

Landslides in the Western Ghats (India) and Disaster Preparedness

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The Western Ghats is a major orographic feature of the Indian Peninsula fringing the Indian west coast. It is becoming increasingly prone to disasters (from floods and landslides) due to unsteady monsoons and unwise land use. Debris flows (Urul Pottal) are the most prevalent and recurring cause of disaster in the region. However, the State is ill-prepared to meet such eventualities. Several years ago, the State government began preparing disaster management plans, however, these plans are not ready.

An increase in population and rapid urbanization has led to the expansion of construction activities in hilly terrains and has catapulted the frequency of landslides to dramatic proportions in recent decades. The majority of mass movements have occurred on hill slopes of >20 degrees along the Western Ghats scarps. The prolonged and intense rainfall, or the combination of the two, is the most important trigger of landslides. A recent study indicates that the additional cohesion provided by vegetation roots in soil is an important contributor to slope stability in the scarp faces of the Western Ghats. Diversion of stream channels in upper slopes, especially above settlements, should strictly be disallowed and adequate provision should be made to ensure drainage of storm water away from the high sloping terrain, as to reduce over-saturation. Any contour bounding, or terracing in slopes of >16 degrees above settlements should have sufficient provision for storm water drainage.

The Geographical Information System-based landslide inventory map and landslide hazard zonation maps of India at the scale of 1:6 million is in high demand for enhancing the preparedness for future landslides. A wireless sensor network system (a product of a consortium of 11 partners from eight countries) to detect landslides at least 24 hours ahead of their occurrence has been set up at Munnar and is in its testing stage.

Keywords: India; landslides; mapping; preparedness; rainfall; terrain

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Boiling Liquid Expanding Vapor Explosion: Simulation and Risk Analysis

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A boiling liquid expanding vapor explosion (BLEVE) generally is considered the most severe scenario. It is characterized by an explosive release of a pressurized liquefied gas. The explosive part of the release is caused by the extremely rapid vaporization of a liquid, and often exhibits the formation of shock waves.

A model for estimating the thermodynamic and dynamic state of the boiling liquid during a BLEVE event was developed. The model simultaneously predicts the bubble growth processes in the liquid at the superheat-limit state, the front velocity of the expanding two-phase

mixture, and the shock wave pressure formed by the fluid expansion through the air.

Conditions of shock formation were found to be associated normally with high initial temperatures that can bring the liquid to its superheat-limit state during the initial depressurization. The high initial temperature also induces a generation of higher vapor pressures that forces a rapid mixture expansion.

Model predictions of the shock wave strengths, in terms of TNT equivalence, were compared against those obtained by simple energy models. The modeling was applied for the formation of risk maps for some gaseous substances that usually are stored, transported, or handled in a pressurized, liquefied form.

The study indicates the important mechanisms that dominate two-phase blow down and BLEVE accidents. The research presents an overview of the mechanism, the causes, the consequences, and the preventive strategies associated with BLEVEs. Therefore, they are important computational tools for environmental safety assessments.

Keywords: expansion; explosion; liquid; liquid expanding vapor explosion; risk; simulation; vapor

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Sequence of Airborne Infection Isolation in an Unusual Biological Event

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Airborne transmissible diseases have the potential to cause severe outbreaks and public health crises. Patients who suffer from severe acute respiratory syndrome (SARS), smallpox, hemorrhagic fever, or severe emerging infectious diseases are hazardous to caregivers and other contacts. The healthcare setting is regarded as an incubator for the spread of airborne transmissible diseases. The danger of airborne spread of infections begins with the first intimate encounter with the patient in the prehospital setting in the clinic or home, transport to the hospital by emergency medical services. The danger continues in the emergency department, and later in the corridors and elevators of the hospital on the way to the definitive care area. In the intensive care unit, this danger is amplified because of the characteristics of the patient. Strict infection control is the ultimate way of managing this threat. Among the extreme measures, negative pressure isolation is imperative. As was learned during the SARS epidemic, these resources usually are scarce.

Since 2005, four cost-effective products for negative pressure isolation and treatment environment for airborne transmissible disease patients were developed with involvement of the end-users: (1) a prehospital solution; (2) an isolation room within the emergency department; (3) an in-hospital patient transport bed; and (4) a temporary intensive care isolation unit. All products have similar structural and functional components.

