The Year in Disasters 1993

India: earthquake myths and realities

India's Maharashtra earthquake of September 1993 was a classic example of a so-called natural disaster: the often sudden and short-lived disaster-triggers that catch their victims unprepared and temporarily overwhelm local capacities for response and recovery, while frequently "seeking out" the most vulnerable in a community for the greatest impact.

Natural disasters also attract considerable attention and sympathy from governments, organisations and individuals wishing to assist. However, their sudden impact leads to an initial scarcity of information about their effect on people and the needs created, making appropriate and timely response difficult, and limiting external appreciation of the abilities of those affected to cope.

Despite their often obvious causes or triggers, natural disasters such as the Indian earthquake are not "easy" to deal with, though they may appear simpler to respond to than the world's increasing number of complex disasters, involving political, economic, ethnic and military factors. It is also clear that increasing populations, urbanisation and vulnerability from poverty, and our massive impact on the environment, coupled with industrial development, are likely to mean more disasters as a result of natural calamities Better preparedness for and management of the "natural disasters" which the world has experienced for centuries will also allow resources and attention to be concentrated on the new complex disasters confronting millions today.

The earthquake which struck the Latur and Osmanabad Districts of Maharashtra State in south-western India during the early hours of 30 September 1993 measured 6.4 on the Richter scale. As information about the earthquake emerged, there was shock at the scale of estimated deaths - around 30,000 - while scientists were puzzled as the area was considered seismically stable. On India's national seismic risk scale of one to five, the epicentre was well within an area classified with a one rating. The extensive national and international media coverage and exaggerated early death figures prompted a flood of offers of relief items, search and rescue teams and medical assistance from concerned countries and groups.

In the face of this international pressure, the government of India, confident that it had the experience as well as the human and material resources to cope with the immediate emergency response, announced that it was not soliciting the international community for immediate assistance. As the situation unfolded, this confidence proved well founded.

India's experience in emergencies comes from its position as a country prone to a wide range of disasters, from earthquakes to drought and floods to high winds. In each case, its pluralistic government, free press and spirit of debate makes national and local government responsive to the needs of disaster victims, while its national and local capabilities in disaster relief and rehabilitation makes the country unlikely to require external assistance in the immediate wake of a disaster Indeed, months before the earthquake took place in Maharashtra, northern India had suf-

fered widespread flooding. Although the floods were a major disaster and had a large economic impact, they did not attract the level of international attention paid to the dramatic impact of the earthquake and its sudden fatalities.

In the final count, the earthquake affected around 130,000 people in 80 villages and towns, killed 9,475 people and injured over 10,000. Public facilities and services such as schools, rural hospitals, primary health centres and water and electricity supplies were also damaged in varying degrees. Although the figures were high, the damage was geographically confined to an area 50 km in radius with terrain that made it relatively easy to reach affected villages. Maharashtra is the third largest State in India, both in terms of population - 78 9 million in 1991 - and area. In this densely-populated agricultural region, around 2.3% of the total population in the worst-hit five districts were seriously affected by the earthquake.

As so often happens in disasters, first response came from the survivors who rescued relatives, friends and neighbours from the rubble and gave them immediate attention. External assistance reached the area from the district authorities within the first six hours. Indian Red Cross Society branches in Latur and Solapur were in the area after the first hour with medical supplies and blood. Local response was very quickly followed by medical teams, search and rescue units and relief supplies from the neighbouring districts, the army, relevant departments of the State and national governments, and from local organisations. Within the first 18 hours, the whole country was mobilised to help the victims. This unprecedented response, particularly from the public who flocked to the area, created some pressure on the authorities, and entry to the area was restricted until the situation stabilised.

Within the first 48 hours, 30,000 Indian army personnel with heavy lifting and earth-moving machinery were on site retrieving bodies, clearing rubble, constructing temporary shelters from corrugated iron sheets, and providing food, water and medical assistance. Teams of doctors and nurses formed by the government were assigned to each village. Doctors from the local hospitals in Latur and the large teaching hospital in Solapur were later joined by paramedics from the army, medical staff from the Indian Red Cross Society and other Indian agencies, many of which had previous experience working with the victims of the 1991 earthquake in Uttar Karshi. Medicine was readily available in Solapur, which has its own drug industry and injuries were treated in the local hospitals. Epidemic control measures, such as distributing disinfectant to

India earthquake injuries 1993

Hospital admissions	Total
Upper limb injury	28
Lower limb injury	19
Multiple fractures	18
Spinal injuries	15
Clavicle fractures	18
Peraplegia	9
Chest injuries	5
Abdominal injuries	4
Head injuries	4
Nervous system injuries	3
Others	2
Totals	125

Only some 125 people were hospitalised after the India earthquake. Their injuries showed the classical pattern of broken limbs and damaged spines.

Source: Indian Red Cross Society. 1993

homeless families, were undertaken by the local health authorities.

