EGU2020-22517
https://doi.org/10.5194/egusphere-egu2020-22517
EGU General Assembly 2020


# Inter-decadal variation in clastic sediment yield from a forested mountain basin in relation to natural and anthropogenic disturbances

**Piotr Cienciala**[1], Mishel Melendez Bernardo[1], Andrew Haas[2], and Andrew Nelson[3]
[1]Department of Geography and GIS, University of Illinois at Urbana-Champaign, Urbana, 1301 W. Green Street, Urbana, IL 61801, USA
[2]Seattle City Light, 700 5th Ave 3200, Seattle, WA 98104, USA
[3]Northwest Hydraulic Consultants, 301 W. Holly Street, Suite U3, Bellingham, WA 98225, USA

The variability in fluvial yield of clastic sediment is a useful metric of the upstream basin's geomorphic response to natural and anthropogenic landscape disturbances. It reflects an integrated signal of sediment mobilization and connectivity, that is the efficiency with which the mobilized material is evacuated by the sediment routing system. Average clastic sediment yield has also been used as a measure of mechanical denudation rates, although material storage along the routing system necessitates caution in such inferences.

Insight into the geomorphic responses to disturbances, provided by sediment yield analysis, is crucial for the understanding and management of river ecosystems. In the context of ongoing environmental change, intermediate-term system responses (spanning decades-to-centuries) to shifting disturbance regimes are of particular interest. Because of non-stationary conditions and high variability in fluvial sediment transport, knowledge developed based on short-term records of instrumented measurements is not readily transferrable to such longer time-scales. As a result, there is a need for more research focused on multi-decadal sediment yield patterns.

This research addresses such a research need, by estimating clastic sediment yield from a forested mountain basin in NE Washington (USA) during a period of 107 years. To this end, we use historical aerial imagery and track, at the decadal resolution, sedimentation associated with delta growth following the construction of a dam. We interpret these data in the context of available records of streamflow and timber harvest operations, which constitute primary natural and anthropogenic disturbances.

Preliminary results suggest relatively low sediment yield from the study basin, almost an order of magnitude lower than those reported from the coastal Pacific Northwest. We interpret inter-decadal variation in sediment yield estimates as indicative of interactive effects of flow forcing and land cover disturbance magnitude. We also believe that, because of variations of connectivity within the routing system, the sensitivity of sediment yield to disturbance at this time-scale is modulated by the location within the basin relative to its outlet.