



Villages in Langtang Valley destroyed by
landslides and pressure waves during the 25
April 2015 earthquake

A preliminary analysis of the upper Langtang Valley suggests that air pressure waves, landslides, and avalanches destroyed much of the valley's villages following the 25 April 2015 earthquake. Eyewitness accounts describe huge and fast-moving avalanche clouds, which were likely triggered when parts of the hanging glaciers in the Langtang Lirung and Langtang II Mountains dislodged and collided with the mountain below (Figure 1). Evidence indicates that before the earthquake, debris and ice from previous ice avalanches and rock fall from Langtang Lirung had accumulated on the mountainside around an elevation of about 4500 metres above sea level. Water from small glacial ponds also possibly contributed to avalanche material. The avalanches consisted of snow, ice, and rock material, and accelerated down the steep valley, which displaced the air and created strong pressure waves. Photographs of the valley, taken by rescue helicopter pilots, show flattened trees stripped bare of their bark, suggesting winds of at least 150km/h.

As a result, the valley's eight highest villages were damaged or completely destroyed, and many lives were lost. Four of these villages, Tsarding, Chamki, Gumba, and a large part of Langtang – the main village of the valley – were also covered by a long runout landslide, which damaged these villages beyond recognition. The newer, western part of Langtang village is covered by a mass of debris and ice. The foundations of the houses in the older, eastern part of Langtang village are still clearly visible in a photograph taken after the event, and suggest that this part of the village was affected by the pressure wave, but not covered by the landslide (Figure 2). Only two buildings in Langtang were not damaged beyond recognition: the new health post above the village, and a house built very close to a high rock wall in the north of the village.

In Thyangshyup, the pressure wave destroyed all houses. In Kyangjing, Singdum, and Mundu, the pressure wave substantially damaged the houses. People in Kyangjing reported flying tin roofs, broken wood, and rocks, which turned into dangerous projectiles. In Singdum and Mundu, many houses were damaged, but inhabitants remained mostly safe. This is presumably because unstable ice had broken off the hanging glaciers above these villages a few weeks before the earthquake, thus clearing the glacier of some of the unstable ice.

Eyewitness reports and satellite imaging indicate that some avalanche or landslide activity continued after the earthquake's primary shock. It must be expected that more mass movements will take place, as they are already common even without earthquake tremors. With more aftershocks still expected while spring melting advances and with the presence of so much destabilized rock and debris, heightened activity is likely to continue.

See also: <http://www.nasa.gov/jpl/landsat-8-reveals-extent-of-quake-disaster-in-nepal-s-langtang-valley>

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Figure 1: The eight highest villages of Langtang Valley with the source areas of the avalanches (blue arrows) and the main landslide material (orange arrow) covering Langtang village.



Figure 2: The old, eastern part of Langtang Village is shown in a Google Earth image from 2005 (top) and a photo taken from a helicopter (bottom, credit: Ang Norbu Sherpa, Facebook, 29 April 2015). In the foreground of the bottom figure, the foundations of the houses can still be recognized, whereas a rockslide covers the newer, western part of Langtang Village in the background. Fine debris particles cover most of the area. Source: Thomas H. Painter