Meanwhile, a wide range of groups and individuals from all over India converged at the earthquake site, particularly at Khillari, at the expense of outlying villages, in a reflex reaction motivated by the shocking pictures beginning to appear on Indian television. They varied from charity organisations, Indian NGOs, Union members and religious groups to individuals simply wanting to help, and encompassed the full range of organisational expertise and experience.

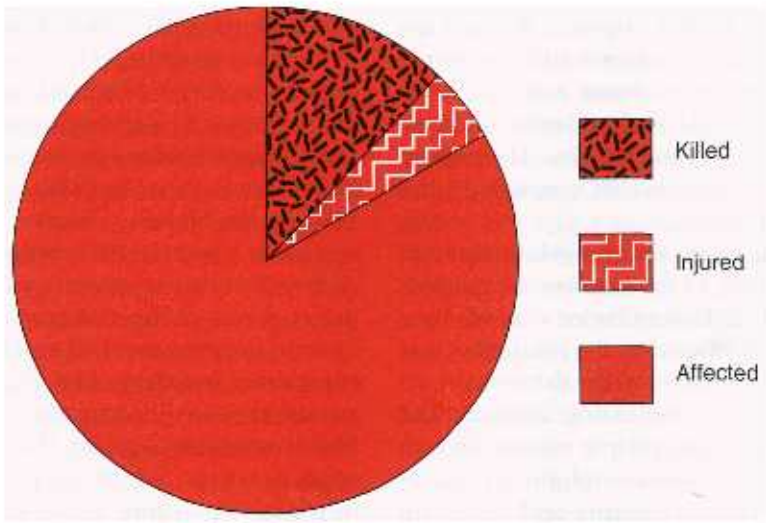
Many came with supplies, ranging from trucks full of warm cooked food (which rotted within a few days), to clothing (from which the disaster victims rejected high-heeled shoes and second-hand rags), medical supplies, digging equipment and tents. Teams of helpers set themselves up in camps next to the disaster victims. Others brought cash to buy food, cooking utensils and water-carrying equipment, all readily available in the markets in Latur and Solapur.

Co-ordination between army, civil authorities and voluntary agencies was organised by the third day, with the setting up of a relief command control room in Latur, connected by a telephone hotline to accessible villages and the State capital. Villages where the telephone wires had been destroyed were connected with the District Headquarters through police wireless and amateur radio operators. The Chief Minister of Maharashtra State established a base in Solapur within the first week, to begin the process of rehabilitation and eventual reconstruction of the devastated area.

In Delhi, the government requested the United Nations Development Programme to coordinate the efforts of international aid agencies, recognising the need to prevent unsolicited donations which would be unlikely to match any unmeet needs. The International Federation of Red Cross and Red Crescent Societies launched an appeal for CHF 6.2 million for a rehabilitation and reconstruction programme to follow the initial Indian Red Cross Society's re-

Death and injury in the India earthquake 1993

Total affected population (167,457)	Percentage/class
Killed	12.0
Injured	4.8
Affected	83.2



Because the earthquake took place at night, many people were trapped in their homes and killed by falling masonry. In day-time earthquakes, the percentage of people injured is usually much greater than that of those killed.

Source: Indian Red Cross Society 1993

lief operation, which began a few hours after the earthquake occurred. Coordinated by the Indian Red Cross Society's National Headquarters in Delhi, 50 medical volunteers distributed relief items airlifted from the capital and carried by trucks from its central warehouse.

The communities affected by the earthquake showed remarkable resilience in the days and weeks following the disaster. Many began to construct makeshift shelters on the outskirts of the villages and organised themselves to ensure effective distribution of aid. Without any substantiated evidence, rumours spread in the national and international media about the rising death toll, survivors left in the rubble, corpses posing a threat of epidemics, widespread looting and a lack of clean water. These remained as rumours. The few international search and rescue teams which eventually made their way into the area saved no one. The only "miracle" survivors rescued several days later were identified by relatives and dug out by the Indian army.

Shortage of water is endemic in Maharashtra, which often suffers from drought. Damage to water tanks and installations created some shortages immediately after the earthquake, but these were very quickly rectified by distribution of water by tankers and from temporary boreholes. There was no shortage of drugs and medical teams carried out epidemic surveillance around the clock. Indeed, there was a surplus of blood products sent to the area as only 4.8% of the affected population were injured. Serious cases - such as pelvic and vertebra fractures, internal haemorrhages and broken limbs - constituted 10% of the injuries. These were rapidly admitted to hospitals in the nearby towns.

The death toll was relatively high compared to the number of injured. One contributing factor was the time of the earthquake: the main shock at 3.56a.m., followed by three main aftershocks of decreasing intensity. The timing caught people asleep after an exhausting week of religious celebrations. The very young and old could not easily escape from their homes before the heavy stone walls crushed them In this mild climate, where 80% of the population are agriculturalists, most people would have been outdoors had the earthquake happened during the day, reducing the loss of life. Under different circumstances, a night earthquake can mean fewer deaths. In the recent Los Angeles earthquake, deaths and injuries would have been much worse had it struck later - when people would have been out in the heart of the rush hour - because of the damage caused to roads and highway bridges.

