

the two parties. This is what was partly implied when Kale *et al.*¹ said 'certain classes of academicians, particularly those with strong interdisciplinary capabilities, have a ready market for their work in Indian Industry'. There is need to promote the Tort law in our country. With more and more industrialization and globalization we will be going in this direction and there is a need for the kind of interaction between the academic community and the industry that Kale *et al.*¹ refer to.

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On the need to install seismographs in the Himalayas

Plans are underway to install a substantial number of new seismographs in the country. It is my strong conviction that a majority of these should be set up to monitor earthquakes of the Himalayas from within the mountains.

Recent earthquakes of the Peninsula notwithstanding, it is acknowledged that the Himalayas are the most active seismic region of India. Four earthquakes with magnitudes exceeding 8 have occurred in the Himalayas in a span of 53 years between 1897 and 1950, while earthquakes with magnitudes up to about 6 only have been reported from the Peninsula. The energy unleashed in a magnitude-8 earthquake is about 900 times that in a magnitude-6 earthquake. The intensity of effects and the region of destruction are correspondingly larger in the former case than in the latter. The rates of increase with magnitude are nonlinear for both intensity and area of destruction. Forty-four years have passed already since the last earthquake of magnitude greater than 8 occurred in the Himalayas.

While the reports prepared to document the visible effects of the above great Himalayan earthquakes are exemplary, the situation regarding instrumental observations is very unsatisfactory. Hence, quantitative information about the great Himalayan earthquakes is almost nonexistent. In fact, the era of modern long-period seismographs had just dawned with analogue recording when the great 1950 earthquake occurred in the then NE Frontier Agency (NEFA). Even today, the number of continuously recording seismographs in the Himalayas is woefully small. None has the digital recording

facility. Moreover, the geographic distribution of instruments is very uneven. Earthquake prediction capability worldwide being what it is, all accessible parts of the Himalayas have to be covered with robust digital recording seismographs to catch the next great earthquake. This is because the threat of a great Himalayan earthquake is not only to the mountainous areas above the buried extended source but also to the contiguous parts of the Indo-Gangetic Plains. With the phenomenal growth in the population of these plains and with no progress towards strengthening of individual houses, the tragedy awaiting us is almost beyond imagination.

There have been efforts in some quarters to downplay the threat of the next great Himalayan earthquake. Of course, it would be unwise to cause a scare among the public on this account. Yet, sober publicity of this threat has to be undertaken for several reasons. Firstly, taxpayers' money is spent on hydroelectric projects and other developmental activities in the Himalayas. Similarly, important facilities, such as nuclear and thermal power plants, major industrial installations, office buildings, hospitals, schools and the like are and will be built in the Indo-Gangetic Plains, where the destructive effects of the great Himalayan earthquakes have been and will be felt. The public should know why the costs of these projects are enhanced if measures are taken against earthquake forces. Secondly, individual members of the public have to be persuaded to strengthen their houses against earthquakes on a priority basis. This

has to be done by retrofitting in houses already built and by initial design in those yet to be built. If this is not done then many more Uttarkashis and Laturs will be witnessed in future Himalayan earthquakes.

This is not the place to expound all the reasons why great earthquakes should be expected to continue in the Himalayas. But even by common sense, one may conjecture that if some natural phenomenon has been observed once then it will happen again under similar circumstances. Thus, if four great earthquakes have occurred in the past hundred years in different segments of the Himalayas, then similar earthquakes should be expected in other segments also in the course of time because all lengthwise segments of the Himalayas are more or less geologically similar.

The compelling need of the hour from the viewpoint of earthquake hazards is for intensified seismological investigations supported by copious, high-quality observations from all parts of the Himalayas. Seismographs installed outside the Himalayas will not meet this need adequately. There have to be numerous instruments right in the mountains. Side by side, a campaign should be initiated to get individual houses strengthened. Monetary costs of these activities should be deemed to be recovered if human lives can be saved.

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