Nepal earthquake: How to prevent thousands more deaths

27/04/2015

Nepal is divided by a massive earthquake fault, which runs for more than 1000 kilometres from west to east. As India slams into Asia – at a rate of 4 centimetres per year – the strain accumulates along this fault, releasing periodically in the form of major earthquakes. Each of these earthquakes busts open a segment of fault around 200 km in length, but once the strain has been released in one segment it is often transferred along to the next segment. Ever since Nepal's last major earthquake – magnitude 8.2 in 1934, which razed one quarter of Kathmandu to the ground and killed more than 17,000 people – geologists have known that strain will be accumulating elsewhere.

Last month, geologists working in the region spotted a historical earthquake pattern, and anticipated a large earthquake in precisely the location where Saturday's quake occurred. Laurent Bollinger of the French Alternative Energies and Atomic Energy Commission and colleagues believe that the recent earthquake was primed by the 1934 quake, following the same pattern as a pair of earthquakes that struck Nepal in 1255 AD and 1344 AD.

For large earthquakes like this, landslides can be as deadly as the quake itself, causing up to half of the casualties. "The real worry at the moment is the places we haven't heard from. I'm expecting that landslides are likely to have blocked roads and caused real devastation in some of these more isolated valleys," says Alex Densmore, a landslide expert at Durham University, UK, and a member of Earthquakes without Frontiers, a partnership of institutions working on seismic risks around the world. Preliminary shake maps have enabled scientists to estimate landslide probability across the region, giving some indication of the areas most at risk.

Thwarting landslides

Right now, Densmore and his colleagues are poring over satellite images of the quake-hit regions, trying to identify the biggest landslips. One of the biggest concerns is temporary dams that can build up when a landslip blocks a river's natural course.

"Once the monsoon rains arrive in mid to late June, these dams will fill very quickly and fail within a matter of days, flooding the valley below," explains Densmore. In the weeks following the immense Sichuan earthquake in China in 2008, the Chinese were very efficient at getting diggers in to the biggest landslides and removing the worst dams, thereby avoiding further catastrophe. "I'm not sure if Nepal has the capacity to do this, but our first priority will be to pass on information about these temporary dams to our colleagues in Nepal," says Densmore.

Over the coming days scientists will start to concentrate on the risk of post-seismic landslips – land that has been made unstable by the earthquake and could be triggered to slide by an aftershock, or heavy rain. "We will certainly expect another pulse of landslides when the monsoon arrives in June," says Densmore.

And they will also be trying to anticipate how the landscape is likely to change. Right now, wide open river valleys, far away from steep slopes, may look like sensible places to resettle people, but these may be buried once the monsoon rains wash excess sediment down from the hills. "After the 2008 Wenchuan earthquake some of the most productive farmland was buried under metres of sand, making the valleys uninhabitable, and survivors were moved to new towns," says Densmore.

The same region of Nepal remains at risk of another major earthquake in the longer term "Early calculations suggest that Saturday's magnitude 7.8 earthquake was probably not big enough to rupture all the way to the surface, so there is still likely to be more strain stored, and we should probably expect another big earthquake to the west and south of this one in the coming decades," says Bollinger.