Sedimentation Engineering

Values

Sedimentation engineering studies are often essential for successfully designing and managing engineering works along rivers, lakes, and reservoirs that may be affected by erosional processes and sediment transport and deposition. The quantitative sedimentation engineering approach also helps meet environmental objectives, including conserving and improving aquatic habitat and restoring physically and biologically degraded streams.

Services

NHC's sedimentation engineering studies are often combined with geomorphic studies, which examine erosion hazards, sediment sources, stream morphology and processes, and associated habitat problems.

OUR SERVICES INCLUDE:

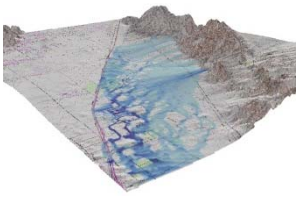
- **Measuring and numerically modeling sediment yields from different landforms, soils, and land uses**
- **Measuring and numerically modeling sediment transport modes in rivers, canals, and flood control channels; and sediment deposition in lakes, reservoirs, and estuaries**
- **Selecting methods, systems, and materials to prevent or reduce erosion at engineering facilities such as flood control levees, bridge and pipeline river crossings, and water intakes**
- **Developing methods to manage, block, or remove troublesome sediment deposits in canals, reservoirs, and other facilities**
- **Field assessment of pump station and valve operation**

- **Physical and numerical modeling of sediment management structures such as gravel traps, flushing sluices, and desanders**

Technical Approach and Capabilities

NHC has long been recognized for our expertise and capabilities in sedimentation engineering. Our experts have published many technical articles and have edited and contributed to well-known technical guidance manuals and handbooks.

NHC's capabilities include: designing and conducting studies to measure erosion and sediment transport rates; numerically modeling sediment yield, transport, and deposition; designing traditional and novel systems to protect riverbanks and engineering facilities from erosion and scour; and hydraulic laboratories to physically model sedimentation problems and solutions.



Experience

Examples of NHC's sedimentation engineering projects for public agencies and private clients include:

- **Major sediment source threatening water supply**

  A major water supply aqueduct was threatened by inflows of contaminated sediment. We conducted geomorphic, hydrologic, and sedimentation engineering studies to identify sediment sources and quantities, and alternatives for storing or by-passing sediment.

- **Sedimentation of a hydroelectric power canal**

  A hydroelectric diversion canal severely lost water transport capacity due to sediment deposition during high river flows. We identified a preferred option of improving intake works and curtailing plant diversion during brief periods of very high river flows.

- **Bank stabilization on a large sand river**

  In densely-populated agricultural Bangladesh, we conducted geomorphic and hydraulic analyses of critical riverbank segments subject to rapid erosion during flood periods. Our proposed bank protection, using both traditional and new erosion protection materials, was designed and installed along with a monitoring, maintenance, and upgrading program.

- **Sedimentation of a major hydroelectric reservoir**

  We estimated reservoir sediment inflows, and modeled the two-dimensional distribution of sediment throughflows using numerical hydrodynamic and sedimentation models calibrated against measured data. We estimated annual sediment accumulation patterns, sediment trap efficiencies, and characterized implications for long-term management.

- **Physical modeling of large scale desanders**

  We carried out several physical models of large desanding chambers, which are crucial components of hydroelectric projects to optimize the desilting performance of the structures.

Measuring sediment discharge, Sacramento River at Colusa

Sediment diversion from water intake

Stabilized meandering river

Sediment diversion at flood control facility, Sacramento River at Fremont Weir

Physical model of the Kutehr Desander, Himachal Pradesh, India

Benefits

NHC's capabilities in sedimentation engineering, as well as in geomorphic studies, can contribute meaningfully in understanding and remedying a wide range of problems related to erosion, sedimentation, and sediment management that may affect engineering works and natural environments.

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NHC provides specialized scientific and engineering services to protect, manage, and develop water resources