and it is worthwhile to reflect on the assumptions and limitations of the science that we apply to erosion assessments. In engineering, fluvial processes of incipient sediment motion tend to be simplified and averaged for practical purposes, and standards of practice are important tools for professional liability and as ethical benchmarks. But with the increasing environmental sensitivity of river engineering and stream assessment practices in recent decades, a deeper awareness of the scientific foundations is useful for both experts and non-experts alike. This scientific perspective is a key contribution of applied geomorphology, and erosion threshold theory is an important example to explore.

With the purpose of engaging the Natural Channel Systems community, this presentation will 1) briefly review the state of the science for streambed erosion thresholds; 2) summarize common practices currently used in erosion assessments, particularly within Ontario; and 3) suggest future directions for collaboration, training, and standards of practice in applied geomorphology. The primary objective is to promote a scientific awareness of erosion threshold theory across many disciplines of river science and management, but the intention is not to promote any single prescriptive methodology. However, different analytical methods should be considered for erosion threshold calculations applied to different stream boundary types and sediment mixtures. With a collaborative outlook, this initiative is also intended to promote the kinds of scientific and professional contributions that geomorphologists can continue to make to watershed science and management.