

## ***Interactive comment on “Development and testing of a community flood resilience measurement tool” by A. Keating et al.***

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The authors would like to thank the reviewer for their thoughtful and useful comments on our paper. Below we outline how we could address specific points raised by the reviewers in a revised manuscript.

‘provide a more detail what is the aim/objective of the paper’ We will provide a paragraph outlining the objective and audience of the paper in the introduction.

‘Please provide a more detail theoretical overview of the resilience term (especially referring to natural hazards, such as Zhou, H., Wang, J., Wan, J. & Jia H, 2010. Resilience to natural hazards: a geographic perspective. *Natura Hazards*, Volume 53, pp. 21-41. Menoni, S. et al., 2012. Assessing multifaceted vulnerability and resilience in order to design risk-mitigation strategies. *Natural Hazards*, 64(3), pp. 2057-2082.

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McDaniels, T. et al., 2008. Fostering resilience to extreme events within infrastructure systems: Characterizing decision contexts for mitigation and adaptation. *Global Environmental Change*, Volume 18, pp. 310-318. Susceptibility versus resilience to mountain hazards in Austria-paradigms of vulnerability revisited. *Natural Hazards and Earth System Sciences*, Volume 9, pp. 337-352. Adger, W. N. et al., 2005. Social-ecological resilience to coastal disasters. *Science*, 309(5757), pp. 1036-1039. And many more)' We will outline, in the introduction, the rise of the use of resilience in the disasters field, an overview of contemporary theoretical and conceptual debates, and key definitions in the field. We will highlight literature (including that suggested by reviewer #1) which provides a more comprehensive review, which due to space constraints is outside the scope of this paper.

'as well as how you define resilience within your paper, which is at the moment missing' This is currently outlined in the introduction to section 3, however we will move it to the introduction. In the introduction, in conjunction with the point above, we will outline how resilience is conceptualized for the purposes of the measurement framework presented in the paper, and the theoretical underpinnings of that conceptualization.

'Introduction: somehow what means Sendai for the society is missing, see for example Zimmermann & Keiler (2015): International Frameworks for Disaster Risk Reduction: Useful Guidance for Sustainable Mountain Development? *Mountain Research and Development*, 35, 195- 202' We will review the suggested paper and highlight the practical implications of the Sendai Framework for building disaster resilience, in particular relating to integration with other sectors.

'Chapter 2 as well as section 3.2 line 12: I would suggest to provide (maybe as an appendix) an overview table with the main references, how they develop/use resilience indicators, how many indicators, advantages/disadvantages of each resilience indicator.' Due to space constraints we are unable to provide such a full review of resilience indicators in this paper. The purpose of this paper (which we will more clearly articulate thanks to your suggestion) is to present our framework and tool. Several other authors

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have conducted reviews of available resilience indicators, and we point the reader to these in our paper (section 2). Several of these reviews include tables like the one you suggest – we will more emphatically point the reader to these for an overview.

'Chapter 3: I would like more explanation about the used methodologies; please, provide a more detail information on the aspect of focus groups and household surveys, such as number of asked people or how it was applied. How did each data source contribute to it? Is it possible to add more to the 'results' so as to directly relate it to the methods used? Further, please provide a more critical reflection in the used method and how you used/integrated all different methodological styles within your paper.' Chapter 3 is the methods section, entitled 'Development of the measurement framework', it describes the process the authors went through to design, test, review and refine the measurement framework. The use of focus groups and household surveys in the development of the framework was in the pilot testing phase; they were not focus groups or household surveys on resilience measurement, they were used in the application of the pilot version of the framework. Perhaps Reviewer#1 is referring to section 4.3 which describes how data to inform grading is collected by assessment teams? If this is the case, we can provide more detail on data collection including guidance provided on household survey size, and a discussion of the strengths and weaknesses of each data collection type. In section 4.4. Grading and weighting, we will also more explicitly describe how raw data is used by assessors to conduct grading. However, in terms of the size of focus group and household surveys, this detail will come in another paper when we report on the actual use and results of the tool.

'Section 4.1.1: why you choose these five capitals instead of Kuhlicke et al. (2011) six capacities (Kuhlicke et al. (2011): Perspectives on social capacity building for natural hazards: outlining an emerging field of research and practice in Europe. Environmental Science & Policy).' As outlined in section 3.1, the 5 capitals of the Sustainable Livelihoods Framework are an underlying framework of the tool, which was chosen because of it is familiar and salient amongst NGO staff. However, the current testing phase has

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indicated that a 6th capital – political capital – would be worth including – we will highlight this in the conclusion as an early lesson from the current implementation phase.

'please provide a more critical reflection on each capacity in terms of social inclusion/exclusion – who gains/who losses (see for example: Thaler & Levin-Keitel (2016): Multi-level stakeholder engagement in flood risk managementâ€”A question of roles and power: Lessons from England. Environmental Science & Policy and/or Thaler & Priest (2014): Partnership funding in flood risk management: New localism debate and policy in England. Area) Sections 4.3+4.4.' As described in section 3.2, the issue of inclusion was flagged at the peer review workshop, and the social capital group was expanded to include further institutional and political dimensions which pertain specifically to social inclusion. We also stress in section 4.5 that the application of our measurement tool should in no way replace other analysis, in particular vulnerability analysis. Early feedback from the current testing phase has indicated that this is an area where the tool could be further improved, and we will include this in section 6 – conclusion and way forward.

'I would suggest to move this section (4.1.1) within chapter 3' Indeed presenting a complex and multidimensional framework in the format of a scientific article has been a challenge. There are many ways in which it can be done. We would hesitate to move section 4.1.1 on the 5 capitals to section 3, which describes the development of the tool, because we do not wish to emphasize the 5 capitals above the other lens (4Rs, DRM cycle etc.) any more than it is already emphasized.

'Section 4.4, line 20: why you choose the weighting with 20%.' Each group of sources is weighted equally, so when viewing the sources through the lens of the 5 capitals, each capital is given a weight of 20%. We will more clearly explain this in section 4.4.

'There is currently no heading labelled 'discussion' and I suspect that most of what is currently in 'Results' more properly belongs in a discussion.' The traditional paper sections do not align neatly to the work we are presenting here. For the ease of the

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reader, in the interests of brevity and keeping related concepts together, we decided to dispense with the 'Discussion' section; this is not an uncommon practice. Section 4 (the 'results' section) is dominated by a description of the tool, only section 4.5 could be more properly called discussion. We could potentially move this to its own section following section 5.

'However, what is missing: how your paper fits in the actual literature, theoretical implication as well as critical reflection on your results is partly missing.' Resilience measurement is a fairly new field: as described in the paper, only a handful of measurement frameworks have actually been applied in multiple sites, and results from the field are only beginning to come out. As foreshadowed in the introduction and review, and brought out explicitly in section 6, the key contribution of this framework and tool is the systematic collection of pre- and post-flood information in a standardized way, which is building an unprecedented database which will contribute to the much elusive empirical evidence on resilience. The purpose of this paper is to present the tool, and to allow others to learn from our design and testing experience; throughout the paper we provide critical reflections on our own process and the resulting framework.

'Appendix B: also here, please provide a more further description/explanations about your used variables is needed.' If the editor considers it necessary we can provide a definition of each of the 88 sources.

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