

## ***Interactive comment on “Review Article: A Comparison of Flood and Earthquake Vulnerability Assessment Indicators” by Marleen C. de Ruiter et al.***

### **Anonymous Referee #1**

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The review of vulnerability indicators in this paper is competent. The novelty of the contribution lies in the attempt to compare approaches for earthquakes and floods, and to see what lessons can be transferred from one to the other. This is quite valuable and moderately innovative, and the paper is generally well written, with a few minor lapses.

I tend to disagree with the fundamental basis of the approach adopted in this paper, in which vulnerability is broken down into sectors - physical, social, psychological, environmental, technical, environmental, etc. - and then recombined. I believe this is inefficient and it glosses over processes that involve several of the sectors at once. A better way to classify vulnerability is based on process (Alexander 1997, p. 292). For example, vulnerability can be seen in relation to the approach taken to manage it, or in

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relation to factors that enhance it such as corruption, organised crime and technofixes. Another factor that is increasingly important is the cascading disaster. The principal vulnerability may lie at the escalation point, not in relation to the triggering event (Pescaroli and Alexander 2016). With the increasing complexity and interconnectedness of society, cascading disasters are going to become very important indeed.

As this is a review paper, the authors might consider examining a few references that have been left out (Cardona and Carreño 2011, Holand 2015, Kappes et al. 2011). Without wishing to suggest huge extensions, I feel uneasy about the lack of reference to the parallel development of resilience indicators. This is now a favourite topic of authors in the DRR field and, of course, it reflects the 'other side of the coin' with respect to vulnerability indicators.

Specific points:-

Lines 13-14: "Next, a selection of index- and curve based vulnerability models that use these indicators have been described" - has been described

Lines 29-47: There is confusion between hazard and vulnerability here. The wording needs to be sorted out. The authors should refer here to some of the work of Roger Pielke Jr on assessing trends in hazard and vulnerability.

Line 50: vulnerability curves, conceptualised in engineering as fragility curves

Lines 115-120: Indicators for cascading disasters and their escalation points are needed. Line 131: "The vulnerability of both infrastructure and buildings are influenced" - is influenced.

References

Alexander, D.E. 1997. The study of natural disasters, 1977-97: some reflections on a changing field of knowledge. *Disasters* 21(4): 284-305.

Cardona, O.D. and M.L. Carreño 2011. Updating the indicators of disaster risk and risk

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management for the Americas. *Journal of Integrated Disaster Risk Management* 1(1): 1-21.

Holand, I.S. 2015. Lifeline issue in social vulnerability indexing: a review of indicators and discussion of indicator application. *Natural Hazards Review* 16(3): 1-12.

Kappes, M.S., M. Papathoma-Köhle and M. Keiler 2011. Assessing physical vulnerability for multi-hazards using an indicator-based methodology. *Applied Geography* 32(2): 577-590.

Pescaroli, G. and D. Alexander 2016. Critical infrastructure, panarchies and the vulnerability paths of cascading disasters. *Natural Hazards* 82(1): 175-192.

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