



Earthquake Disaster Mitigation From The Grass Roots Upwards

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SUMMARY

The new State Government of Uttaranchal in the earthquake prone north of India is making exciting progress in involving all sectors of society in preparedness for earthquakes. In remote villages, it is facilitating the preparation of action plans by the villagers themselves to address all the natural hazards they can identify. Parallel processes are being encouraged at the district administrative level, and at the state government level. The new government has had a Minister of Disaster Management from its first days, and is taking a fresh approach to disaster mitigation. The occurrence every year of devastating, but localised, cloud bursts and flash flooding in the monsoon season give the opportunity for testing the systems for earthquake disasters which traditionally affect much wider areas. The initiative for this innovative approach has come entirely from within the State of Uttaranchal. The authors have worked together over two years as part of an Asian Development Bank funded program of technical assistance implemented by the Asian Disaster Preparedness Center, Bangkok, to advance the implementation of the state government's plans. The paper describes the existing difficulties that are being addressed, and details both the grass-root actions for short and long-term lessening of vulnerability, and the planned introduction of geographical information systems and state-of-the-art communications to improve disaster response. Plans to overcome the current deficiencies in technical education in building, and the progressive introduction of improved building controls at all administrative levels are detailed. Plans for improved centres of excellence in building are discussed, along with an action plan that has a real chance of mitigating the effects of earthquakes that regularly strike this region.

INTRODUCTION

Indian cities are growing at exponential rates. It is estimated that by 2025 the urban population which was only 25.7 per cent of the total in 1991 will be more than 50 per cent. The increasing urbanisation means that some of the urban agglomerations accommodate more than 10 million people and the numbers will continue to grow. Such trends in the Indian demographic scenario, coupled with the fact that about 65 per cent of the land area of India is liable to seismic hazard where man-made structures are often poorly built and maintained, subject cities to greater levels of risk to life and property in the event of an earthquake. The Indian seismic design code divides India into five zones, with zone II referring to the areas with least likelihood of damaging earthquakes, and progressively zone V referring to areas with maximum likelihood

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of damaging earthquakes. Some of the important cities like Delhi, Dehradun (Capital of Uttaranchal) and Guwahati fall in the high seismic zone.

Uttaranchal, as a new state, has been facing a swift urban sprawl in the past years. It also lies in a multi-hazard prone region. In particular, this region is highly susceptible to earthquakes. The districts along the Chinese and Nepalese border lie in Zone V (Very High damage risk zone), while the remaining districts all lie in Zone IV (High damage risk zone). The active tectonic feature near Dehradun is the Main Frontal Fault (MFT), running in a north-west to south-east direction. It is approximately 10 km to the north-east of the city. The geological setting is a threat to the urban population of Dehradun city.

Out of the 13 districts making up Uttaranchal, four lie in Zone V, five fall partially in Zones V and IV, while four lie totally within Zone IV. The October 1991 Uttarkashi earthquake killed 768 people, and there was one of Magnitude 5.6 on January 5, 1997, in the Dharchula area. Another on March 29, 1999, in the Chamoli-Pipalkoti area took 115 lives and was followed by two aftershocks of 4.9 and 3.0 magnitudes two days later. The last major earthquake in the state was on 27 May, 2003, in the Gopeshwar-Chamoli area (M 4.9).

In 2000, The Asian Development Bank initiated a Technical Assistance project “Strengthening Disaster Mitigation and Management at the State Level in India (ADB TA 3379-IND)” which was implemented by the Asian Disaster Preparedness Center of Bangkok (ADPC). During the first month of the project the target state, Uttar Pradesh, was reorganised into the two states of Uttar Pradesh and Uttaranchal. As a result of this, the new state of Uttaranchal was targeted for assistance with the earthquake risk mitigation aspects of the project. The authors were part of the ADPC team delivering this assistance. This paper is confined to the earthquake risk mitigation aspects of the project.

BUILDING ON EXISTING INITIATIVES

The ADPC team worked closely with the new Uttaranchal state government and a wide range of government departments, technical institutions and community organisations over a period of two years. It is expected that the most lasting impacts of the assistance will be the pre-disaster preparedness and mitigation orientation of the new institutional structure of the new Ministry of Disaster Management and Health, and the preparation and development of District Disaster Management Action Plans for 12 Districts and Village Disaster Management Action Plans for 80 villages.