These products were tested for safety and operability and are implemented regularly for training in large-scale, regional, biological exercise. They comprise a sequence of biological safety in cases of airborne biological hazards, a sequence that increases healthcare personnel confidence,

and supports a window of opportunity for delaying the evolution of an outbreak. In isolated cases, it might even help to contain the event. These products currently are part of the national stockpile for an unusual biological event.

Keywords: airborne infection; biological; infection; outbreak
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Identifying Needs of Medical First Responders in Disasters

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Introduction: Magen David Adom coordinated a project funded by the European Commission under Framework Program 7 (FP7)—Security, Identifying Needs of Medical Responders in Disasters (NMFRDisaster). The project involved 10 partners, emergency medical services, and research institutes.

Objective: The objective was to point out areas that require further research and development in order to meet the needs in the field.

Methods: Five issues were identified: (1) training methodology and technology; (2) human impact of disasters; (3) law and ethics; (4) personal protective equipment (PPE); and (5) use of blood and blood components. A partner was assigned to conduct a review and a workshop with the participation of end users, researchers, and the industry.

Results: Areas identified as requiring further research and development:

1. Human Factor and Training
 - a. Profile (enabling and limiting factors, motivation, learning styles, needs for support);
 - b. Building evidence-based recruiting, training and support programs, needed core competencies; and
 - c. The role of volunteers, recruitment, training, retention, and a “volunteer contract”.
2. Legal and Ethical issues
 - a. Minimum training curriculum and European-recognized accreditation;
 - b. Reference to disasters in current laws or a “disaster legal framework”; and
 - c. A reference framework of ethical implications of emergency response for the planning phase.
3. Understanding the impact of cultural diversity on preparedness and response (responders and community).
4. The role of the media and new means of communication in preparedness and response.
5. Cooperation between response organizations, the military, NGOs, and international organizations in preparedness and response.
6. Need for a strong knowledge management structure—research, lessons learned, best practices, possibility for comparison and sharing, and a strong network of stakeholders.
7. Personal Protective Equipment
 - a. Agreed upon tasks, operational procedures, standards;
 - b. Communications problem using PPE; and
 - c. Standard decontamination procedures for casualties, personnel, and equipment.

8. Use of Blood and Blood Components

1. New products and procedures;
2. New robust testing methods, for a “non-tech” environment; and
3. Understand the public attitude regarding blood donations, especially in situations that put the person at risk (e.g., during a pandemic).

Keywords: development; emergency management; first responders; research
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Children as Targets: What We Need to Know Now

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Introduction: If the purpose of terrorism is to promulgate fear and psychological disruption in a civilian population, the targeting of children represents a particularly potent, though profoundly horrific, strategy. Children, how they are transported (e.g., school busses) and the places where they may congregate—schools, day care, special events—are the ultimate “soft targets”. Ample historical evidence with respect to targeting children in settings across the globe and repeated statements from Al Qaeda with respect to American children, make these concerns legitimate.

Vulnerability: Schools and congregate facilities for children are, generally speaking, difficult to secure. The overt presence of hardened, isolated facilities—or the visibility of armed security personnel—is, in many communities, potentially distressing and disconcerting to young children. Children also are more susceptible than adults to psychological and physical consequences from disasters of any kind. Younger children are dependent on adults for safety, as they generally lack the capacity to independently move away from danger. Metabolic and physiologic realities create medical vulnerabilities as well. Relatively large skin surface-to-body mass, more permeable integument, higher respiratory rates, lower “breathing zones”, and a greater propensity to develop dehydration and shock all are important factors in assessing vulnerability of children.

Response: Compounding the heightened vulnerability is the relatively diminished surge capacity of pediatric-specific countermeasures, facilities, and personnel. This certainly is true in the United States, where planning for the novel H1N1 pandemic has shed a light on substantial deficits in readiness capacity with respect to children and disasters.

Recommendations: A multi-faceted strategy to improve security and interdiction capacity in areas prone to terrorism is critical. Assessing community and regional response medical and mental health capabilities with respect to pediatric mass-casualty events and designing strategies to enhance these capacities also is essential.

Keywords: children; pediatrics; terrorism
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