



Comparative spatial risk assessment of flood and earthquake risk: based on expected annual damages, which adaptation measures should prevail?

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Traditionally, building adaptation measures are aimed at a single risk. However, in many countries the building stock faces the threat of multiple risks. Building-level adaptation measures which aim to decrease earthquake vulnerability can have opposing or conflicting effects on flood vulnerability, and vice versa. For example, building on stilts is an often-used measure to decrease a building's flood vulnerability level, however it simultaneously increases a building's earthquake vulnerability.

In this study, we assess the risk of floods and earthquakes in terms of expected annual damage for the same geographical area using building materials rather than land-use classes applied to country-level and local-level analyses in Afghanistan; Nicaragua; and Australia. Moreover, we explore the effect of certain adaptation measures on both risks, illustrating to what degree a risk reduction of one hazard may actually be offset by an increase of the other hazard in certain conditions; ultimately showing which type of measure is worthwhile in which area. This allows policy makers to spatially differentiate building codes and other building-level adaptation measures to address the most prevalent risk while not compromising the risk of other hazard types.