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 respiratoy 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 learneed 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,

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