

SIAM Fact Sheet

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Overview

The computer program Sediment Impact Analysis Methods (SIAM) integrates information on sediment sources, bed material, hydrology, hydraulics, and transport potential to evaluate the movement of sediment through a watershed. The model assesses dynamic equilibrium on a reach-based scale to link sources and transport of sediment to sediment yield and geomorphic trends. Results identify the potential causes of geomorphic problems. SIAM provides rapid quantitative techniques for screening and evaluating multiple management and restoration strategies at basin scales where the size of the basin and scope of alternatives may prevent more detailed studies.

Potential Applications

SIAM provides a screening tool to identify erosion and sedimentation impacts. Potential applications include:

- Identification of areas undergoing geomorphic adjustment or likely to experience future adjustment under current or proposed management plans.
- Identification of agents causing or likely to cause high sediment yield or channel instability. Results assist in developing rehabilitation alternatives.
- Planning and scoping of management practices or projects including developing targets for establishing balanced sediment movement and evaluating impacts from changes to sediment continuity.
- Development of input data for more detailed studies including estimating boundary conditions for more detailed modeling and the relative importance of including or excluding features.
- Sensitivity analysis and evaluation of the impact of natural variability and uncertainty in sediment impact results.

Applicability and Limitations

Channel substrates may include mixes of sands and gravels, cohesive silts and clays, bedrock, or an armor layer.

SIAM applies to reach scale processes where the behavior an individual pool, riffle, or bend does not impact the average sediment movement or the understanding of project objectives.

Estimation of the magnitude and severity of geomorphic trends does not include adjustment processes such as changes to geometry, coarsening or fining of bed material, or shifting climate conditions. The trend methods employed cannot estimate intermediate states or adjustment timeframes.

SIAM simplifies interactions between sediment transport, hydraulics, and morphology to facilitate a rapid analysis. Where time and budgets allow, or for final design, more precise tools can simulate river processes in detail. Using SIAM as a screening tool can reduce the number of detailed evaluations.

The SIAM model accommodates a wide variety of techniques and detail levels for input ranging from intensive field measurement and local scale simulation to gross general assumptions. Interpreting model results requires assessing the confidence in the input data. When the input includes a high degree of uncertainty, sensitivity studies may assist in evaluating results.

Features

- Quick computation speeds for multiple “what-if” scenarios, risk and uncertainty evaluations, or sensitivity studies.
- Tracking sediment sources from the origin to potential zones of deposition and yield to identify causes of sedimentation problems.
- Estimates of equilibrium conditions required to satisfy sediment continuity.
- Differentiation between materials moving as wash load that does not interact with the channel boundaries versus bed material load that can cause geomorphic change.