

Using Remote Sensing to Estimate Impounded Sediment Volume and Dominant Grain Size at Dams in New England

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Problem: Dams and Impounded Sediment

Impounded sediment reduces reservoir storage capacity, which adversely affects dam functionality. For example, reduced capacity limits the ability of flood control dams to mitigate flood peaks, water supply dams to meet water use demands, and hydropower dams to produce adequate electricity during low flows. In dam removal projects, impounded sediment can increase logistical complexity and project costs. Impounded sediment often requires stabilization or dredging prior to removal to prevent downstream suspended sediment pollution. Fine-grained sediment can be especially challenging as it is more easily eroded and more likely to contain contaminants. Contaminated sediment may require expensive and logistically challenging remediation prior to dam removal.

Estimating Impounded Sediment Characteristics at New England Dams

A cross-site comparison between surveyed New England dams will be conducted to examine how the volume and grain size of impounded sediment is related to sediment supply, sediment transport in streams and rivers, and dam trap efficiency (Figure 1). Impounded sediment volumes and grain-size distributions will be obtained from impoundment surveys documented in scientific and consultant (grey) literature. Watershed erosion characteristics, sediment transport proxies, and impoundment

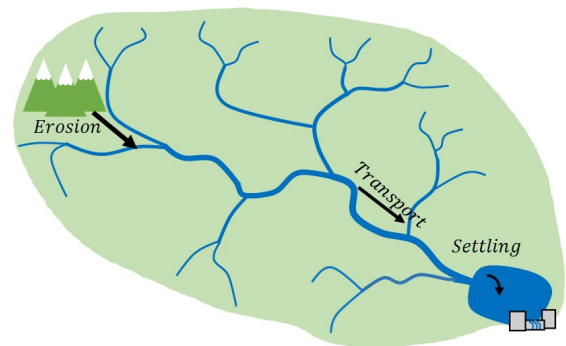


Figure 1. Three factors that control impounded sediment volume and characteristics behind a dam: erosion from the watershed, sediment transport, and sediment settling.

surface area will be derived from remote sensing data sets and validated with field-measured data where available.

Regression analysis will be used to quantify relationships between the independent variables (watershed erosion characteristics, sediment transport proxies, and impoundment size) and the dependent variables (impounded sediment volume and grain size). Relationships from regression analysis will be used to conduct a region-wide tradeoff analysis between impounded sediment characteristics, improvements to fish passage, and dam safety.

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