TSUNAMI DAMAGE ASSESSED IN SRI LANKA AND THAILAND

Tiziana Rossetto, BHRC associate and UCL specialist in earthquake engineering, recently participated in the Earthquake Engineering Field Investigation Team (EEFIT) tsunami field mission. The team spent 2 weeks making tsunami run-up measurements and surveying the damage to buildings and lifelines along the south western coast of Sri Lanka, and Phuket Island, the area of Khao Lak and Phi Phi Island in Thailand. A large variation in the degree of damage (from total devastation where over 70% of the buildings collapsed, to light damage where only windows and shutters were damaged) and water levels (from 2 to 11m run-up) along the coasts was observed and is attributed to local variations in shoreline topography, bathymetry and the presence of offshore coral reefs. Generally, poorly built one-storey masonry houses fared worst during the tsunami. These form the majority of the building stock in Sri Lanka and where the water level exceeded 2m most were seen to have collapsed. Villages composed of these houses were often totally wiped out. Low-rise reinforced concrete frame buildings performed better. Most suffered damage to their infill walls and windows and a few suffered partial failure, however the latter could typically be attributed to the presence of poor joint detailing, poor quality concrete or smooth reinforcing bars with inadequate bond. The structural performance of medium-rise well engineered and constructed reinforced concrete buildings (e.g. most hotel structures in Thailand and public buildings in Sri Lanka) was generally satisfactory, with only non-structural damage and contents damage being observed even in the presence of large wave heights.

One of the main observations made during the field mission was that there are differences in the criteria defining building life-safety performance in earthquake and tsunami scenarios. During an earthquake, life-safety performance is held to have been achieved if the building is structurally intact. However, in the case of the Indian Ocean tsunami, where in some areas water levels reached the third storey of buildings (e.g. Khao Lak, Thailand, see image below), although well-built hotel structures were standing after the tsunami, damage to non-structural components such as windows, doors and infill panels, which allowed water to enter the buildings, determined life safety. The failure of buildings to provide the necessary life protection is reflected in the extremely large death toll associated with the event. Hence, although good engineering practice can reduce economic losses it will not ensure life safety in the case of another large tsunami. It is therefore essential that the risk of life loss be reduced through the implementation of a program of tsunami preparedness, which provides education, methods of warning, disseminating alarm and evacuation and a post-event disaster management plan. Tiziana Rossetto, BHRC, t.rossetto@ucl.ac.uk

A Powerpoint presentation by Dr Rossetto Observed damage and effects of the 26th December 2004 Indian Ocean Tsunami can be downloaded from: www.benfieldhrc.org/SiteRoot/activities/publications.htm#obs

[Image: Khao Lak, Thailand. Courtesy Tiziana Rosetto]