Disaster Management Cell, Nainital

The project was able to build on the strong initiatives that had been taken by the Academy of Administration, Nainital, under the aegis of the Ministry of Agriculture, Government of India. This academy innovated and established a Disaster Management Cell (DMC) in 1995 to study and disseminate in a coherent and timely manner the needs of those exposed to disaster and emergencies. The DMC had from its beginnings the following objectives:

- To find and promote solutions to the root causes of disasters in the state of Uttaranchal/Uttar Pradesh.
- To facilitate the smooth transition from relief to rehabilitation and development.

The activities the DMC had undertaken included: information dissemination, awareness creation, documentation, preparation of Disaster Management Action Plans (DMAP), formulation of strategy for disaster management, training and sensitization, and consultancy.

The DMC had also identified policy/decision-makers, in-line departments, non-government organizations, community based organizations, schools and community as their target groups. It continues to organise in-house training programmes and out-reach workshops/awareness camps regularly.

The Disaster Management and Mitigation Centre (DMMC)

Just after the creation of the new state, the state government of Uttarakhand, established the DMMC with a vision of disaster reduction for safer communities and sustainable development.

While the DMMC primarily acts as an operational centre, it also has an important and innovative role to act as a 'think tank'. It is tasked with assisting research and development institutions within the state in their efforts, and to develop an effective network with them. Its partnership will include and cover a wide range of institutions. These include the Government of India, the national IDNDR Committee, training and academic institutions, regional development bodies, local institutions, national and international funding agencies, and non-government organizations.

The objectives of the DMMC are based on best international practices in disaster mitigation and management. It has been realised, even by the most economically advanced countries, that with limited resources the role of the government must change and focus on those tasks that only government can perform or for which government has unique capability. This approach, which decreases the role and responsibilities of government necessarily increases the role and responsibilities of the communities and non-government organizations, especially that of the individual citizens.

The DMMC is the lead centre in Uttarakhand, and potentially for the entire Himalayan region of India. The centre is working with to assist communities and the government authorities in formulating appropriate policies and strengthening their capabilities to cope up with all aspects of disaster management. In addition to offering an extensive range of training programs, providing advance information about likely natural disasters through latest technologies available for the purpose, and maintaining a network of experienced experts working in the field and institutions of excellence, DMMC will also provide consultancy services to all levels of government, international agencies and non-government organisations.

It will also undertake the responsibility of training communities and community-based organisations and through them develops a strong regional knowledge base concerning disaster policy, prevention mechanisms, mitigation measures, and preparedness and response plans.

On the operational side, the DMMC hosts the state's emergency operations center (EOC), and will establish and maintain an advance-warning system for the region. The EOC has been tested a number of times states of emergency following cloudbursts and subsequent flooding in the downstream areas of the Himalayas.

The ultimate beneficiaries of DMCC are the inhabitants of the Uttarakhand (particularly those who are living below the poverty line), and grass-root level government functionaries and community workers - both in the government and private sectors.

Improve maintenance of infrastructure and buildings

The physical condition of many infrastructures in Uttarakhand is poor, suffering from low maintenance and inadequate management practices. In addition, the tendency to make decisions on major investment

projects without appropriate information on hazard assessment or mitigation measures contributes to the precarious state of the infrastructure.

Funding of maintenance activities is commonly insufficient to provide for proper execution of this unglamorous but important function. For public buildings, with their expected heavy usage, a normal annual maintenance budget is about four percent of the contemporary capital cost of the buildings and equipment, assuming that the buildings are in good condition. For zone V infrastructure, the figure is likely to be higher. Obviously, when infrastructure is in poor condition, the cost of maintenance must be higher. Like land-use regulations, maintenance requires greater budget allocations.

A review of the damage caused by recent disasters has shown that an well-operated maintenance system is a very effective disaster mitigation measure in terms of cost and facility usage. It is essential to include a maintenance plan in disaster mitigation plans.

GRASS ROOTS INITIATIVES

The most exciting aspect of disaster preparedness being actioned in Uttaranchal is the development of awareness at the village level at the same time as the infrastructure is being put in place at the state level. As in all parts of the Himalayan region, much of the population lives in small communities which may be inaccessible by road, and many hours by foot from the nearest road-head. While there is good quality census information on the number and location of people, in the event of a natural disaster such as an earthquake affecting a wide area, it may be a long time until external assistance can be provided. As in other countries, it is now being realized that all communities need to be their own first-level emergency responders. Clearly, the remoter the community, the more important is this self-sufficiency. The Disaster Management Cell (Nainital) has developed an efficient way of encouraging communities to organize themselves by way of Village Disaster Management Action Plans.

