Lessons we learned from the landslides induced by the 2005 Kashmir earthquake and Attaabad, Hunza area: Its applications for the future

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Landslides may damage any civic structure and cause the loss of lives when they occur in a catastrophic way. During the second half of the 20th Century, there has been a rapid increase worldwide in the economic losses due to natural disasters and in the number of damaging landslide events (EM-DAT, 2010). Similar trends have been observed for the number of landslide events at national and regional scales (Cendrero et al., 2006). According to the database created by the Centre for Research on the Epidemiology of Disasters, landslides and related processes killed approximately 61,000 people in the world over the period 1900–2009 (EM-DAT, 2010). Moreover, it should be emphasized that the high numbers of small- to medium-scale landslides, which are widespread in many parts of the world, normally cause much higher costs to human society than high-magnitude catastrophic events, which tend to occur quite rarely.

Over the course of the 20th century, Pakistan has faced a major natural disaster almost every ten years with their frequency increasing especially during the recent time. However, when they affect local communities, which have only limited resources to prepare for and respond to them, their effects can be nonetheless disastrous. In major parts of Azad Jammu & Kashmir (AJK), Khyber Pakhtunkhwa (KPK) and Gilgit-Baltistan (GB), where people mostly practice agriculture at subsistence level and food security at household and village levels is therefore very low, even small scale natural hazards can seriously affect the local communities. The 2005 Kashmir earthquake which occurred on October 8th, 2005 in Balakot-Muzaffarabad and Bagh areas induced more than 600 landslides, causing severe damage and isolating villages in the epicentral mountainous areas. The earthquake has killed more than 73,000 people, including 23,000 people by landsliding. This earthquake occurred in an area with many previous landslides, and thus the area still has unstable or metastable landslide mass. It was one of the major earthquakes to give various scientific data of earthquake induced landslides in such an area; earthquakes that induced distributed landslides in the past decade or so include the 2004 in Niigata Prefecture in central Japan, 1999 Chi-Chi earthquake in Taiwan, the 1995 Hygoken-nanbu earthquake in Japan, the 1994 Northridge earthquake and the 1989 Loma Prieta earthquake in the USA. In the Hunza region, specifically Attabad area along the Hunza River, has experienced another landslide in January, 2010, about 1900 m long and 60 m wide that killed 19 people, and will likely to experience, a rather bewildering variety of landslide hazard in future also where fracture controlled landslides, rock blocks, and rock columns along the edge of steep cliffs are common features of the Karakoram batholith. Two exceptionally large landslides in the Kohistan batholiths along Hunza River deserve special attention. The pre-historic Salmanabad landslide, which dammed the Hunza River (approximately in 1890) and Mumhill glacier avalanche, near Shiskat village (1977). Both these landslides occurred in the most highly jointed, fractured, foliated and faulted Kohistan batholith.

Different landslide scenarios are more or less likely to occur as a result of different specific rainfall or earthquakes conditions, and no part of the community can be considered safe from such landslides. Unfortunately, we currently lack the understanding to accurately forecast what might happen in each possible rainfall or earthquake scenarios. Prudence would certainly dictates, however, that we anticipate renewed landslide activity during or after future periods of prolonged and (or) intense rainfall. Future earthquakes, of course, also could trigger landsliding in the area.

Disaster Management in Pakistan has so far focused on response rather than preparedness. It has also been biased towards material aspects at the cost of increased knowledge and awareness. Finally, there has been no comprehensive management and the existing bodies have traditionally favoured areas of political and economic importance over remote rural areas. Therefore, of primary interest to the general public and various governmental entities is the current state of hazard in parts of AJK, KP and Gilgit-Baltistan of Pakistan. While many preliminary reports of these areas do not represent a detailed evaluation of those hazards, a few reasonable observations can be made:

(1) Historical accounts and geologic evidence show that landsliding of a variety of types and scales have been occurring in the northern areas of Pakistan for many thousands of years, and on a frequent basis, up until the present. There is no reason to believe this pattern of landslide will stop.

(2) The 2005 Kashmir earthquake related landslides could still remobilize most likely as a deep slump. This type of movement most likely be relatively slow, but still could pose serious hazards to property and, perhaps, life.

(3) The landslide scenarios could impact any part of the areas mentioned above and community. Future landslide activity could move into the same areas (e.g. Attabad landslide, Hunza area) that recently have been damaged or could damage or all of the developed areas.

(4) Finally, earth scientists should strive to compile landslide overview map of all landslide-prone areas in the regions that should summarize geologic, hydrologic, and topographic data essential to the assessment of national hazard problems. The map must delineate areas where large number of landslides exist and areas which are susceptible to landsliding.

References

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