



The global occurrence of fatal landslides in 2007

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This paper presents a review of the occurrence of fatality-inducing landslides worldwide in 2007, based upon an analysis of the University of Durham landslide fatality dataset. Data on the occurrence of fatal landslides worldwide have been compiled on a daily basis since 2003 using aid agency data, news reports, scientific papers and direct reports by correspondents as the data sources. All fatal mass movements, with the exception of snow avalanches, are recorded.

In 2007 a total of 395 fatal landslide events were recorded, inducing a total of 3017 deaths worldwide. This total is considerably lower than the average over the period 2003-2006, which is 4399 excluding losses associated with the 2005 Kashmir earthquake, or 10976 if estimated landslide deaths from this event are included. Nonetheless the total of over 3000 deaths continues to demonstrate that previous estimates of human losses from landslides have massively underestimated the true costs. Geographically, 38.7% of fatal landslide events, and 34.5% of landslide deaths, occurred in South Asia, whilst a further 24.0% of landslide events and 20.0% of landslide events occurred in SE. Asia. E. Asia, including China, accounted for 15.2% of landslide events. Thus in total Asia, including central Asia, was responsible 82.5% of fatal landslide events and 75.9% of the fatalities. The Americas were responsible for just 10.7% of fatal landslides and 13.9% of the fatalities.

From a seasonal perspective, the dominant months were June (12.7% of the fatalities), July (25.1% of the fatalities) and August (10.5% of the fatalities). No other month exceeded 10% of the total number of fatalities. This reflects the geographical distribution of the events, which is dominated by areas affected by the Asian summer monsoon. In 2007 the SW monsoon rainfall was particularly in S. Asia in July and August, result-

ing in floods that affected millions and the extensive occurrence of fatality inducing landslides. In contrast, the occurrence of landfalling tropical cyclones, especially in Central America and the Caribbean, which historically leads to large numbers of landslides, was much lower than the long term average. The result of this appears to be an anomalously low landslide event rate in these areas. As with previous years, the number of recorded fatal landslides Africa remains very low (13 in 2007). It is likely that this indicates that a substantial number of fatal landslide events are being missed for this continent.

An interesting statistic is the average number of fatalities per landslide in each area. In the most developed areas this average is very low (1.2, 1.6 and 3.2 deaths per event in N. America, Europe and Australasia respectively). On the other hand, in E. Asia (dominated by the highly populous and comparatively poorly developed China) this average is 11.1 deaths per event and in Africa the value is 9.2 deaths per event. Note that these higher figures probably also indicate that the number of landslides in these two areas is being significantly underestimated, as only the largest events are recorded fully.

In terms of the occurrence of landslide fatalities by nation (Table 1), the most seriously affected country was China with 695 landslide-induced deaths, followed by Indonesia (465), India (352), Nepal (168), Bangladesh (150) and Vietnam (130). In terms of trigger, worldwide 89.6% of fatalities were caused by landslides triggered by intense and/or prolonged precipitation. Other triggering processes were construction (mostly undercutting of slopes) (3.4% of deaths), mining and quarrying (1.8% of deaths) and earthquakes (0.7% of deaths). No cause was identified for 3.4% of all landslides.

Finally, analysis of the average and median number of fatalities per discrete landslide event (excluding multiple landslide events) by country for rainfall induced landslide reveals some interesting trends (Table 1)). There is a wide variation in the average number of deaths per landslide, ranging from 17.0 in Pakistan to 2.9 in Vietnam. There is less variation in the median number of deaths, ranging from 8.0 in Indonesia to 2.0 in Brazil, the Philippines and Nepal and India. At present there is no clear explanation for these variations.

Table 1: Landslide fatality data by country for 2007. Note that the average and median sizes are for discrete rainfall-induced events only

Country	Total number of deaths	Average no. deaths (rainfall induced)	Median no. d (rainfall indu
China	677	13.0	6.0
Philippines	92	3.5	2.0
Vietnam	130	2.9	3.0
Indonesia	465	12.6	8.0
Nepal	168	3.9	2.0
India	352	5.3	2.0
Bangladesh	150	8.8	5.0
Pakistan	273	17.0	7.0
Afghanistan	43	8.6	7.0
Colombia	73	5.5	6.0
Peru	40	8.0	6.0
Mexico	74	9.3	3.0
Brazil	56	3.7	2.0