Tsunami Damage in Thailand

Report by Geoffrey Jago

On the morning of Boxing Day 2004 Mother Earth creaked and it was a big one. An earthquake of magnitude 9.0 to 9.3 is big. It was enough to kick off a tremble over all her circumference by a whole ten millimetres. From an epicentre 30 kilometres below, 30 cubic kilometres of ocean quietly sleeping 160 km off the coast of Sumatra was suddenly kicked about.

The press fully reported the dreadful effects of the resulting huge waves but less has been published on the work that has followed.

Very soon after the disaster, British Geological Survey were assisting their Thai equivalents, the Department of Mineral Resources (DRM); and one of the BGS team was Dr. Andrew Gibson, our speaker on the evening of 3rd July, 2007. Again, BGS kindly provided the meeting place at their Keyworth offices for a joint meeting of our Group with East Midlands Geotechnical Group.
Dr. Gibson described the effects on the west coast of Thailand. At 8 am the earthquake was felt as only a small rumble but at 10.10 the sea retreated, to be followed four minutes later by the first wave. After another twelve minutes a larger 16 metre wave struck and thereafter water flooded inland at a depth of 5 to almost 7 metres and kept coming. It was nearly two hours before the water receded. The compelling presentation included many still illustrations of the destruction as well as movie films of the wave.

The help that geoscience could provide lay mainly with mapping what damage had been caused with a view to research into any remedial measures that could be taken should such a threat be repeated. This had been an overwhelming event with complex effects, many of which had yet to be fully understood. A foundation of useful work, mainly inundation mapping, was completed in the first week in cooperation with Thai DRM staff, to whom Dr. Gibson paid tribute. BGS was able to provide precise surveys by Ground Positioning Satellite (GPS) systems and satellite photography: especially useful were IKONOS aerial images promptly emailed from BGS to give comparisons before and after the event.

Dr. Gibson went on to describe his work at the tourist resort of Khao Lak, which geologically is a low sandy coast with a granite or mudstone bedrock. Considerable mineral resources, including tin, have been recovered in Thailand and the beach at Khao Lak had been dredged. The shallow bay is bounded to the north by a low coral reef and by a rocky headland to the south. The tsunami approached as a fast swirling wave which added to the hazards by forming a whirlpool at the south of the beach. An interim simulation of a tsunami was mapped out, better to understand the effect on the three types of shore: coral, sand and hard bedrock. It was then possible to lay out information and prediction schedules.

BGS recommendations highlighted a need for tsunami action plans and for tsunami preparedness plans. It was possible to define command and community structures, resource and management structures, and methods of using local social structures compatible with existing emergency frameworks. One recommendation for physical change was the construction of small areas of higher ground, because at Khao Lak old mine dumps had provided effective refuges.

The outcome of the work included a simple coastal classification based on geology and geomorphology while hazard scenarios have been applied as more is known; and this new information has been incorporated into DRM coastal information.

It was concluded that modelling work and the effort made towards integrated coastal zone mapping had been effective as had been behaviour unit classification.

David Boon gave a speech of thanks.