Geophysical Research Abstracts
Vol. 16, EGU2014-7177-1, 2014
EGU General Assembly 2014

A comparison of socio-economic loss analysis from the 2013 Haiyan Typhoon and Bohol Earthquake events in the Philippines in near real-time

James Daniell (1), Bernhard Mühr (2), Tina Kunz-Plapp (1), Susan A. Brink (1), Michael Kunz (2), Bijan Khazai (1), and Friedemann Wenzel (1)

(1) Geophysical Insititute, Center for Disaster Management and Risk Reduction Technology, Karlsruhe Institute of Technology, Karlsruhe, Germany, (2) Institute for Meteorology and Climate Research, Center for Disaster Management and Risk Reduction Technology, Karlsruhe Institute of Technology, Karlsruhe, Germany

In the aftermath of a disaster, the extent of the socioeconomic loss (fatalities, homelessness and economic losses) is often not known and it may take days before a reasonable estimate is known. Using the technique of socio-economic fragility functions developed (Daniell, 2014) using a regression of socio-economic indicators through time against historical empirical loss vs. intensity data, a first estimate can be established. With more information from the region as the disaster unfolds, a more detailed estimate can be provided via a calibration of the initial loss estimate parameters.

In 2013, two main disasters hit the Philippines; the Bohol earthquake in October and the Haiyan typhoon in November. Although both disasters were contrasting and hit different regions, the same generalised methodology was used for initial rapid estimates and then the updating of the disaster loss estimate through time.
The CEDIM Forensic Disaster Analysis Group of KIT and GFZ produced 6 reports for Bohol and 2 reports for Haiyan detailing various aspects of the disasters from the losses to building damage, the socioeconomic profile and also the social networking and disaster response. This study focusses on the loss analysis undertaken.

The following technique was used:-
1. A regression of historical earthquake and typhoon losses for the Philippines was examined using the CATDAT Damaging Earthquakes Database, and various Philippines databases respectively.
2. The historical intensity impact of the examined events were placed in a GIS environment in order to allow correlation with the population and capital stock database from 1900-2013 to create a loss function. The modified human development index from 1900-2013 was also used to also calibrate events through time.
3. The earthquake intensity and the wind speed intensity was used from the 2013 events as well as the 2013 capital stock and population in order to calculate the number of fatalities (except in Haiyan), homeless and economic losses.
4. After the initial estimate, damage patterns were examined and the loss estimates calibrated.

The economic loss estimates of $9.5 billion USD capital stock and $4.1 billion USD GDP costs and the estimate of 2.1 million long term homeless from the Typhoon Haiyan event from the initial model proved very accurate with around the same values coming from reports around a month after the event.
For the Bohol earthquake, the economic loss estimate was reasonable (around $100 million USD), however, the number of fatalities was slightly underestimated given the intensity field being underestimated and due to the number of landslide and other deaths (heart attacks etc.) in the first day. As the damage estimates were reported on post-disaster over the next days, the fatality function was calibrated and produced results closer to 200 deaths.

Such parsimonious modelling in the aftermath of a disaster and socioeconomic profiling of the disaster area can prove useful to relief agencies and governments as well as those on the ground giving a first estimate of the extent of the damage and the models will as such continue to be developed in the course of FDA.

Daniell J.E. (2014) The development of socio-economic fragility functions for use in worldwide rapid earthquake loss estimation procedures, Ph.D. Thesis (in publishing), Karlsruhe Institute of Technology, Karlsruhe, Germany.