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India's time bomb

24695 By Shekhar Singh The Hindu

IN persisting with the construction of the Tehri Dam and in going back on assurances to review the project comprehensively, the Prime Minister and the Government of India have once again reiterated their insensitivity to the Indian people. They have shown that they are unmoved by the plight of thousands of people who would be thrown out of their homes and the million who would perish if the dam collapsed. To expect such a government to show concern for the life and dignity of Mr. Sunderlal Bahuguna, or to treat Ms. Medha Patkar and other protestors with the respect they deserve, is pointless.

But do the people protest in vain? Perhaps; but what else can they do when all the technical committees and experts cannot get the Government to even review the project, leave alone abandon it?

In a presentation made to the Prime Minister, in 1993, the Ministry of Environment and Forests stated that on the basis of a dam failure analysis, it had been determined that if the Tehri Dam collapsed Rishikesh would be hit by a wave 260 metres high, Haridwar by a wave 232 metres high, Bijnor 17.72 metres, Meerut 9.85 metres, Hapur 8.78 metres, and Bulandshahar 8.5 metres high.

Available information suggests that if the dam is built the way it is currently designed, the chances of its collapse are high. Much of the debate around the Tehri project is based on this fear. There is, however, a need to demystify the debate so that a wider group of people can participate in it and see for themselves the absolute necessity for a review.

The safety of the Tehri dam is seriously in doubt because the dam is situated in a highly earthquake prone zone. This means that the dam is located at a site which is expected not only to experience frequent earthquakes, but also earthquakes of a high magnitude. This fact is not disputed.

The Tehri dam authorities initially maintained that the worst possible earthquake that could be expected in the region would be under 6 M, on the Richter Scale and later changed this to 7.2M. However, a host of scientific evidence, presented by independent experts and by activists, finally made the project authorities concede that the worst possible earthquake at the site of Tehri dam could be 8+M. An earthquake of the magnitude of 8.5 would be more than 60 times as powerful as the earthquake of 7.2 which hit Kobe (Japan) in 1994 and caused extensive death and damage. The destructive power of an 8.5M earthquake has been equated to 10,000 atomic bombs of the Hiroshima type. This, then, is the magnitude of the maximum credible earthquake that is likely to strike the Tehri dam. This is not disputed.

However, though the magnitude of the earthquake describes its power, the actual destruction it causes depends to a great extent on the resultant peak ground acceleration (PGA). As most earthquakes have their epicentres well below the surface, the shock waves and energy from the epicentre travel up through the earth's crust till they reach the surface.The energy of the earthquake when it reaches the surface of the earth is classified as ground acceleration, and peak ground acceleration (PGA) is an estimate of the maximum level that such energy would reach. When an earthquake generates a PGA of 1g and above, gravity is effectively neutralised and unsecured objects fly into the air.

Available information suggests that if the Tehri dam is built the way it is now designed, the chances of its collapse are high.

The calculation of the expected PGA resulting from an earthquake of 8+M at Tehri has become one of the most critical and hotly debated issues. The project proponents argued that the PGA of 0.25g that was calculated for 7.2M would also hold good for an earthquake of 8+M. However, this is strongly disputed by independent experts and by many activists. The evidence in support of raising the PGA value is as follows: There are no recorded earthquakes in the world of a magnitude of 8+M and PGA of any where as low as 0.25 g. There have been many earthquakes of below 8+M with PGAs much higher than 0.5 and, in some cases, even higher than 1g. Even the 1991 Uttarkashi earthquake, which was of 7M, and in the same region as Tehri, had a PGA of 0.43g. Caution dictates the the PGA taken into consideration should be the highest possible.

For these and other reasons, it has been repeatedly demanded that the Tehri Project authorities work with a PGA value of at least 1g and that the dam should be demonstrated to be safe for this level of PGA.

Till the Kobe earthquake of 1994, the debate on the safety of the Tehri dam was primarily focussed on issues regarding the magnitude of the maximum credible earthquake and the resultant PGA. Even before this debate could be resolved, the Kobe earthquake introduced a new and third critical issue to the safety debate: the reliability of earthquake engineering.

Japan is undisputedly the most advanced country as far as earthquake engineering is concerned. Yet, in Kobe, structures designed to withstand earthquakes of 7.9 M collapsed though the earthquake was only 7.2M. This led Japanese engineers and, in fact, earthquake engineers all over the world to question the prescribed earthquake engineering standards.

For Tehri this means that even if the project authorities were to agree on a PGA of 1g, and the dam structure consequently designed to withstand it, the dam might not withstand such a shock when the earthquake actually occurred. The fact that, at present, the dam is designed for a PGA of only 0.25g makes it an invitation for disaster and destruction.

Independent experts have also pointed out that whereas it might be technically possible to strengthen the dam, though at a phenomenal cost, the hillsides around the reservoir cannot be similarly strengthened. And if they collapse and slide into the reservoir, as they are almost certain to do, the effect would be the same as if the dam itself burst.

It is not as if all this is not known to the decision-makers. Numerous official and non-official reports, including the reports of two committees set up by the Government to appraise the project, have given these and many other reasons in support of their recommendation that the Tehri dam is not fit for clearance.

Two official committees and numerous experts have rejected the Tehri dam on at least four different points. First, the dam has been comprehensively rejected on the grounds of safety. Second, the dam has been assessed to be environmentally non-viable. Third, the dam has been shown to cause unacceptable levels of hardship to people who would be displaced without any prospect of being adequately and appropriately relocated. And, finally, the dam has been rejected for being uneconomical.

The Prime Minister, and more recently the Environment Minister, have given assurances that the project would be reviewed, but to no avail. Despite the fact that the Ministry of Environment & Forests had accepted in 1985 the recommendations of the S. K. Roy Committee rejecting the project, a year later the same Ministry, without any fresh evaluation being done, issued a press note claiming that the project had been given environmental clearance. Reportedly this was done to attract financial support for the project from the USSR. Pressures from the Power Ministry and the Prime Minister's Office had led an otherwise strong and pugnacious Ministry to buckle down. In 1989-90 the Bhumbla Committee unanimously rejected the project. But again, the project was not abandoned.

What would be the cost of a review? The actual measurements required to determine better the anticipated levels of PGA would hardly cost anything. The main objection has been to delays in the project and how such delays make the project costlier. However, this is not accurate for, even though the price of the Tehri itself might go up as the years pass, the money currently earmarked for it could be diverted to one of the many half finished projects which are languishing for lack of funds. Any increase in the costs would be more than offset by the savings from these projects.

A democratic government, it is said, is sensitive to the apprehensions and will of the people. An enlightened democracy, it is said, cares about every individual and is not just the rule of a brute majority. Transparency, openness, public accountability are all touted as pillars of a benign social order. Yet, projects like Tehri are still pushed in this day and age, brutally, secretively and with no public accountability. The collapse of the Tehri dam might kill a million Indians, but the Government's efforts at steamrolling public opinion has angered many more.

(The writer is on the faculty of the Indian Institute of Public Administration, New Delhi, and was a member of the Bhumbla Committee which appraised the Tehri project).