Disaster management: need for an aggressive strategy

The last decade witnessed several disasters in India, including earthquakes, landslides, floods, cyclones and droughts with large losses of life and property. The trend in annual losses has been markedly upward, and appears to be related to the greater exposure of a larger number of people and infrastructure to natural disasters and the attendant manifold increase in risk, the underlying reasons for which are population growth and increase in aerial extent of habitation in vulnerable areas. These losses are a massive drain on the exchequer. It is clear that massive efforts have to be mounted – to improve our performance in dealing with disasters and to develop a sound scientific strategy for disaster mitigation.

This is one crucial area where earth scientists can influence public policy. Although many social and economic factors play out in these issues, the cities are basically expanded into floodplains, wetlands and active faults. It is the duty of earth scientists to state their science in the form of common-sense statements rather than using unnecessary technical jargon and unduly emphasizing on measurement uncertainties.

The two basic approaches for reducing the impact of natural disasters are mitigation and response. Mitigation includes all those actions taken – by applying scientific and technological inputs – before, during and after the occurrence of a natural event, which minimizes its impacts. Response includes those actions taken during and immediately after the event.

There are various elements in a disaster mitigation programme. It may involve hazard zonation, that is, demarcation of areas prone to floods, earthquakes or landslides; strengthening structures to reduce vulnerability; generating a scientifically sound land-use map that encourages people to move away from vulnerable areas, and providing warning of impending hazards like floods and cyclones. A realistic mitigation strategy will include: (i) demarcating areas that are prone to hazards, (ii) indicating the nature of hazards, (iii) characterizing the population and structures vulnerable to specific hazards, (iv) fixing standards for acceptable levels of risk and (v) developing an appropriate plan of action based on cost–benefit analysis. The response includes both short-term emergency actions (for example, by the police or the army) as well as longer-term actions (such as food, shelter or rebuilding). Although both mitigation and response are equally important, due to political and cultural reasons, emphasis has been only on the response. Elsewhere, especially in developed countries, the last decade has seen a major shift from the traditional focus on response and recovery to mitigation, that is, preventive actions to reduce the effects of a natural hazard.

We are yet to make any headway in risk assessment, which forms the core database for disaster management. It requires intense field studies and developing models using data on the frequency and severity of a particular type of natural hazard that strikes an area, and combining this information with the nature and class of vulnerable structures. Powerful computing packages, including the Geographic Information System (GIS) are to be developed not only to estimate the costs, but also to generate different disaster mitigation scenarios or models. To improve these models, post-disaster investigative data are important. Many of the local revenue divisions may be doing a good job in collecting this information. But what about the machinery required to archive these data, for use in generating models? These models, even if less accurate, need to be generated for all the hazardous regions in this country because they provide the scientific basis for fund allocation and deciding priorities.

Another area that needs attention is the development of land-use planning. This will have a great impact in areas that are prone to flooding. However, implementing this programme will not be easy, and from a practical point of view, it needs acquiescence from the local people. Instead of implementing the mandates using strong-arm methods, we must try providing incentives for compliance such as low building and property tax to those who prefer to live away from hazardous areas. Ultimately, the subsidies and tax discounts will be offset by the lower losses incurred during a disaster. Such methods can be used not only for popularizing land-use planning, but also in encouraging people to adopt building codes (minimum construction standards), which are effective for reducing disaster losses. Most of the low-income groups (especially rural and illiterate) located in disaster-prone areas live in poor-quality houses. We have to find means, such as giving incentives, to bring about changes in local outlook toward disaster management and preparedness. A starting point would be to strictly implement safe building norms at least for the government constructions in known hazardous areas.

In advanced countries, unlike in India, insurance and financial institutions play a major role in promoting risk education and risk reduction methods, basically because companies themselves stand to gain from such measures. Practices, such as lower premiums for individuals who invest in hazard-reduction measures and refusing coverage to those who do not, can be adopted. However, a specific problem in many developing countries may be the illegal constructions, which do not come under the ambit of insurance coverage. This issue needs separate treatment and the local government authorities must come up with practical solutions. Local governments should be given powers to formulate variable taxes on property and houses – to be decided based on scientifically prepared land-use maps, delineating hazardous and less hazardous areas.

Our experience in the Himalayan towns, in sites of moderate earthquakes, indicates that better building practice is a major factor in lessening the impact of destructive events. Our present understanding of the earthquake sources in the country allows us to reasonably quantify the expected ground motion in any region; this can be the basis for designing earthquake-resistant buildings.

