

Every year in Nepal, hundreds of fatalities occur and hundreds of thousands of people are impacted as a result of cascading landslide hazards triggered by heavy rainfall, seismic activity, spring snow melt and glacial lake outbursts. Archives suggest that landslide impacts are increasing through time, with recent increases being attributed to changing weather and also development, specifically the proliferation of road construction. While there have been many local scale investigations of individual sections of road or single triggering factors little work has been done to systematically address the multi-faceted issue of how landslides impact the hazard and vulnerability of linear infrastructure networks in Nepal and the extent to which road construction generates additional problems. This project leverages newly available and multi-decadal time series of satellite-based remotely sensed imagery to demonstrate how optical, radar, precipitation, topography, soil moisture, and other model and in situ products can be fused to develop a new capability to better understand the frequency, hazard and impacts of cascading hazards that impact upon critical infrastructure.

This project work takes a multi-sensor, multi-variable view to address landslide activity across the HMA region, with a particular focus on transportation corridors in Nepal. The project is initially considering landslide modulation and behavior through three different mechanisms: 1) we are first testing new SAR-based remote sensing data to determine the potential feasibility of detecting landslides across a monsoon season in the Trishuli basin, 2) use of optical and SAR data are being tested over the Karnali region to determine the frequency and characteristics of landsliding along the most dangerous section of the road, 3) finally we are working to address the spatiotemporal landslide-rainfall patterns across HMA using three different rainfall products (TMPA, MERRA-2, GCM) to better understand the variability of landslide-triggering storms across this region and rainfall product performance with the goal of characterizing the long term and future structure of potential extreme rainfall as it relates to landslides within HMA. These three initial efforts will form a foundation for further landslide hazard and runout work within this study domain.