



## **Toward near real-time flood impact estimation in developing countries: damage index definition**

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According to a report published in 2018 (Centre for Research on the Epidemiology of Disasters - CRED - and United Nations Office for Disaster Risk Reduction - UNISDR -), extreme events due to natural hazards between 1998 and 2017 caused a toll of 5.7 billion affected people and US\$ 2,908 billion total direct economic losses. More than 90% of the reported events was due to extreme weather hazards. In this scenario, the development of ex-ante financial mechanisms aimed at mitigating the economic impact of such events, can contribute to strengthen economic and fiscal resilience, especially in developing countries. One of the most effective financial instruments is represented by the so-called Insurance-Linked Securities (ILS), such as catastrophe bonds, which complement traditional insurance or reinsurance coverage. This type of bonds can be triggered through specific event parameters, which are typically referred to as parametric triggers. Parametric insurance represents a solution to provide faster response and recovery than indemnity coverage and the most recent developments in this type of products employ modelled loss indexes to trigger a cat bond. This study addresses the use of catastrophe risk models, namely Near Real-Time Loss Estimation (NRTLE) models, as a basis for the development of innovative parametric insurance schemes. NRTLE models utilize a Damage Index (DI), to compute the payments that have to be issued if an extreme event is detected. A new methodology to compute such an index for flood events in the Philippines is introduced by this study, employing CMORPH (CPC MORPHing technique) satellite precipitation estimates, historic loss data from the EM-DAT International Disaster Loss database, and exposure information (in terms of Occupied Housing Units – OHUs) provided by national censuses issued by the Philippine Statistics Authority (PSA). Risk model components (hazard, exposure and vulnerability) employed to generate the above-mentioned index are first described. Then, a vulnerability curve relating satellite precipitation estimates with affected OHUs (i.e. DI) is proposed and subsequently calibrated. An “as if” analysis is performed to measure the impact of historical hydro-meteorological events on the current exposure. Finally, an illustrative example of a potential parametric insurance coverage based upon the designed DI is illustrated.