

Título: Selection of local case studies with fully probabilistic hazard and risk assessments

Ficha No. 15

**RESUMEN**

For the Global Risk Assessment of the UNISDR's Global Assessment Report on Disaster Risk Reduction 2015 (GAR15), a coarse grain fully probabilistic risk assessment has been conducted at country level, obtaining in this version the full loss exceedance curve (LEC) from where relevant risk metrics such as the average annual loss (AAL) and probable maximum loss (PML), among others, can be derived. What is also important to highlight, is that following the exact same arithmetic, physical risk can be also assessed at higher resolution levels such as sub-national level using a proxy exposure database and even at city level using detailed building by building information. The selection of the resolution level lies, besides the available information, on if the question that is to be answered requires a detailed approach (e.g. for insurance, cost-benefit of retrofitting and land-use planning).

Since physical risk is being calculated as the convolution of the hazard and vulnerability the selection of a higher resolution level may have influence in the way the exposure and in some cases the hazard are modelled. That may imply an abrupt change in scope, approach and resources associated to the risk assessment, especially in countries and regions where there is little information.

By increasing the resolution level, it is also possible to consider other hazards such as floods and landslides that have a more relative punctual affection whilst also allowing considering more details that are relevant such as the site effects (due to the dynamic soil response) in the seismic hazard and risk analysis.

This background paper presents a selection of fully probabilistic hazard and risk assessments conducted at local (city) level where the same methodology and model used for the GAR13 and GAR15 have been followed; that is, hazard is represented through a set of stochastic scenarios and physical vulnerability is quantified by means of probabilistic vulnerability functions. Even more, all the cases have been calculated using the CAPRA Platform (Cardona et al. 2010; 2012) the same used



AUTOR / ES	International Centre for Numerical Methods in Engineering, INGENIAR Ltda
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PALABRAS CLAVE	Probabilistic hazard assessment, probabilistic risk assessment, Medellín, Bogotá

**COMPONENTES DE LA EVALUACIÓN**

<b>AMENAZA</b>	<ol style="list-style-type: none"> <li>1. Tipo de amenaza: Sismo</li> <li>2. Métricas de intensidad: Peak Ground Acceleration (PGA)</li> <li>3. Escala/resolución: Subnacional</li> <li>4. Resultados: Mapas de amenaza integrada</li> <li>5. Localización: Colombia; Medellín, Manizales, Bogotá</li> <li>6. Metodología: CRISIS 2007 (Ordaz et al. 2007), Modelo de amenaza nacional (AIS, 2010), Microzonificación sísmica Bogotá (CEDERI, 2006)</li> <li>7. Períodos de retorno (años): 475 años</li> </ol>
<b>VULNERABILIDAD</b>	<ol style="list-style-type: none"> <li>1. Tipo de vulnerabilidad: física, humana</li> <li>2. Metodología: CAPRA - Módulo de vulnerabilidad</li> <li>3. Tipología estructural: Adobe, madera, mampostería confinada / reforzada / no reforzada, pórticos de concreto, pórticos en acero</li> <li>4. Representación: Función de vulnerabilidad; Deriva máxima vs. Valor esperado de la pérdida / PGA vs. Valor esperado de la pérdida</li> </ol>
<b>EXPOSICIÓN</b>	<ol style="list-style-type: none"> <li>1. Tipo exposición: Edificaciones</li> <li>2. Portafolios: Comercial, residencial, institucional, industrial, población</li> <li>5. Localización: Medellín, Bogotá, Manizales</li> <li>4. Valor de reposición total: -</li> <li>5. Área expuesta (m2): -</li> </ol>
<b>RESULTADOS DE RIESGO</b>	<ol style="list-style-type: none"> <li>1. Modelo utilizado: Comprehensive Approach for Probabilistic Risk Assessment (CAPRA)</li> <li>2. Métricas de riesgo: Pérdida Anual Esperada (PAE), Pérdida Máxima Probable (PML)</li> <li>3. PAE: 4.1 % Medellín / 2.51 % Bogotá / 2.408 % Manizales</li> <li>4. PML: 50, 100, 250, 500, 1000 años de TR</li> <li>5. Representación del riesgo: Curva de excedencia de pérdidas. Mapas de riesgo; pérdida anual esperada relativa</li> </ol>