Another factor was soil conditions, with the most damage in areas of black cotton soil. Layers of softer soils can magnify the shock waves of an earthquake to act like vibrating liquids and transmit more of the shaking effect to buildings with weak foundations.

The time of disaster, environmental conditions and life styles are all factors contributing to losses in most disasters. In earthquakes, however, the most critical single factor is the earthquake resistance of buildings. As Los Angeles showed, with around 60 deaths, major earthquakes in seismically-active countries like Japan and the US result in less loss of life because buildings are constructed according to building codes designed to resist seismic activity, while the most powerful earthquake of 1993, which measured 8.0 on the Richter scale and occurred near Guam in the Pacific, merely injured 71 people because many buildings on the island were already built to withstand typhoon winds of up to 200 miles an hour.

India is no stranger to large earthquakes, as 60% of its land is earthquake-prone in varying degrees. In this century, four major earthquakes took place in Bihar in 1934, Assam in 1950, on the Nepalese border in 1988 and Uttar Karshi in 1991. India is also quite advanced in seismic engineering and has pioneered research on seismic improvement of small, non-engineered buildings like those that suffered heavy damage in the Maharashtra earthquake. This knowledge, however, is difficult to enforce in a country where there is a very large stock of vulnerable buildings

and competing priorities for limited public funds.

In areas where there is no public memory of earthquakes, traditional buildings do not evolve to meet seismic criteria. In the particular part of western Maharashtra which suffered from the earthquake, rural houses are built of thick stone walls and roofs to keep them cool inside during the day. It is evident from those buildings that survived the earthquake with little damage that minor improvements, such as stronger corners, wooden beams, better mortar and detailing to bind the stones together would have saved many more lives. Had it been possible to better assess or predict the risk, and had people become sensitive to it, they could have built stronger buildings. These mitigating measures would not have radically increase the cost of the stone buildings, which are not cheap by rural Indian standards, nor would they have been technologically difficult to implement.

In general, the most vulnerable in natural disasters are the poorest sectors of the community. In this earthquake, the majority of affected people were smallholders with two to three acres of land. The economically and socially most disadvantaged groups in this area actually suffered less physical damage because they could not afford stone houses. The makeshift thatched shelters of landless peasants mostly remained standing due to their lightweight structure.

However, the economic consequences of the earthquake are likely to affect the poorest until the lives of the relatively better-off land-owners and employers return to normal. The local authorities have plans to absorb this work force in cash-for-work schemes that are well practised in many parts of India. Until that happens, wage labourers and other low income groups may well migrate to find work. Government plans for reconstruction emphasise economic recovery of the affected communities as an integral part of post-disaster recovery. This was evident even in early stages of the governmental recovery plan, which included distribution of seeds, fertilisers and simple agricultural tools to the affected families.

Within India, the system of disaster response at national, regional, state and local level is matched by the structure of the Indian Red Cross Society, as part of its role as an auxiliary to government. Involved in every Indian disaster, the Society has a very broad range of experience both in disasters and in the recovery work that is effective in an Indian context.

In the aftermath of the immediate relief efforts for the Maharashtra earthquake, during which Red Cross staff and volunteers distributed food, blankets, clothes and cooking utensils, the Indian Red Cross Society channelled domestic and international resources into programmes to reduce vulnerability through economic recovery. These concentrated on providing tools for many thousands of small-scale farmers, landless labourers and craftsmen, including carpenters and shoe-makers, to ensure that they could swiftly return to work or grow crops and thus restore lost income.

The focus of the work by the Society has now shifted to rebuilding community services, rural schools, local hospitals and provision of clean water, and these plans will be integrated into the overall strategy of the government for long-term rehabilitation.

The Maharashtra earthquake contained many of the factors associated with earthquakes and other natural disasters. Its impact was only partly the result of its strength and seismic type, and far more to do with people's vulnerability, the timing of the shocks, the seismic resistance of buildings and the capacities of families and communities to manage their own recovery. This included their ability to rescue friends and relatives far more effectively in the few "golden hours" after a disaster than any late-arriving international search and rescue teams. The work needed to help people affected in Maharashtra to recover proves again that the impact of naturally-triggered disasters, whether sudden or slow, does not disappear in a few hours or a few days; the rebuilding of commu-

nities, reduction of vulnerability and preparedness for future disasters can take years.

Most of the myths of disaster were raised anew in Maharashtra, despite being disproved time and time again in previous emergencies: people did not sit around dazed and wait for outsiders to do all the work; vast areas were not devastated and local markets were well able to supply, for cash, most of the physical needs of those affected, from food and clothes to blankets and kitchen utensils; epidemics did not break out because of dead bodies, wholesale looting did not take place and people did pull together to help each other in crisis.

Most importantly of all, good planning and systems at national and local level are, as always, crucial in allowing disaster- affected countries to meet many of the needs of their own citizens without begging for international assistance, however well-meaning. Finally, of course, cash remains the best aid, allowing flexible local response and support to reduce the most fundamental vulnerability of all· poverty