

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1  
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## Comment on nhess-2021-409

Anonymous Referee #1

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Referee comment on "Rapid landslide risk zoning toward multi-slope units of the Neikuihui tribe for preliminary disaster management" by Chih-Chung Chung and Zih-Yi Li, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-409-RC1>, 2022

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### General comments

The manuscript describes a rapid landslide risk zoning approach targeted at supporting preliminary disaster management in Taiwan. Overall, this is clearly an application-oriented work, and scientific novelty is somewhat limited. However, since the geological disasters do occur quite frequently in this area, entailing that also case-study-type studies aiming at effective disaster management is of importance, I think that this topic is generally suitable to be published in NHES.

Please find some specific and technical comments below.

### Specific comments

- In general, I would term this indicator-based approach as a semi-quantitative method rather than a fully quantitative one throughout the manuscript. Indicators and weights are not set on a fully quantitative basis, but rather by using expert knowledge. Susceptibility models based on statistical learning or vulnerability curves based on exact measurements of damage and process intensity would be fully quantitative. Many concepts used here imply equal weights or nearly linear relationships on ordinal scales (e.g. "low - medium - high"). This is not a criticism of the method per se,
- *Abstract*: The information about the "No.11 slope unit" is too specific to be mentioned in the abstract without further context. This particular slope unit will be unknown to a vast majority of readers.
- *Figure 2*: It would be helpful to include the variable displayed in each facet, e.g. in the legend for quicker understanding.
- l. 120: "Among the processes of delimited slope units, grid-cells units and slope units are commonly adapted (Reichenbach et al., 2018)." Personally, I find the beginning of this section to be a bit sudden. The concept of slope units should be briefly described here, including methods for delineating them. This would aid the reader, especially those who are not familiar with the concept.
- Table 1 mixes two types of information. Suggest to separate the lower part of the table

to keep the datasets tidy; otherwise it might be confusing why "Classification" would correspond to 10~14; "Occurrence index" would correspond to 7~9, and "Grades" would correspond to "4~6". This is obviously not meant here.

- The same applies to Table 2, Table 4 and Table 5.
- *3.2.1 Susceptibility analysis*: The exact method used is unclear to me. l. 160 describes that "Susceptibility of the landslide was evaluated by weighting factors of the slope degree and distance of river channel, lithology, and dip slope", which might indicate some sort of (logistic?) regression model. However, this assumption somewhat contradicted by Table 1, which looks more like an indicator-based approach (which would be more in line with the rest of the described approach)? Please clarify.
- l. 191: "Among the elements of Risk zoning, an exposed object is significant." Please clarify/rephrase this sentence.
- *3.4 Vulnerability analysis*: "Vulnerability analysis in this study initially represents the degree of damage of the exposed object by considering the relative position from the landslide, runout, and deposition area. The closer the distance, the greater the damage and the higher vulnerability." I think that the assumption that vulnerability (denoted as damage in this context) depends on the distance to the landslide is too simplistic. Many factors do determine physical vulnerability (c.f. <https://doi.org/10.1016/j.jhydrol.2022.127501>), and even deposition height might not be a fully adequate indicator of physical vulnerability, let alone distance. While I understand why this was done due to practical reasons (lack of better information), I think this should be openly discussed as a limitation.
- *Figure 12*: I suggest to use a "prettier" functional relationship between the two y-axis, e.g.  $y_2 = 10 \cdot y_1$  (i.e. scale for total accumulated rainfall is [0, 500]). Otherwise, the horizontal lines are off, and the labels for "Total accumulated rainfall" are floating around without corresponding horizontal grid line.
- *Discussion*: I think that the pros and cons of using an indicator-based approach like this one could be discussed in more detail, including the setup of the single elements (tables).
- *Discussion*: Validation is performed basically with one event on Slope No. 11 during a Typhoon event. This is ok, but  $n=1$  is more anecdotal evidence rather than a convincing sample size for accurate validation of the approach. Some sort of goodness-of-fit metric would be good. Since this can probably not be achieved within the scope of this study, accuracy could be discussed based on plausibility and local expert knowledge, and validation procedures could be outlined.
- *Data availability*: Please consider depositing the data to a more persistent repository, e.g. the PANGAEA data repository or zenodo.

#### **Technical corrections:**

- Figure 2 / Figure 8: "Slpoe" (probably incorrect layer name)