Keeping a watch for the big one

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India's tsunami warning system, intended to prevent a repeat of December 26, 2004, is expected to become operational by September 2007.

— PHOTO: AP

EARLY WARNING: In this November 15, 2005 file photo, a buoy that is a part of a tsunami warning system floats in the Sunda straits off Java island, Indonesia.

INDIA'S TSUNAMI and storm surge warning system will be up and running by September 2007, according to a status report provided recently by the Government to the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System.

The Indian Ocean tsunami warning system is intended to prevent a repeat of December 26, 2004, when a magnitude 9.3 earthquake near Aceh in northern Indonesia produced the most powerful tsunami in over 40 years. Thousands in countries bordering the Indian Ocean lost their lives. It led to the sombre realisation that countless lives could have been saved had a proper tsunami warning system, such as the one operating in the Pacific Ocean, been available.

The warning system planned for the Indian Ocean will have the participating countries creating networks of sensors and then sharing the data from those sensors.

Networks of three types of sensors are required for tsunami warning. High-quality seismic stations are essential to precisely locate any earthquake that occurs and establish the characteristics of the fault that produced it. But only a small number of earthquakes actually lead to a tsunami. So tide gauges installed in harbours and on piers as well as bottom pressure recorders placed in the open ocean are needed to detect changes in sea level that a tsunami would produce.

India plans to establish a network of 17 seismic stations that would transmit data in real time to two central receiving stations, one at the India Meteorological Department in New Delhi and the other at the Indian National Centre for Ocean Information Services (INCOIS) in Hyderabad. The first four seismic stations at Port Blair, Bhuj, Shillong, and Hyderabad and the central receiving stations would be ready by January 2007. The remaining 13 seismic stations would be operational by May 2007, according to the Government's status report. Only data from the first four seismic stations would be shared with other countries, says P.S. Goel, Secretary to the Union Government's Ministry of Earth Sciences.

The country intends to install a network of 50 tide gauges. In the first phase, 14 tide gauges had been installed by the Survey of India and the National Institute of Ocean Technology. The remaining 36 are to be installed and made operational by March 2007. A dozen deep ocean assessment and reporting systems are to be installed, 10 in the Bay of Bengal and two in the Arabian Sea. Each system consists of a bottom pressure recorder that was installed on the ocean floor to detect any increase in the height of the water column above it. That information is then relayed to an ocean buoy bobbing on the surface, which would transmit the data to shore.

The bottom pressure recorders are being procured and integrated with indigenous surface buoys, according to the status report. Four bottom pressure recorders have already been imported and will be deployed by September this year. The remaining eight systems will be installed by April 2007.

India will share the data from its sensors only in case of an earthquake greater than magnitude six, according to Dr. Goel.

Computer simulation

The country has also initiated efforts into tsunami modelling. Computer simulations using models like the N2 developed by Japanese scientists and MOST created in the United States make it possible to quickly work out how fast a tsunami would travel across the ocean, how high the waves would be when it came onshore and which places would be most vulnerable to its onslaught.

The N2 model had been set up to run simulations for the Indian Ocean region and calibrated using the extensive data collected during the December 2004 tsunami, says the Government's status report. Travel times had been generated for historical earthquakes, which were being organised into a database,

and more simulations of possible earthquake scenarios were planned, the report added.

An Interim Early Warning Centre was already operating at INCOIS in Hyderabad. The centre received earthquake and tsunami advisories from the India Meteorological Department, the Japan Meteorological Agency, and the Pacific Tsunami Warning Centre as well as data from tide gauges in India and abroad. This arrangement worked well when the centre was able to confirm within an hour that the tsunami of July 17 this year, which originated with an earthquake near Indonesia, was not likely to hit India, noted the status report. Computational and communication facilities for the National Early Warning Centre were being evolved, the report added.

But establishing as quickly as possible that a tsunami was on its way is only half the task. The warning must reach people in vulnerable areas so that they can escape from harm's way. On July 17, although the Indonesian Government received information of the onrushing tsunami 20 minutes before the first wave struck, it failed to warn communities along the Javanese coast and several hundred people died as a result.

Information of any tsunami that could affect India would be promptly passed on to the Ministry of Home Affairs and the National Disaster Management Authority, and the media informed, said Dr. Goel. It was also necessary to evolve suitable systems to reach warnings to the people, he told *The Hindu* .