This is a review of "**Between global risk reduction goals, scientific-technical capabilities and local realities: a novel modular approach for multi-risk assessment**" NHESS-2023-142 by Schoepfer et al.

I thank the authors for their very interesting manuscript on framing multi-risk assessments in the context of a case study in Peru.

I believe that this paper will be an excellent addition to the growing literature on multi-risk assessment, as long as it does not overstate what has been proposed and done, recognises the inherent biases and limitations involved with any such analysis, and considers a bit more strongly the pracitioner stakeholder who might use the methodology proposed (or parts of it).

Below are a series of comments, in no particular order of importance. Although some are slightly critical (the nature of doing a review), most are aimed at making the manuscript more useable and useful by practitioner stakeholders and others who might want to take your learnings and apply them to another region.

1. Title.
    a. The paper is much more about your **case study in Peru, so I would expect that to be in the title**.
    b. You use the word '**novel'**. Is this really novel? All the elements have been done previously. I believe the approach and paper are well worth while, just be careful about overstating the originality of what you are doing.
2. Abstract. **This is a bit high level and more a motivation rather than an actual (with metrics such as 'how many' and 'of what') summary of the paper.** I suggest you rethink a bit the abstract, and consider more how it is really a summary of the paper.
3. Introduction.
    a. The introduction does a nice job of bringing in some of the literature, but **I believe there are other major papers** out there that have put into context multi-hazards, multi-risk and multi-impact in the context of natural hazards. Please do a relatively rapid review to ensure you have captured the majority of papers out there that have put into context multi-hazard/risk/impact.
    b. **I did not find it easy to read the introduction due to all the definitions and quotes**. Perhaps consider for the definitions using tables or bullet points so that it is not huge chunks of text with lots and lots of quotes. I've seen half a dozen 'reviews' of the past literature on multi-hazards and multi-risk, and the most useful ones I have seen (from a practical perspective) are those that have tables, figures with timelines, ideas broken out into bullet points, etc. I understand that you do not want to do a complete review of the literature—that is fine, but perhaps one or two table with your key quotes to reduce the text? For example, much of Section 1.3 could be supplemented by a table. Many of the quotes in Section 1.1 could be in a table and then referred to. The studies given in 1.2 would be ideally put in a table, with a few headers to pull out salient parts of the studies, and then discussed in the text.
4. Conceptual Approach.
    a. This is broadly fine, within the limitations of what is presented and has a couple of nice summary figures, but I give a few comments below
    b. **General: Use of the word and approach to vulnerability**. A key part of risk, as you acknowledge, is vulnerability. The word vulnerability comes up 14 times in the manuscript (many of these are part of direct quotes), which is appropriate, but at no place do you define vulnerability (although do mention once physical vs. social vulnerability). For me, a key part of multi-risk (vs. multi-hazard) analyses, is the incorporation of both physical and social vulnerability. I would like to see a more solid defining of vulnerability either in the intro or conceptual approach, along with strengths and limitations of including physical/social vulnerability into multi-risk assessment in terms of data, equations, etc. either when vulnerability is first mentioned or in the discussion. It was not until I got to line 536 that I felt you acknowledged that physical vulnerability only was included and not social vulnerability, and this needs to be acknowledged much earlier.

c. Again, like the intro, I found **there was a lot of text to go through in the conceptual approach**, to get to the practical 'how is this being done' parts. Might you break some of the text into bullet points or numbers, to make it easier to read? I'm thinking of the practitioner (who you have aimed part of this paper at) who wants to know what to do, how to do it, and limitations.
d. Riesgos and Riesgos 2 are mentioned on line 148 (the only place in the text) and then on the data and code availability section. This code seems essential for a practitioner to operationalize the approach suggested here in a pracitical way (and which you do a test case study with peru). **I would suggest you have 1-2 paragraphs outlining more about Riesgos Code Availability and Use (or refer the reader explicitly to the places they can read about how to use it) with text both in this section and then again in the next section (Peru Case Study)** so that they can better understand the theory going into practice, or more importantly, how would they begin to implement the learnings from this paper if they were interested.

5. Peru Case study
    a. Some **very nice figures and flowcharts**, but please **reevaluate the white text in Figure 5** (not easy to read on my PDF), and where possible **enlarge font size on figures**.
    b. Broadly I was fine on the approach taken. It does get at a number of interesting aspects of multi-risk (although not social vulnerability).
    c. Please state somewhere the **ethical procedures** you went through before working with the human participants.
    d. Be careful of **typos.** Lines 374-375. Earthquakes appears twice
    e. Use of **Tables**: This section might benefit by **an additional table summarizing the data used, their sources, key parameters, and any comments such as regarding uncertainty**.
    f. I found the user groups were interesting, but I would like to see
        i. **a much better definition of the user groups** given in Figure 2 (which I assume were then used in Peru) and
        ii. some **idea of the user group numbers involved and where they were located**—in other words, why were they representative.
        iii. I also am **not a fan of the word 'end users'** as everyone in the research community, NGOs, etc., are end users. This is why (see above) I'd like a much better defining of who was actually involved. You have a couple lines on this in in 280-282, but then when we get to Section 3 you do not refer back to this discussion, and it should be more in-depth.
        iv. In all of the reporting of the results you state things like "18% of the the users"—I assume this means that you have now put all the users together into one big group. **Remind us in a few strategic place 'how many'. So 18% of the ### users.**

