

Earthquake – Tsunami Hazard Assessment and Risk Mitigation in Vietnam using GIS

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The increase of damages and losses due to earthquake and tsunami is not a contingent phenomenon, but a indispensable consequence of population explosion, high speed industrial and infrastructure development, and other social-economical activities. High seismic risk exposure is particularly focused on megacities, industrial centers located in the areas, vulnerable to earthquake impacts, or coastal zones within radius of tsunamis affection. Therefore, planning and investment for strategies on reduce and mitigation of losses and damages due to earthquake and tsunami now become an urgent issue for many countries in the World. Moreover, these strategies have to be made and implemented before the occurrence of earthquake or tsunami in order to avoid much more expenses for the response and recovery activities.

Starting from the year 2000, many researches on urban seismic risk assessment have been implemented in Vietnam. The typical seismic risk assessment problem essentially lies in the modeling of earthquake sources and development of realistic earthquake scenarios, which serves as a basis for the estimation of earthquake-related damages and losses in urban areas. A methodology suitable for Vietnam was developed and pilot tested for some megacities of Vietnam. The application of GIS technology allows developing a powerful tool for implementation of quantitatively risk evaluation procedure for an urban area and display results in terms of maps showing building damage and casualties at different levels and at different times of a day.

This presentation shows some preliminary results of using GIS to assess seismic risk and to estimate losses for urban areas of three biggest cities in Vietnam, namely Hanoi, Ho Chi Minh City and Nha Trang. The obtained results show a realistic picture of damage and loss that may result from future earthquakes/tsunamis at urban scale. It then discusses on the needs of using high-performance computing facility to develop a database of pre-calculated earthquake/tsunami scenarios for warning purpose in Vietnam.

The estimates of damage and human impacts due to earthquakes and tsunamis can help the decision-makers at local, regional and national levels in:

1. Mitigating the possible consequences of earthquakes;
2. Anticipating the possible nature and scope of the emergency response needed to cope with an earthquake/tsunami-related disaster, and
3. Developing plans for recovery and reconstruction following such a disaster.