Shaken island

Geophysical analyses of the 2010 Haiti earthquake suggest that there is still potential for seismic activity in the region. Building a more resilient country is the only option.

WWW.DAVEGRANLUND.COM

Nine months have passed since the disastrous earthquake in January 2010, but the state of emergency in Haiti has not ended. Refugee camps are still prevalent, and acceptable levels of security are a distant dream, particularly for women. It is impossible to imagine the suffering caused by a death toll of 230,000 or more, concentrated in a country the size of Haiti. And the catastrophic conditions are just not going away: infrastructure, funding and a governmental organization capable of facilitating swift action are all lacking. The humanitarian crisis will take a long time to recede.

Nor is the case on the 2010 Haiti earthquake closed from a scientific point of view. As documented in this special issue on the disaster, no evidence for surface rupture has been found along the Enriquillo–Plantain Garden fault. This fault is the prime suspect for the generation of earthquakes in the region around Port-au-Prince. But given the lack of a smoking gun — offsets in straight lines running through the landscapes, such as rivers, roads or fences — it is not clear whether any slip occurred on this particular fault. Three possible scenarios for the geological events on 12 January are proposed in this issue, involving movement on either one, two or three faults (page 794; page 800). At present, it is not clear which of the models is correct (see page 743).

The question of which faults were involved is not just an academic one, it determines Haiti's seismic future. Crustal strain builds up continuously in the region, as the Caribbean plate drifts relative to the North American plate. The most recent historical earthquakes in the Enriquillo–Plantain Garden fault zone near Port-au-Prince probably occurred in 1751 and 1770, and at least one of them ruptured the surface (page 789). Since then, the strain has been accumulating. Only if we know exactly what happened in the Earth's crust on 12 January 2010 can we estimate how much of this strain has been released — and how much plate movement is waiting to be accommodated in a future earthquake. In any case, that the surface did not rupture this time implies some scope for shaking in the not-too-distant future.

So there is no doubt that better provisions against natural catastrophes urgently need to be implemented. Of course, there was no doubt before 2010. Given the seismic activity in the region, together with known plate movements and the timing of past earthquakes, the quake came as no surprise. And it has been known for decades how to build houses that resist earthquakes. In fact, in the same year, stronger quakes in more-developed regions resulted in only a fraction of the damage seen in Haiti, at least in terms of loss of life. The catastrophic impact of the quake stems from the apparently insurmountable difficulty of implementing efficient building standards in a country that needs money as desperately as it needs a stable political system.

Redevelopment is not helped by the fact that earthquakes are not the only type of natural disaster likely to strike the island of Hispaniola that hosts Haiti and the Dominican Republic. Only in 2008, Haiti was in the news for the destruction caused by Hurricane Gustav. As pointed out on page 739, the cheapest, lightest types of housing fared relatively well in the January earthquake. But if the next disaster happens to be caused by a hurricane, building cheaply and lightly is unlikely to be a successful strategy. Safer buildings for Haiti must protect its citizens from the forces of nature overhead as well as underfoot.

In theory, the path to a safer country can be laid out. Rebuilding efforts should be swift, carried out according to the latest engineering know-how and supplemented by insurance to cover the unavoidable economic damage (see page 739). At the same time, local scientific expertise should be fostered and built into a national centre of seismic and meteorological monitoring that entertains close links to both the international research community and local government (see page 740).

In the country's present traumatized state, it will be almost impossible to put these plans into practice. Nevertheless, geoscientists, the international community at large, development agencies and the people of Haiti must work together to make as much headway as possible towards protecting the population from future devastation. The alternative — risking another disaster of comparable dimensions — is entirely unthinkable. ❐