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‘Scientists downplay earthquake risks’

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V.K. Gaur: “Little geological research has been done to quantify earthquake risks in vulnerable areas.” Photo: K.Gopinathan

Two destructive earthquakes within a week of each other, the first with a 7.5 magnitude on the Iran-Pakistan border, on April 16, and the second measuring 5.6 in eastern Afghanistan last Wednesday, were unsettlingly felt over much of north India, but were geologically unconnected to India’s seismic anatomy. However, the massive tectonic processes intrinsic to the Indian plate, notably in the Himalayan arc and on the western coast, cannot be ignored, says ***Vinod Kumar Gaur****, seismologist with the Centre for Mathematical Modelling and Computer Simulation (Council of Scientific and Industrial Research).*

The “collision zone” along the Himalayan arc, where the Indian plate crushes continuously into the belly of the Tibetan plate at 20 mm a year, has long been the subject of scientific scrutiny for Prof. Gaur, who along with American geophysicist Roger Bilham had, a decade ago in a Science *paper, warned of a great Himalayan earthquake that could put millions of people at risk in the towns and villages of the Gangetic plains.*

A pervading scientific culture that "lacks responsibility and rigour towards public safety... denies society the advantage of information and consequently resilience, against the natural disaster," he told ***Divya Gandhi*** *in an interview at his home in Bangalore.*

While high-risk zones remain curiously neglected in scientific literature, scientists who voice concerns about them are sidelined, said Prof Gaur. He and his co-author were effectively "silenced," he said, when they presented, in a Current Science *paper in 2011, the possibility that "the apparent seismic quietness of Jaitapur [where the world's biggest nuclear power plant has been proposed] does not mean that a severe earthquake cannot occur there." Excerpts:*

How imminent is another great Himalayan earthquake?

Calculations show that there is sufficient accumulated energy now to produce an 8 magnitude earthquake. I cannot say when. It may not happen tomorrow, but it could possibly happen sometime this century, or wait longer to produce a much larger one. The central Himalayas, Uttarakhand in particular, are vulnerable, considering that the last massive earthquake took place there as long ago as 1505.

Scientists have fairly reliable figures for the rate of compression in the Himalayas, but the absence of data on earthquake cycles or their recurrence interval means that we cannot accurately quantify or map seismic risk. In the Himalayas we need to push our records back to 10,000 years in order to understand these cycles and chart at least the last five major seismic events. We need to look far more rigorously at earth archives — buried fossil traces of previous fractures — all along the foothills through trench excavations, and a dense GPS network.

Why do we still lack the information we need to understand seismicity in these high-risk areas?

Remarkably, little geological research has been done to quantify earthquake risks in vulnerable areas; those that are densely populated or sites of critical facilities such as dams and power stations where an earthquake hazard has a high potential to cascade.

The scientific rationale for locating a borehole earthquake observatory eight-kilometre deep in Koyna, rather than tunnelling or trenching along the Himalayan foothills, is baffling. Why would you spend hundreds of crores to study earthquakes at a site where the strain energy has been largely drained [in the 1967 earthquake] and where another consequential event is unlikely for the foreseeable future? I would go to a place where earthquake genesis is truly fast, such as the central Himalayas.

You have been vocal in your scepticism of Jaitapur as the location for a proposed 10,000 MW nuclear power plant...

Not for the construction of the plant, which can be designed with safety features. But India's western coast, a well-recognised zone of potential seismic vulnerabilities, is likely laced with ancient faultlines buried under sediments and waiting to spring back like a piano accordion under continental compression. It is intriguing that Jaitapur [on the Maharashtra coast], the chosen site for the world's biggest nuclear power plant, should have been declared seismically safe without refuting these possibilities.

My concern is that the various geological proxies of faultlines around Jaitapur and their possible implications on the plant and public safety have been neither adequately studied nor communicated. A clear picture of Jaitapur's vulnerabilities and their quantification, needed in order to calculate the level of safety measures to be incorporated, is missing from the earthquake hazard assessment of the site.

What, in your opinion, prevents a more thorough safety analysis of Jaitapur?

We have every technological possibility to exhaustively investigate the subsurface geology of Jaitapur including high resolution seismic imaging that can be carried out at a fraction of the project cost.

Scientists tend to downplay earthquake risks. It is convenient to do so. You keep everybody happy when you maintain status quo. But science only grows by addressing challenges, by considering alternative views and designing incisive experiments to prove or refute conjectures.

Are dissenting voices such as yours among a minority in the scientific community?

If not dissenting, perhaps cautionary. For instance, those who expressed concerns over Jaitapur's vulnerability were intimidated into silence. My research paper on seismicity around Jaitapur was ridiculed and Roger Bilham [co-author of the paper] prevented from entering India in May 2012. Officials claimed visa issues as the reason. But it is widely believed he was blacklisted for his inferences on earthquake risks in the Himalayas and Jaitapur. I am used to being painted as "anti-development" by scientists and engineers. It took decades for scientists to accept my argument that a major earthquake was likely to occur at Tehri dam and that the design should be subjected to a three-dimensional computer test. The test was never done, and instead my pleas were advertised as resistance to building the dam. I despair at approaches to development that privileges engineering prowess and trivialises developmental concerns.

Sadly, our scientific culture lacks responsibility and rigour towards public safety, and so denies society the advantage of information, and consequently resilience, against the natural disaster.

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