

Learning from Catastrophes: Incorporating Natural Disasters into the Undergraduate Civil Engineering Curriculum

James Kaklamanos

Assistant Professor, Department of Civil and Mechanical Engineering, Merrimack College,
315 Turnpike Street, North Andover, MA 01845, USA (kaklamanosj@merrimack.edu)

Thomas C. Cross

Undergraduate Student, Department of Civil and Mechanical Engineering, Merrimack College,
315 Turnpike Street, North Andover, MA 01845, USA (crosst@merrimack.edu)

2014 International Conference on Disaster Mitigation, Preparedness, Response and Sustainable
Reconstruction: The Role of Architectural, Planning, and Engineering Education

Center for Rebuilding Sustainable Communities after Disasters (CRSCAD)

University of Massachusetts Boston

Boston, Massachusetts

8-9 May 2014

Session: Disaster Mitigation and Sustainable Reconstruction in the Curricula of Colleges and Universities

ABSTRACT:

Natural disasters can have devastating effects—through loss of life, property, and livelihood—on families, communities, and societies as a whole. In the interest of saving lives and developing sustainable and resilient infrastructure, scientists and engineers are faced with the challenges of developing methods by which natural hazards can be understood, quantified, and incorporated into engineering design. Undergraduate civil engineering education may be enhanced with learning objectives regarding natural disasters and resulting engineering failures. I will discuss some curricular enhancements on natural disasters that may be undertaken in civil engineering courses, with a focus on an introductory course in geotechnical engineering. Recent natural disasters, such as Hurricane Katrina in 2005, the major earthquakes in Japan and New Zealand in 2011, and the 2014 Oso, Washington, landslide, are used as curricular bridges for different themes throughout the semester. These disasters serve as poignant examples for teaching soil mechanics concepts such as soil classification, groundwater flow, effective stress, and shear strength, as well as the broader implications of errors in design, maintenance, and public policy.