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Revealing the underlying drivers of disaster risk: a global analysis

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Disasters events are perfect examples of compound events. Disaster risk lies at the intersection of several independent components such as hazard, exposure and vulnerability. Understanding the weight of each component requires extensive standardisation. Here, I show how footprints of past disastrous events were generated using GIS modelling techniques and used for extracting population and economic exposures based on distribution models. Using past event losses, it was possible to identify and quantify a wide range of socio-politico-economic drivers associated with human vulnerability. The analysis was applied to about nine thousand individual past disastrous events covering earthquakes, floods and tropical cyclones. Using a multiple regression analysis on these individual events it was possible to quantify each risk component and assess how vulnerability is influenced by various hazard intensities. The results show that hazard intensity, exposure, poverty, governance as well as other underlying factors (e.g. remoteness) can explain the magnitude of past disasters. Analysis was also performed to highlight the role of future trends in population and climate change and how this may impacts exposure to tropical cyclones in the future. GIS models combined with statistical multiple regression analysis provided a powerful methodology to identify, quantify and model disaster risk taking into account its various components. The same methodology can be applied to various types of risk at local to global scale. This method was applied and developed for the Global Risk Analysis of the Global Assessment Report on Disaster Risk Reduction (GAR). It was first applied on mortality risk in GAR 2009 and GAR 2011. New models ranging from global assets exposure and global flood hazard models were also recently developed to improve the resolution of the risk analysis and applied through CAPRA software to provide probabilistic economic risk assessments such as Average Annual Losses (AAL) and Probable Maximum Losses (PML) in GAR 2013 and GAR 2015. In parallel similar methodologies were developed to highlitght the role of ecosystems for Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). New developments may include slow hazards (such as e.g. soil degradation and droughts), natech hazards (by intersecting with georeferenced critical infrastructures) The various global hazard, exposure and risk models can be visualized and download through the PREVIEW Global Risk Data Platform.