BAY ON TROUBLED WATERS: MODELLING TSUNAMI HEIGHTS ALONG THE COASTS OF SOUTHWESTERN LUZON AND MANILA BAY FROM EARTHQUAKES ALONG THE MANILA TRENCH AND MANILA BAY AREA

ISHMAEL C. NARAG 1, Erlinton B. Olavere 1, Bartolome C. Bautista 1,
Ma. Leonila P. Bautista 1, Yuichiro Tanioka 2

1. Seismological Observation and Earthquake Prediction Division, Philippine Institute of Volcanology and Seismology, C.P. Garcia Avenue, University of the Philippines, Diliman, Quezon City, PHILIPPINES
2. Hokkaido University

Tsunami hazard along the Manila Bay is one of the least studied earthquake-related hazards. The tsunami threat comes from earthquakes originating from the Manila Trench located west of the bay as well as from a source region in the bay area. Meanwhile, a previous study on earthquake hazards in Metro Manila had suggested that the metropolis has a low vulnerability to tsunami hazards due to the narrow configuration of the mouth of Manila Bay, the presence of Corregidor Island near the mouth of the bay which has an abating effect on any tsunami wave and the relatively deep slab of the Manila Trench beneath the bay. However, historical records show that there were accounts of at least two earthquakes that mentioned occurrence of unusual sea waves after a felt earthquake that affected Manila shores and its nearby vicinity.

For the past ten years, the coastline population and industries along Manila Bay has significantly increased which warrants the need to verify whether the tsunami hazard in the study area is indeed low. In order to do this, a modelling study was conducted in order to determine possible tsunami heights that may result from an earthquake along the Manila Trench and a source zone in Manila Bay. The present modelling effort uses bathymetric grids generally interpolated from available digital bathymetry data and corrected from available bathymetric maps. Source parameters for representative earthquakes were inferred from available seismic data and estimated magnitudes of historical events occurring in the study region. Tsunami waveforms were numerically computed by a finite-difference computation of the linear long-wave equations.

Model runs were made for earthquakes with various magnitude sizes for the Manila Trench as well as for the 1863 Manila Bay Earthquake. Risks and vulnerability analyses could be done effectively if we could consider effects of variations of tsunami heights for different earthquakes especially in areas with existing communities and industries in the bay. In order to determine whether the configuration of the Manila Bay will have an effect on the ensuing tsunami, finer bathymetric data will be gathered and further modelling will be done to determine better tsunami heights.