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Hazard mitigation against tsunami in atoll islands: from the experience of Maldives at the 2004 Indian Ocean Tsunami

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The Indian Ocean Tsunami caused by the Sumatra-Andaman earthquake of 26 December 2004 hit the Maldive Islands, 2,300 km west of the epicenter about three hours after the earthquake. Following the tsunami, the Republic of Maldives reported 82 confirmed deaths, 26 people missing and more than 3,997 incidents of house/building damage. There are few reports on the tsunami-generated phenomena and the influence on atoll islands and populations. The 2004 Indian Ocean tsunami disaster in the Maldives suggests a potential risk for all atoll nations/districts in the Pacific and Indian Oceans.

We investigated 43 islands (35 inhabited, 8 uninhabited) in the northern to the southern Maldives during February-to-March and August 2005 by measuring profiles across islands to observe topographic features along with the measurement of watermarks. We also interviewed local residents to determine wave direction, number, interval, height, and relation to watermarks, and also gathered information concerning the evacuation procedures of the local population in disaster areas in the southern atolls.

It is generally understood that the Indian Ocean tsunami arrived without any forerunning phenomena in areas located west of tsunami source area. However, according to the results of our interviews in the southern Maldives, the following forerunning phenomena were in fact observed: 1) loud noises (from 2-to-10 minutes before the tsunami); 2) bubbling reef flat water (from 2-to-10 minutes before the tsunami); and 3) the thrusting up of house floors (a few-to-10 seconds before the maximum tsunami surge).

On the basis of interview research regarding the seeking of refuge by local residents in Meemu and Lamu Atolls, several factors can be pointed out in relation to human damage reduction. Refuge taken in branched trees and in the lee of strong walls was especially effective on low-lying atoll islands. Fishing boats (dhonis) moored in the lagoon harbors played an important role in the rescue of people swept into lagoons. The transmission of information at the initial stage of a tsunami event is also important for disaster prevention.

These forerunning phenomena, hazardous locations and effective refuge activities described by interview research in the southern Maldives may help with the construction of a disaster prevention program for all atolls nations/districts.

Keywords: Indian Ocean Tsunami, forerunning phenomena, refuge activity, atoll islands, coral reef, Republic of Maldives