

Interactive comment on “A multi-scale approach to cost/benefit analyses of landslide prevention vs. post-event actions” by G. Salbego et al.

Anonymous Referee #1

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The authors ask a very relevant question: What's the economic benefit of prevention measures versus post-event remedial measures in the case of landslides in the province of Vicenza (Italy)? Their answer is that 30% of the remediation costs could have been saved with prevention measures.

The rationale behind this conclusion is (if I understand correctly) that a) the necessary prevention measures would have been possible to assess [based on a susceptibility map], and b) these measures plus maintenance of the measures would have been 30% cheaper than the effective remediation costs. Is this rationale valid? I would like to challenge that with the following arguments:

a) State-of-the-art maps (models) of landslide susceptibility based on multiple-

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regression or other statistical analysis of topographic and geomorphological factors can capture the “big picture” of landslide occurrence at the regional scale. But such models have only limited skill to predict the exact location of individual landslides. (see e.g. Von Ruette et al., 2011, *Geomorphology*, 133: 11-22). So I really doubt that one can claim that the location of the Carrè landslide (discussed in this manuscript) was foreseeable with the susceptibility model of chapter 3.

b) Figure 4 shows several areas of very high probability of either translational-rotational slides or earth flows (estimated to cover approximately 4 to 8 km²). So what should the responsible people of the municipality do? Should they drain all these slopes with ditches? What would such a prevention measure cost? Probably much more than the remediation costs of a few single landslides.

c) The cost-benefit calculation assumes a return-period of 20 years for the Carrè landslide. Well, I can believe that it makes sense to take stabilizing measures (e.g. drainage or bio-engineering) at locations where landslides have been observed every 20 year. (By the way, to this end you don't necessarily need a susceptibility map but rather an inventory of passed landslides.) But, assuming there is no record of passed landslides, how reliable can a return period of such landslides be assessed based on modelling?

There are many things that I don't fully understand in this manuscript. In particular, the methodology behind the susceptibility map (chapter 3) and the use of the finite-difference software (chapter 4). A lot of information is missing, e.g. the FRI was calculated from different classes of different factors (listed in Table 1). What classes? How many? How were these classes selected? Or another crucial missing information was: how large was the drainage trench that would have stabilized the Carrè slope? This lack of details with respect to the used methodology and the case study leaves me with the uneasy feeling that it's very hard for me to judge the value and correctness of this manuscript.

In addition, the structure of the present manuscript is unusual for a scientific paper. In

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this case, I believe that a more traditional structure with a detailed description of the methodologies, followed by the results and finally with a discussion, would have been more suited for the reader to understand.

Specific comments:

- The introduction deals for the most part with damage costs of natural hazards, but nothing about costs of preventive measures. And nothing about landslide susceptibility mapping or geomechanical modelling, which are the methods used in this paper. So I think that the introduction is not addressing the relevant issues of this paper, but only give a kind of justification for the relevance of the topic.
- The spatial scale of the susceptibility map derived in chapter 3 is actually much larger than the analysis of the Carre landslide. So the titles of chapters 3 and 4 are misleading.
- The costs for the detailed assessment of susceptibility and slope stability are missing in the cost-benefit analysis. However, these costs are not negligible if the authorities need very reliable information to take the correct preventive measures.

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