6. Discussion and conclusions.
    a. I found the basic ideas in the discussion and conclusions good, but felt it was rather short and did not bring us back to the overall literature of what others have done. Please relate many of **your key points back to the existing literature**.
    b. The approach relies heavily on the **availability of detailed data** (e.g., about hazards, vulnerabilities, and exposures). In regions where such data may be lacking or outdated, the application of the methodology could be challenging. Might you be able to acknowledge **more these limitations and suggest potential solutions or workarounds**?
    c. The paper focuses on a specific case study area, and while this demonstrates the practical application of the methodology, there is **limited discussion on its scalability and adaptability to other regions** with different risk profiles and socio-economic contexts.
    d. The discussion could be strengthened by a more **explicit identification of gaps in the current approach**. This would not only highlight areas for improvement but also encourage further research in the field of multi-risk assessment.
    e. **Actionable Recommendations**: Make the recommendations actionable by providing clear, specific steps that can be taken by researchers, practitioners, or policymakers.

For instance, instead of broadly stating the need for further research, specify the types of studies or methodologies that could address existing gaps.

f. **Highlighting Implications for Policy and Practice**: Explicitly articulate the implications of your findings for disaster risk management policy and practice. This could include suggesting changes to existing frameworks or identifying new areas for policy development.

7. Overall.
    a. While the innovative methodology is a strength, its complexity could be a barrier to its widespread adoption. **The text could benefit from a more simplified explanation in places or additional step-by-step guides that could make the approach more accessible to practitioners who may not have a strong technical background**.
    b. Overall there is a high level of writing, **but tending towards VERY long paragraphs, which often could be broken up into two, or better use of bullet points**.
    c. This will most likely go through copy editing, but there are places where text could be improved. Long sentences are often used where they could be broken up into two or shortned. Some examples (there are many) include.
        - **Original Lines 19-21:** "The complex relationships between multiple and consecutive natural hazards exposed population and built environment result in a variety of cascading effects which if are often not considered appropriately by decision makers can result to inadequate or even misleading risk management strategies."
        - **Suggested Revision in two sentences:** "Complex interactions among multiple and consecutive natural hazards, the exposed population, and the built environment can lead to cascading effects. If not accurately considered, these can lead decision-makers to implement inadequate or misleading risk management strategies."
        - **Original Lines 27-29:** "Based on recent scientific and technical capabilities we developed a tool through an iterative participative approach which has allowed users to explore various scenarios of multiple hazards cascading effects and their impacts."
        - **Suggested Revision in two sentences:** "Leveraging the latest scientific and technical advancements, we developed a tool via a participatory iterative process. This tool enables users to explore various scenarios, including the cascading effects of multiple hazards and their impacts."
        - **Original**: "In addition to immediate crisis management and rapid response during and after a disaster, disaster preparedness is becoming increasingly important."
        - **Suggested Revision:** "Beyond immediate crisis management and rapid response, disaster preparedness is growing in importance."
        - **Original**: "The shift from managing disasters to managing risk is articulated in the Sendai Framework for Disaster Risk Reduction 2015-2030, which was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015."
        - **Suggested Revision:** "The transition from disaster management to risk management is emphasized in the 2015-2030 Sendai Framework for Disaster Risk Reduction, adopted at the Third UN World Conference in Sendai, Japan on 18 March 2015."
        - **Original**: "An increasing number of people worldwide are exposed to natural hazards, particularly in poorly planned urbanisations, where effective prevention and risk management can save lives and reduce all kinds of losses."
        - **Suggested Revision**: "More people globally face natural hazards, especially in poorly planned urban areas where effective prevention and risk management could save lives and minimize losses."
        - **Original**: "For instance, in the context of seismic hazard, information on the possible earthquakes that can hit a region in the future needs to be available. For that aim, existing earthquake catalogues are gathered."
        - **Suggested Revision**: "For example, in seismic hazard assessment, future earthquake risks require access to existing earthquake catalogues."
        - **Original**: "However, the design of information systems or tools that are capable of analytically exploring multi-hazard risk situations and, in particular, dynamically updating the damage on exposed elements due to various hazards with cascading effects remain challenging."
        - **Suggested Revision**: "Designing information systems or tools to dynamically analyze multi-hazard risks and dynamically update exposed element damages from cascading hazard effects presents significant challenges."