Figure DR1. (A) Longitudinal profiles of the Karnali and Tila Rivers and selected tributaries in western Nepal. (B and C) Slope-area plots for the Karnali and Tila Rivers. (D) Location map showing mainstem rivers (red and blue lines), tributaries (red and blue triangles), low-relief landscape (brown polygon labeled “LRL”), and physiography (dashed bold black lines labeled PT2-N and PT2-S).

Figure DR2. Same as Figure 2 from main text but with overlays of the major thrust faults which serve as boundaries between Greater Himalaya (GHS), Lesser Himalayan (LHS), and Sub-Himalayan (SH) lithologies.

Figure DR3. (A) Normalized histograms of steepness index as a function of rock type (GHS—Greater Himalayan Sequence; GHS_DK—Greater Himalayan Sequence equivalents on the Daedeldhura Klippe; LHS_N—Lesser Himalayan Sequence North of the Daedeldhura Klippe; LHS_S—Lesser Himalayan Sequence South of the Daedeldhura Klippe; SH—Sub-Himalaya; LRL—Low-relief landscape). (B) Mean normalized channel steepness index as a function of position within the orogen, colored by lithology. Steepness index appears to be highest for GHS rocks and the northernmost exposures of LHS. In contrast, it is low for SH, rocks on the Daedeldhura Klippe, and the southernmost exposures of LHS. In between PT2-S and PT2-N, streams traversing the GHS appear to have elevated steepness indices relative to those within the LHS units. However, this lithologic distinction is not apparent north of PT2-N, where steepness increases rapidly regardless of rock type. Streams within the low-relief landscape are gentler than those in the LHS despite traversing harder GHS units.

Figure DR4. Mean annual rainfall in the study area derived from the TRMM satellite (methods summarized in Bookhagen and Burbank, 2010). Although the low-relief area in west Nepal is relatively dry due to orographic shielding by the escarpment at PT2-S, it is no drier than areas to the north, which exhibit steeper, higher-relief topography.