Along with the aforementioned steps, our scientific community should improve the technology of warning systems for disasters like cyclones, tsunamis and floods, such that they are relatively easier to set up. The warnings must specify the time, location and severity of the expected events with error margins. We must develop on-line disaster information networks that include spatial maps delineating hazard zones. Primarily a GIS package, this system will also use

the archival data on past events in conjunction with on-line data. The recent trends in data dissemination are useful in planning emergency services. For example, the latest advances in seismic sensor technology, data acquisition systems, digital communication and computer hardware and software facilitate developing real-time earthquake information systems. In fact, real-time data dissemination should become a norm in all the fields. Free sharing of data is the backbone of any knowledge-based society. This may be a tall order for a country in which mere accessing of any data is difficult (including a simple topographic map), and where releasing of data requires endorsements from various authorities.

In order to strengthen our disaster management capabilities, it is important that we have a pool of trained scientists and technologists. This gets complicated mainly because our university departments are water-tight compartments. It is high time that we allowed students to choose their optional topics even while majoring in one subject, and strengthened our training courses by updating the syllabus, allowing us to introduce newer topics. Interaction between research organizations, relevant university departments, non-governmental organizations and interested public/private companies must be encouraged for transfer of knowledge and expertise. All these cannot be accomplished overnight, but our leadership must first realize that scientific studies, proper engineering and public awareness are the fundamental pillars of an effective hazard mitigation strategy.

C. P. RAJENDRAN

Centre for Earth Sciences,
Indian Institute of Science,
Bangalore 560 012, India
e-mail: cp.rajendran@yahoo.com

Future of nuclear power in India

Considering the increasing roadblocks in the expansion of the nuclear power programme in the country, it is most appropriate to initiate a healthy dialogue amongst all stakeholders.

Per capita consumption of electricity of about 650 units in India is about one-fourth of the world average, 10% of European Union and 5% of USA. It is a clear indicator of the mammoth efforts needed to turn India from a developing nation to a developed one. We need to exploit all sources of power generation and preferably those which have lower emission of greenhouse gases. Nuclear energy, which is one of the cleanest sources, has eluded India for a long time due to reasons beyond the control of the Department of Atomic Energy (DAE). About 4% share of nuclear power of the total electricity produced in our country is dismal and is incidentally one-fourth of the world average (16%) and way behind developed countries like France (75%), South Korea (40%) and Japan (35%). Strong will displayed by the government to proceed with the Indo-US nuclear deal (in spite of numerous hurdles) and its resolve to settle the liability issue amicably have given a ray of hope that India may leap forward and increase the share of nuclear power to a respectful figure of the world average in the next few decades. However, the opposition of the so-called citizen groups, ambivalent stand of a few political parties and gloomy global economy can thwart this dream. The government has already announced its intention to make the Atomic Energy Regulatory Board (AERB) independent of the DAE. Periodic audit of the safety features of our reactors (particularly those built in the sixties and seventies) by experts chosen by an independent AERB should go a long way to allay fears in the minds of the countrymen about the safety of our nuclear power programme. However, poor and gullible persons will continue to be exploited by theatric outbursts, half truths and misinformation spread by self-seeking leaders of civil rights groups in the name of protection of the environment. It is the collective responsibility of media (both electronic and print), scientific bodies like the Indian Nuclear Society, AERB and DAE to meet this challenge head on and counter the propaganda of some vested interests to block the industrial/agricultural growth of the nation. Awareness must be created among all sections of society (including teachers, doctors, lawyers, managers, elected representatives, students, etc.), preferably in regional languages, about the need for energy security by exploiting all clean sources of energy, including nuclear and renewable. It needs to be explained that the loss of human lives due to nuclear accidents has been much lower than those in coal-mine accidents per unit production of electricity. Spin-offs of nuclear energy in societal benefit programmes in agriculture, medical and industrial sectors are numerous and indispensable for any developing society. Stalling the criticality of the Kudankalam power station at this stage when thousands of crores of public exchequer money has gone into the project, is to say the least just anti-national. One needs to ask where were these anti-nuclear groups when the project was announced and the work was in progress for more than a decade. It is unfortunate that the opposition to nuclear energy is more in India than in Japan, Russia and USA, where major nuclear accidents have occurred in the history of nuclear power. China, though started much later, has announced major nuclear projects and may overtake India in the near future if these groups are allowed to stall the projects at Jaitapur and Kudankalam. It will give a wrong signal and jeopardize the energy security of the nation for which future generations will hold us responsible.

VIJAY MANCHANDA

P2/83, Zarina Park, Mankhurd,
Opp. Anushaktinagar Main Gate,
Mumbai 400 088, India
Present address: Department of Energy Science,
Sungkyunkwan University, Suwon,
440-746, South Korea
e-mail: vkm25749@gmail.com