Village Disaster Management Actions Plans

130 Village Disaster Management Action Plans (VDMAPs) (80 funded by the ADB Technical Assistance Project) have been prepared in Uttaranchal and Village Disaster Intervention Teams (VDIT), serving as Community First Responders, constituted. The method by which these have been prepared is novel, but very straightforward. Teams of well-briefed and enthusiastic facilitators have been sent in to these villagers to discuss the objectives with the community leader. Meetings have then been promoted within the community/village where the communities requirements after events such as earthquakes and flash flood are put forward by those present. Also, they are encouraged to examine their own capability in terms of specific tasks such as first aid and in terms of resources. The community is thus encouraged to develop its own plan over which it has ownership. After a suitable period, the facilitator returns to examine and carefully critique the draft plan. Omissions can be dealt with by careful suggestion, and that plan can then be published and distributed throughout the community. Where specific deficiencies have been identified (such as in first-aid capability), a plan of action to provide such training can be implemented.

The Technical Assistance project also trained local NGOs to replicate the process in other villages.

District Disaster Management Actions Plans

The primary regional administrative unit in India is the District, with each district managed by a Collector or District Magistrate. It is therefore important that each of the 13 districts in Uttaranchal has its own Management Action Plan which takes into account the peculiarities of the topology, population and resources of the particular area. In the event of a strong earthquake, it is very possible that a District may

be cut off for some time from contact with the state authorities. In Uttaranchal, this is exasperated by the mountainous nature of the land, with fragile gorge roads prone to landslide and other secondary effects. The District Collector has to be empowered to act promptly with available resources and local knowledge.

Essentially the same process as for the Villages is therefore required. Facilitators convene meetings in the district at which the participants are encouraged to draw together their own plans. These are then moderated so that they fit within the overall state framework, but retain the individuality of the Districts.

GIS Databases

The advances in the last decade with respect to computer-based Geographical Information Systems (GIS) and their associated databases open great possibilities for disaster management in countries like India. Now it is possible for District Magistrates to have the same quality of information at their finger tips as those in the state and national emergency operations rooms. The DMMC has been trialling such a system that would allow all levels of the emergency control chain to have access to quick estimates of the size of the natural disaster soon after its occurrence is reported.

It is not difficult or expensive to construct a database from existing government records which records census information (including numbers in each age range) for all villages, even if they are remote. To this can be added capabilities in a number of different categories that include personnel, equipment and material/food supplies.

In the event of an earthquake or other natural hazard (a landslide that has caused a river to dam up, for instance) being reported by monitoring agencies, a simple algorithm can be implemented to suggest the likely area of effect of the natural disaster. Common GIS functions can then be employed to estimate the number of people who may have been affected. A more reliable estimate can then be made at an early stage as to the quantum of assistance required. The advent of cheaper and reliable portable satellite phones will allow hitherto fragile telecommunications to be bypassed for requests for outside assistance to be relayed to those who can co-ordinate at a state and national levels.

The quality and geographical precision of the information can be used to make distribution of aid more efficient. With a reliable database, the pilot of a helicopter taking off to deliver household or age-related aid to an affected area can be instructed not only as to the precise co-ordinates (locatable with an on-board Global Positioning System) of the remote villages to be visited, but also as to the appropriate quantity of material to deliver to each.

Building Centres

A previous project established a number of model building centres in remote parts of Uttaranchal. The state covers both flatter plains and mountainous areas. The choice of building materials depends upon what is most easily available and what is affordable to most households. Where the building is close to road access, it is natural that modern materials such as reinforced concrete and fired bricks become an option. Modern materials often come with their own problems. Roofing is a good example of this. Many poorer families have begun to upgrade their roofs by installing corrugated iron sheet even though it makes the interior either unbearably cold or hot, depending on the season. They do this because these sheets are easy to use, require little or no understructure, and they last for many years. Few village potters still make traditional country tiles because the factory-made (so-called Mangalore Pattern) tiles are stronger and absorb less water. Against this, the factory-made tiles are more expensive, require an elaborate understructure, and can be easily damaged (particularly in monkey-infested areas).

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