Geomorphic Studies

Values

Geomorphic conditions and processes often significantly affect efforts to manage flooding, develop water supply infrastructure, and restore habitats. Geomorphic studies provide insights into the evolution, stability, and behavior of rivers and estuaries, and are often critical to successfully designing viable and sustainable river engineering works and for managing and restoring rivers.

Services

NHC's geomorphic studies often precede or accompany hydrologic, hydraulic, and sediment transport analyses in a watershed-based approach to design and management.

OUR SERVICES INCLUDE:

- **Identifying and quantifying sediment sources for analysis of sediment transport and budgets, to address reservoir sedimentation, water quality, and multi-objective management options.**

- **Investigating and classifying stream morphology, evaluating stream stability and processes, analyzing historical trends, and geomorphic mapping. These efforts assist in designing stable channels, determining scour and erosion potential, and formulating restoration plans.**

- **Identifying channel banks and floodplain areas exposed to bank erosion or channel shifting over long periods or during flood events, and the severity of such hazards. These studies are often needed for design of bridges and highways, flood control levees, water intakes, and other river engineering facilities.**

- **Evaluating effects of channel and floodplain morphology and processes on aquatic and riparian habitat, and developing restoration concepts that incorporate geomorphic principles.**

- **Predicting future watershed and stream conditions based on integrating historical conditions, sediment budget, stream analysis, and other geomorphic studies.**

Technical Approach and Capabilities

NHC conducts geomorphic studies that integrate a long-term perspective and larger watershed context into project planning and design. NHC provides senior specialists with many years of practical experience in observing, assessing, and analyzing watersheds and rivers. NHC also applies a variety of technical tools and capabilities, including specialized GIS applications. NHC also provides full field service capabilities including surveys, mapping of geomorphic features, measurements of erosion, streamflow gaging, and sediment gaging. NHC has completed many specialized field studies, including measurement of sediment yields under different land conditions.

Experience

NHC has conducted many geomorphic studies since the company was formed in 1972. We have contributed to many design, management, and restoration projects in North America, Asia, and Latin America. North American clients have included federal, state/provincial, county/regional district, and city governments, as well as watershed conservation groups and private companies. Overseas clients have also included national governments, banks, and international agencies. Examples of experience include:

- **Sediment Sources and Budgets**

  Budget studies have examined the impacts of forestry practices, urbanization, and reservoir construction on historical sediment yield; results are incorporated into water quality and reservoir and flood management planning efforts.

- **Stream Morphology and Geomorphic Processes**

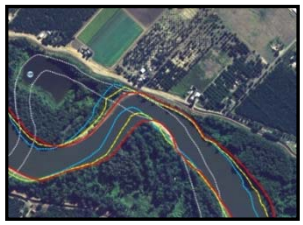
  Studies have evaluated conditions for the siting and design of river engineering works, and documented natural and anthropogenic components of channel changes and trends in erosion and sedimentation.

- **Erosion Studies**

  Bank erosion has been assessed for the design of flood control levees. Specialized evaluations have included the potential impacts of tree fall and subsequent scour on levee stability.

McLymont Creek Hydroelectric Project sediment monitoring

Bedford Channel bank stability assessment



Sediment diversion from water intake

Suspended sediment sampling, Sacramento River, CA

Benefits

Geomorphic studies provide a long-term perspective on river characteristics and behavior that promotes effective planning, management, and capital investment in river-related works, as well as sustainable practices in river management and restoration design.

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

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